Office for National Statistics

Economic & Labour Market Review

Contents

Vol 3 No 3
March 2009 edition

Office for National Statistics

palgrave macmillan

ISBN 978-0-230-57803-6
ISSN 1751–8326 (print)
ISSN 1751–8334 (online)

A National Statistics publication

National Statistics are produced to high professional standards set out in the UK Statistics Authority's Code of Practice for Official Statistics. They are produced free from political influence.

Not all the statistics contained within this publication are national statistics because it is a compilation from various sources.

The inclusion of reports on studies by non-governmental bodies does not imply endorsement by the Office for National Statistics or any other government department of the views or opinions expressed, nor of the methodology used.

About us

The Office for National Statistics

The Office for National Statistics (ONS) is the executive office of the UK Statistics Authority, a non-ministerial department which reports directly to Parliament. ONS is the UK government's single largest statistical producer. It compiles information about the UK's society and economy which provides evidence for policy and decision-making and in the allocation of resources.

The Director of ONS is also the National Statistician.

Palgrave Macmillan

This publication first published 2008 by Palgrave Macmillan, Houndmills, Basingstoke, Hampshire RG21 6XS and 175 Fifth Avenue, New York, NY 10010, USA

Companies and representatives throughout the world.

A catalogue record for this book is available from the British Library.

Contacts

This publication

For information about this publication, contact the editorial team, 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

You can find a downloadable version of this publication at www.palgrave-journals.com/elmr

Subscriptions

Annual subscription £224, single issue £40
To subscribe, contact Palgrave Macmillan, tel: 01256 357893, www.palgrave.com/ons

Copyright and reproduction

Printing

This book is printed on paper suitable for recycling and made from fully managed and sustained forest sources. Logging, pulping and manufacturing processes are expected to conform to the environmental regulations of the country of origin.

Printed and bound in Great Britain by Latimer Trend & Company Ltd, Plymouth, Devon

Typeset by Curran Publishing Services, Norwich

In brief

Children in workless households by local authorities and counties, 2004 to 2007

Estimates for the percentage of children living in workless households in each unitary and local authority were published by the Office for National Statistics on 17 March 2009. The source for these estimates is the Annual Population Survey (APS) household datasets, which allow better quality local area household estimates.

The APS household datasets are currently available for the calendar years 2004 to 2007, with the release of 2008 data due in summer 2009.

Children in workless households at smaller geographical areas have low sample sizes and so relative standard errors accompany each estimate. Even using the APS household datasets, over half the estimates are unreliable for practical purposes. Shading shows these unreliable estimates, providing a guide to quality. The Labour Force Survey household datasets would not be robust enough to provide any reliable estimates for this specific group at the geographical area.

More information

www.statistics.gov.uk/statbase/product.asp?vlnk=15150

Contact

Katherine Kent
01633 455829
katherine.kent@ons.gsi.gov.uk

International workshop on data access

The 'Nuremberg Group' is an informal group set up in 2007 by the IAB, the research agency of the German Federal Employment Office. The aims were to review access to confidential government data for research purposes, and to build an expert network which could help to identify best practice and disseminate advice about effective management of research facilities.

In February 2009, the second Workshop on Data Access took place at the Office for National Statistics' head office in Newport, supported by the IAB and the German Social and Economic Research Council. Participants from the UK, Germany, Netherlands, Slovenia, France, Canada, the US, Japan, China and Australia reviewed developments in technology, the legal and statistical environments, and management issues across countries with a much wider range of experience. Among the highlights of the meeting were the news of developments in the French and Japanese legal systems, greatly increasing the opportunities for microdata research in two major economies.

Two main themes arose from the meeting. The first was the increasing convergence of statistical legislation in respect of research use of data. While there is still a large variation across countries, there are common themes in recent legislation across the globe, including recognition of the value of microdata research to statistical institutes. Many countries have developed, or are on the way to develop, access for researchers to microdata via research data centres or remote data access. Remote data access has expanded considerably over the last few years in different countries.

The second theme was the growing importance of metadata, particularly as a source of analysis in its own right. Even something as notionally simple as creating micro-aggregated data comparable across countries, or describing data using international standards and definitions, can be informative about both the data and the way they can be used.

The meeting closed with an agreement that the momentum gained from the first two meetings be maintained, specifically by:

- expanding the network to under-represented regions
- continuing with the conference delivery programme
- building a 'portal' website to support the network, identify current models of operation and circulate best practice ideas

The next meeting will be in Ann Arbor, Michigan, in May 2010.

Contact

Felix Ritchie
01633 455846
felix.ritchie@ons.gsi.gov.uk

Beyond GDP

There is increasing recognition that economic indicators such as GDP were never designed to be comprehensive measures of wellbeing. Complementary indicators are needed that are as clear and appealing as GDP, but more inclusive of other dimensions of progress – in particular, environmental and social aspects. In many ways, the UK sustainable development indicator set fits this bill, but there is continuing interest in measuring progress, the distribution of true wealth, and the wellbeing of nations, which the Office for National Statistics is exploring.

One source of information and discussion is 'Beyond GDP', an initiative of the European Commission, the European Parliament, The Club of Rome, the Organisation for Economic Co-operation and Development, and the World Wildlife Fund. Resources from conferences hosted by these organisations, together with other material, are available on a website whose details are given below. The website will continue to highlight the latest developments regarding the Beyond GDP initiative, such as the recent adoption of an Opinion by the European Economic and Social Committee on the issue.

DG Environment and DG Eurostat run the European Commission's Beyond GDP newsletter, to provide updates regarding the Beyond GDP initiative and related indicator developments. To join the mailing list, email contact@beyond-gdp.eu

More information

www.beyond-gdp.eu

Contact

Paul Allin
01633 455841
paul.allin@ons.gsi.gov.uk

ONS work on the knowledge economy

Over the next 18 months, the Office for National Statistics (ONS) will be working with Imperial College and the National Endowment for Science, Technology and the Arts (NESTA) to research and develop measures of the impact of knowledge and innovation on major areas of the UK economy. This set

of measurement and analysis projects is in support of NESTA's programme to assess the role of innovation in the UK economy, and to help promote policy which encourages new products, services and processes which create value.

ONS will focus its attention on the market sector, and the research will use growth accounting methods to develop an extended view of UK National Accounts in which important parts of knowledge creation such as workplace training, business process development and design are treated as investment for the future, rather than as current expenses. The new studies will build on earlier analysis with HM Treasury (Intangible investment and Britain's productivity) and with Professor Jonathan Haskel (An Innovation Index Based on Knowledge Capital Investment); details are given below.

The programme of work aims to produce initial estimates by autumn 2009, with a fully researched set of 'innovation accounts' by September 2010. Industry stakeholders will be involved at an early stage. The studies will also be supported by work with policy experts in the Department for Innovation, Universities and Skills and the Intellectual Property Office.

More information

HM Treasury Economic Working Paper No. 1
www.hm-treasury.gov.uk/d/pbr_csr07_macroeconomic333.pdf

Innovation Index Working Paper
www.innovationindex.org.uk

Contact

Tony Clayton
020 7014 2031
tony.clayton@ons.gsi.gov.uk

UPDATES

Updates to statistics on www.statistics.gov.uk

6 February

Producer prices

Factory gate inflation falls to 3.5% in January
www.statistics.gov.uk/cci/nugget.asp?id=248

Index of production

Manufacturing: 5.1% decrease in Q4 2008
www.statistics.gov.uk/cci/nugget.asp?id=198

10 February

UK trade

Deficit narrowed to £3.6 billion in December 2008
www.statistics.gov.uk/cci/nugget.asp?id=199

11 February

Average earnings

Pay growth steady in year to December 2008
www.statistics.gov.uk/cci/nugget.asp?id=10

Unemployment

Unemployment rate rises to 6.3% for three months to December 2008
www.statistics.gov.uk/cci/nugget.asp?id=12

17 February

Inflation

January: CPI down to 3.0%; RPI down to 0.1%
www.statistics.gov.uk/cci/nugget.asp?id=19

18 February

International productivity

Revised estimates for 2007
www.statistics.gov.uk/cci/nugget.asp?id=160

19 February

Public sector

January: £8.4 billion current budget surplus
www.statistics.gov.uk/cci/nugget.asp?id=206

20 February

Retail sales

Underlying growth remains steady
www.statistics.gov.uk/cci/nugget.asp?id=256

24 February

Business investment

3.9% down in Q4 2008
www.statistics.gov.uk/cci/nugget.asp?id=258

25 February

GDP growth

Economy contracts by 1.5% in Q4 2008
www.statistics.gov.uk/cci/nugget.asp?id=192

Index of services

0.9% three-monthly fall into December
www.statistics.gov.uk/cci/nugget.asp?id=558

Service prices

SPPI inflation at 2.9% in Q4 2008
www.statistics.gov.uk/cci/nugget.asp?id=253

FORTHCOMING RELEASES

Future statistical releases on www.statistics.gov.uk

3 March

Mergers and acquisitions involving UK companies – Q4 2008

4 March

Consumer credit business – January 2009

6 March

Output and employment in the construction industry – Q4 2008

Producer prices – January 2009

10 March

Index of production – January 2009

MM22: Producer prices – February 2009

11 March

MM19: Aerospace and electronics cost indices – December 2008

UK trade – January 2009

12 March

New orders in the construction industry – January 2009

16 March

Monthly review of external trade statistics – January 2009

MM17: Price Index Numbers for Current Cost Accounting – February 2009

MQ10: UK trade in goods analysed in terms of industry – Q4 2008

18 March

Digest of engineering turnover and orders – January 2009

Labour market statistics – March 2009

Public sector employment – Q4 2008

19 March

Public and private breakdown of labour disputes

Public sector finances – February 2009

20 March

Gross domestic expenditure on research and development 2007

24 March

Consumer price indices – February 2009

Public sector finances: supplementary (quarterly) data

25 March

Average weekly earnings – January 2009

26 March

Business investment revised results – Q4 2008

Internet retail sales – February 2009

Investment by insurance companies, pension funds and trusts – Q4 2008

Retail sales – February 2009

SDM28: Retail sales – February 2009

27 March

Balance of payments – Q4 2008 missing

Consumer trends – Q4 2008

Quarterly national accounts – Q4 2008

United Kingdom Economic Accounts – Q4 2008 (online version)

30 March

Focus on consumer prices – February 2009

International trade in services 2007

31 March

Consumer credit business – February 2009

Distributive and service trades – January 2009

Government deficit and debt under the Maastricht Treaty

Index of services – January 2009

Productivity – Q4 2008

1 April

Profitability of UK companies – Q4 2008

Economic review

March 2009

Graeme Chamberlin
Office for National Statistics

SUMMARY

Latest National Accounts data confirms the preliminary view published last month that the UK economy has entered recession, and that the pace of the downturn has accelerated. In the final quarter of 2008 Gross Domestic Product fell by 1.5 per cent, driven by large output declines in the manufacturing and distribution, hotels and catering industries. New data on the expenditure side of the economy shows that household consumption and fixed investment have contracted sharply, but the most significant contribution to falling demand has come from falling inventories as firms prefer to meet demand by running down stocks rather than through production. Strong and rapid pass-through from falling output to the labour market has continued, with further rises in redundancies pushing up the unemployment rate to 6.3 per cent. Consumer prices inflation remains above target at 3 per cent, but is expected to fall sharply during this year.

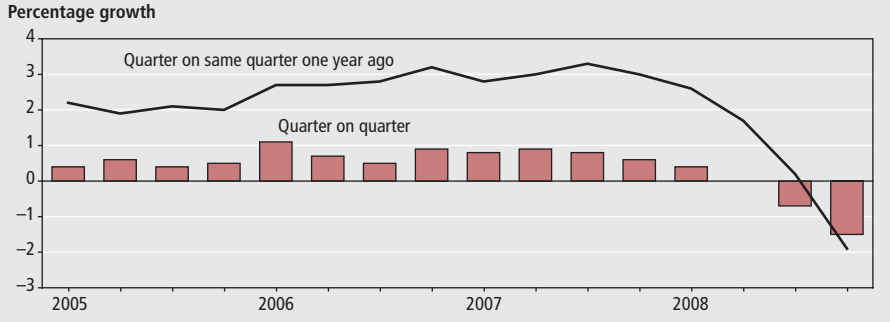
GROSS DOMESTIC PRODUCT

Latest data confirms sharp fall into recession

Preliminary estimates of economic growth released by Office for National Statistics (ONS) in January reported the UK economy contracted by 1.5 per cent in the final quarter of 2008. These figures were significant for two reasons. First, it marked two successive quarters of negative economic growth which, according to the technical definition, defines a recession. Second, the pace of the UK downturn that started in the second half of last year has accelerated sharply.

Consequently the outlook for 2009 is bleak. The Bank of England's central forecast projection worsened in their February Inflation Report, with the UK expected to be in recession throughout 2009 before recovering in 2010. HM Treasury, who tend to be relatively upbeat, predict Gross Domestic Product (GDP) to contract by 1 per cent in 2009. The average of independent and city forecasts made in the last three months points to the UK economy shrinking by 2.7 per cent this year.

Figure 1
UK economic growth



Source: ONS UK Output, Income and Expenditure

Preliminary estimates are published around 23 to 25 days after the end of the reference quarter. Timeliness though has a trade off in terms of information content. Growth estimates are only available for the output side of the economy and are based on Gross Value Added which is a proxy for GDP. Limited data availability, especially for the final month of the quarter, requires gaps to be filled with forecasts and imputations so a complete set of accounts can be presented.

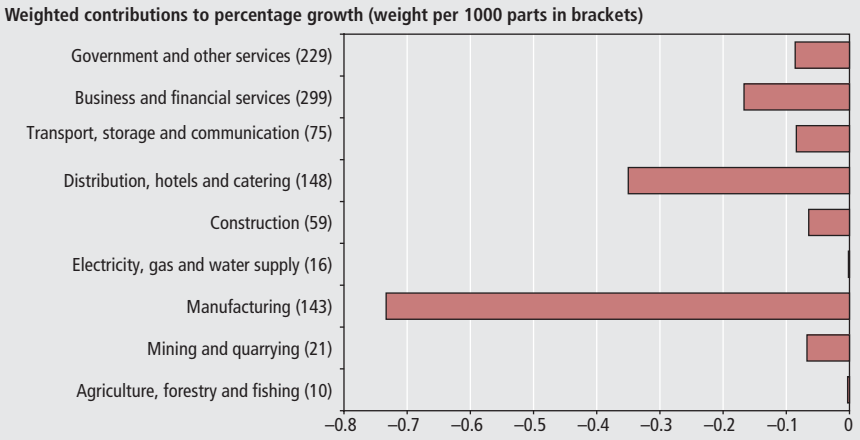
At the end of February ONS published its second estimated of Gross Domestic Product (GDP) for the fourth quarter of 2008. Not only does the data content increase but estimates for the expenditure and income measures of GDP are available for the first time. Therefore it gives an opportunity for the current recession to be viewed from both the demand and supply sides of the economy.

Latest headline GDP data is unrevised, indicating the UK economy shrank by 1.5 per cent in the final quarter of 2008 (**Figure 1**). Compared to the same quarter in 2007, GDP was 1.9 per cent lower. These data confirm the sharp fall into recession that started at the beginning of the year. In fact, as a mark of the severity of the current economic situation, the most recent data points to the largest quarterly fall in output since 1980 quarter four.

Manufacturing, distribution, hotels and catering lead the downturn

Figure 2 shows the relative contribution of each category of output to the total 1.5 per cent fall in the final quarter of 2008. The most striking observation is the contribution of the manufacturing industry which, despite only representing about 15 per cent of total output, accounted for almost half the contraction. During the fourth quarter of 2008 manufacturing output slumped by 5.1 per cent, the largest quarterly fall on record, and was 8.1 per cent lower compared to the same quarter in 2007.

Figure 2
Contributions to growth in 2008 quarter four by category of output



Source: ONS UK Output, Income and Expenditure

Clearly the current recession has bitten the manufacturing sector hard. The loss of output has already surpassed that suffered during the last UK recession in the early 1990s and is similar in magnitude to the recession of the early 1980s.

As the largest part of the economy, constituting approximately 75 per cent of total output, the services sector has traditionally been the main driver of UK economic growth. A fourth quarter fall in output of 0.9 per cent is fairly unprecedented for an economy where the service sector has generally remained robust, even in periods of downturn. Only in three instances (1979 quarter three, 1968 quarter two, and 1958 quarter two) has the UK economy experienced a greater quarterly fall in service sector output, and on each occasion, it largely represented a reversal of particularly strong growth in the quarter before. This time the contraction followed a fall of 0.5 per cent in the third quarter.

Distribution, hotels and catering recorded a second successive quarterly fall in output of 2.3 per cent and appears to be the main driver of the downturn in the services part of the economy. Business and financial services have also made a strongly negative contribution. This category accounts for almost a third of total UK output and has shrunk by 0.6 per cent in each of the last two quarters of 2008.

Construction output has now fallen for three successive quarters, registering a 1.1 per cent contraction in 2008 quarter four. As yet the downturn in this sector has been relatively mild when compared to the previous recession. However, evidence on fixed investment in dwellings and buildings and new orders in the industry suggests a much weaker outlook.

Industrial production contracts sharply

The production industries consist of mining and quarrying, manufacturing and the supply of electricity, gas and water. Output fell by 4.5 per cent in the final quarter of 2008 and, as Figure 2 shows, together they accounted for over half the total fall in output in that quarter. Trends in industrial production are usually driven by manufacturing which accounts for 80 per cent of output with the other two categories contributing about one tenth each.

The monthly Index of Production provides a breakdown of growth by main industrial groupings as presented in **Figure 3**. Clearly the impact of recession has lead to a broad-based fall in output across all parts of the industrial sector.

Manufacturing of consumer durables is a relatively tiny part of the UK economy, but in the three months to December output fell by a huge 7.4 per cent. Much of this was concentrated in the car industry where there have been a spate of extended shut downs over the Christmas period, announced cuts in production and job losses. Consumer non-durables, which are a much larger component of output, fell by 2.6 per cent in the final quarter of 2008.

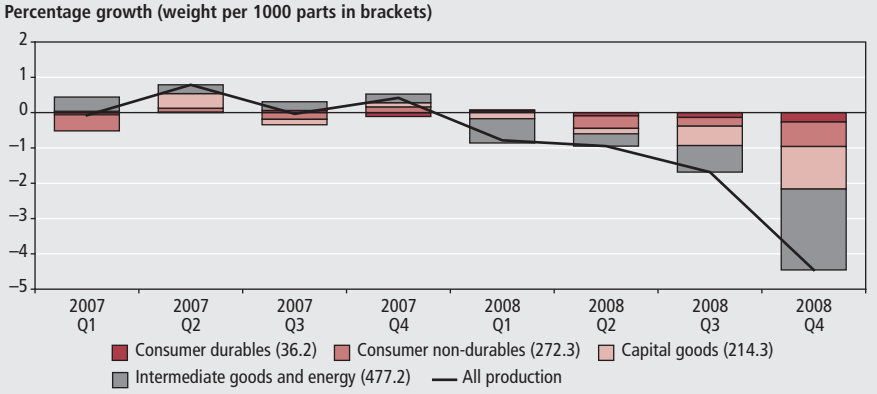
UK output of capital goods has contracted sharply, falling by 5.6 per cent in the three months to December relative to the previous three-month period. A similar picture emerges when looking at the production of energy and intermediate goods which account for almost half of total industrial output. Like capital goods, output has fallen consistently throughout 2008 culminating in a 4.8 per cent contraction in the final quarter.

These production trends are highly reflective of the domestic and global recessionary conditions. Falling capital goods production highlights the pessimistic outlook of business, and declining output of intermediate goods and energy is an indicator of the current and broad-based fall in output. The last UK recession in the early 1990s occurred at a time when the global economy was growing reasonably well so falling domestic demand was offset by a maintaining of exports. However, this recession is both local and global providing a severe collapse in output far more reminiscent of early 1980s.

Large falls in motor trades and wholesaling activity, but the retail industry grows

The monthly Index of Services provides greater detail on the output of the sector during the final quarter of 2008. In the three months to December distribution, hotels and catering recorded a 2.3 per cent fall in output, making the largest contribution to falling services

Figure 3
Industrial production by main groupings



Source ONS Index of Production

output. But, as **Figure 4** shows, there were some marked differences in the performances of the sub-components.

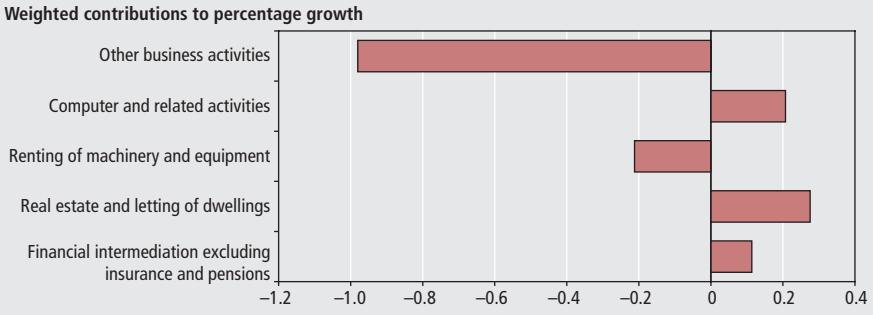
Motor trades and wholesale distribution have been particularly hard hit by the current economic downturn. After contracting by 9.6 per cent in the third quarter of 2008, motor trades output fell by a further 6.8 per cent in the fourth confirming the terrible news that has surrounded the car industry of late. Wholesaling did not fare much better, posting a 4 per cent and 5.6 per cent contraction in the third and fourth quarters respectively. Retail output though managed to buck the trend. Although output was flat in the third quarter, the industry actually grew by 0.7 per cent in the fourth.

Hotels and restaurants showed a strong contraction of 1.4 per cent in the final quarter, with the months of November and December particularly bad. Representing a predominately discretionary element of expenditure it is perhaps of little surprise that this sector has suffered as the UK economy enters recession.

Mixed news from the financial and business services sector

Financial and business services have been the engine of the UK economy for the last one and a half decades. Between 1994 and the summer of 2008 quarterly growth averaged 1.3 per cent. However, in each of the last two quarters of 2008 the sector contracted by 0.6 per cent, significant because according to 2003 weights these activities account for almost a third of UK output. Although the downturn may not appear dramatic when placed next to other parts of the economy, relative to the high growth rates that have been sustained for a long period of time, the recent data marks a profound turnaround in the fortunes of the sector. Using data published in the December 2008 Index of Services, a breakdown of the output of the financial and business services sector is presented in **Figure 5**.

Figure 5
Weighted output contributions of output in the business and financial services sector in 2008 quarter four

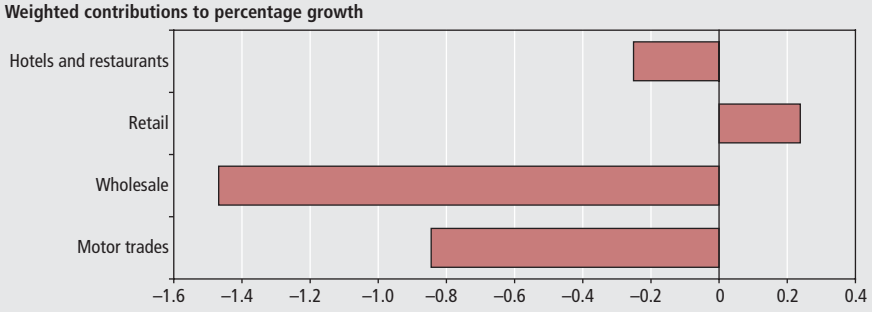


Source: ONS Index of Services

Clearly Figure 5 shows a mixed picture of growth performances in the final quarter of last year. Other business activities' category, which consists of a myriad of businesses including accountancy, legal activities, management consultancy, marketing and architecture, recorded a significant contraction of 2.8 per cent. Although only a relatively small proportion of sector output, renting of machinery and equipment also saw a rapid fall, with output sliding by 5.4 per cent. It is not surprising that these industries, being more discretionary components of business output, saw the largest contraction in line with the broad economic downturn.

On the other hand, computer and related activities, financial intermediation, and real estate and the letting of dwellings all recorded positive growth in the three months to December relative to the previous three-month period. The first of these performed especially well, growing by 2 per cent during the quarter.

Figure 4
Weighted contributions to output growth in the distribution, hotels and catering industry in 2008 quarter four



Source: ONS Index of Services

Real estate and the letting of dwellings also reported modest but still positive growth of 0.8 per cent. A significant proportion of this output though represents the implicit rental payments that owner-occupiers pay themselves for the privilege of living in their own houses, an accountancy measure designed to aid international comparisons of GDP when owner occupation rates differ by country. As such this industry, despite large swings in the property market that does have an impact on real estate activity, tends to be relatively stable over time.

Given the volatility and turmoil in financial markets it may seem surprising that the financial intermediation industry managed to grow by 0.7 per cent during the fourth quarter, but it is worth bearing two things in mind. First, output growth has slowed considerably. According to the Index of Services data, the sector expanded by an average 8.3 per cent each year between 1996 and 2007 which corresponds to an average quarterly growth rate of 2 per cent. Latest data is less than half this rate. Secondly, a significant proportion of financial intermediation output relate to Financial Services Indirectly Measured (FISIM).

Prior to the introduction of FISIM into the National Accounts final output of the financial services was underestimated, as many of the services provided by the industry did not carry an explicit fee but an implicit one based on a spread between interest rates charged on lenders and borrowers. The impact of the revision was to essentially reduce the volatility of financial sector output as FISIM output tends to be less cyclical than the corresponding Financial Services Directly Measured (FISDM). It was also reported that activity related to dealing in shares and securities had remained buoyant in the last quarter.

UK TOTAL EXPENDITURE

Output collapses as firms run down inventories

Early estimates relating to expenditure are not disaggregated into a great deal of detail, but do provide an indication of the important trends emerging from the demand side of the economy. Furthermore it offers an opportunity to reconcile the expenditures of households, firms, the government and trade with the statistics on output to, hopefully, give a coherent view of the current economic picture. **Figure 6** plots GDP growth showing the relative contributions of the main categories of expenditure.

Household consumption is the largest category of expenditure representing about one half of GDP. In the final quarter of 2008 households cut back their final consumption spending by 0.7 per cent. Although this segment only accounts for a small part of the recent downturn it is worth bearing in mind that the latest data indicates a marked reversal of the strong growth rates in recent years.

Fixed investment has been a leading indicator in the current recession, posting a signification fall in each quarter of 2008. In the final quarter fixed investment expenditures were 2.3 per cent lower than in the preceding quarter and a massive 9.7 per cent lower than the same quarter in 2007.

The most striking element of Figure 6 though is the contribution of inventories to the fourth quarter slump in GDP. Inventories are stocks of finished goods, works in progress and raw materials. Despite being a tiny part of total expenditure, large swings over the economic cycle often mean it can have a significant effect on quarterly growth rates. Firms reducing their holdings of inventories dragged GDP down by 1.3 per cent in the fourth quarter, accounting for a large proportion of the total 1.5 per cent contraction.

The fall in inventory holdings has had a significant impact on output, particularly in the manufacturing sector. Many of the business surveys conducted by organisations such as the Confederation of British Industry (CBI) and the Chartered Institute of Purchasing and Supply (CIPS) at the end of last year reported record levels of stock adequacy, with firms preferring to meet demand from existing stocks rather than production. The collapse in manufacturing output, especially in the durable and intermediate goods categories, reflects this trend of firms de-stocking as fast as they can at the expense of production.

Final consumption of the general government sector (central government, local government and public corporations) has continued to grow robustly. In the final quarter of 2008, spending increased by 1.5 per cent. Without the positive contribution of this spending category, which added approximately 0.3 per cent to total growth, the recent slump in measured GDP would have been even more profound.

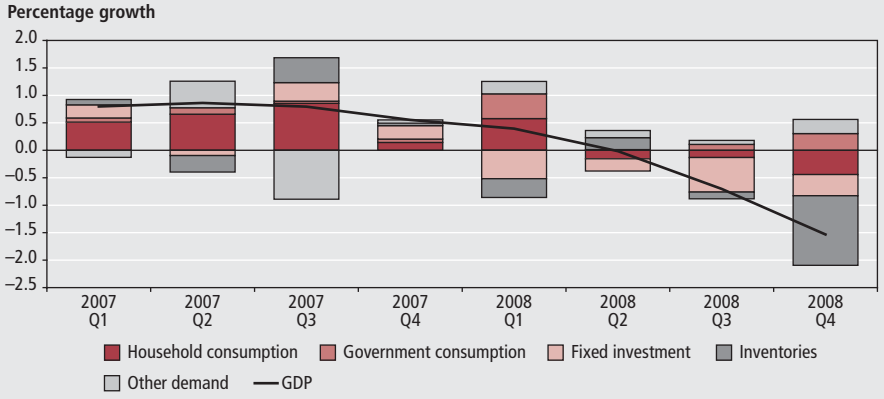
A further positive contribution to growth was made by the other category. This includes spending by non-profit institutions, acquisitions less disposals of valuables, an alignment adjustment to reconcile the output and expenditure measures of GDP, and most importantly net-trade which the difference between exports and imports. Although exports fell by 5.5 per cent in the final quarter, imports contracted at a faster rate of 5.7 per cent. Consequently the trade deficit fell to £8.8 billion compared to £9.8 billion in the previous quarter and £11.1 billion in the same quarter of 2007. Net trade therefore subtracted from total expenditure to a lesser extent than in previous quarters.

Reconciling the fall in household final consumption and the rise in retail sales

Falling household consumption stands in stark contrast to recent trends in official retail sales data (**Figure 7**). While in the final quarter total household consumption contracted by 0.7 per cent, the all items Retail Sales Index (RSI) grew by 0.8 per cent. In fact, latest data, pertaining to the three months to January 2009, shows the RSI grew even faster by 1.5 per cent relative to the previous three month period.

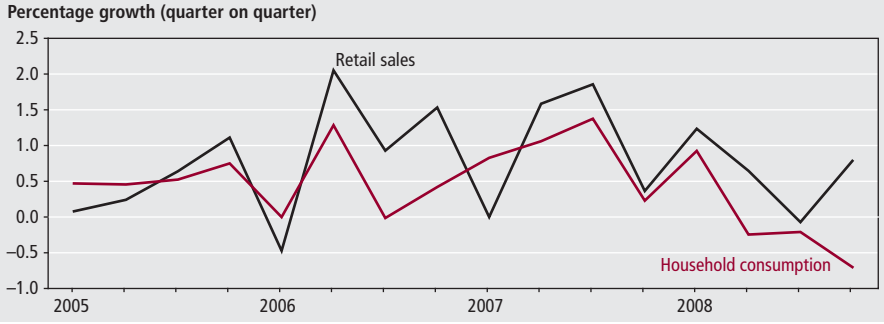
Towards the end of last year, official data on RSI attracted criticism for remaining relatively robust despite the onset of recession. A number of commentators and analysts questioned its correspondence with other economic data reporting just how bad things were for the household sector. In particular, a sharp contraction in borrowing capacity, a weakening labour market, a suppression of real incomes and falling house prices were thought to be the principal drivers behind the lowest rates of consumer confidence on record. So even though retail spending growth has slowed

Figure 6
Contributions to growth by category of expenditure



Source: ONS UK Output, Income and Expenditure

Figure 7
Retail sales and household consumption growth



Source: ONS UK Output, Income and Expenditure and Retail Sales Inquiry

considerably it is yet to fall off a cliff as many expected.

In addition, surveys of the retail sector undertaken by the CBI and the British Retail Consortium (BRC) were far weaker than the RSI. Both groups claim ONS is underestimating the pain felt on the high street where the recession has already claimed a number of high profile casualties.

Despite this, the strength of retailing between December and January has been less controversial. In that month alone retail sales rose by 0.7 per cent and was particularly strong in textile, clothing and footwear stores, other predominately non-food stores and in non-store retailing (mail order and internet sales). Data compiled by the BRC tends to confirm the overall strength of retailing around the turn of the New Year, but the general feeling is that activity was encouraged by heavy discounting at the start of the month which has since tailed off. Therefore, these trends are not expected to persist and the depressing effects of the recessionary environment will return to the fore.

In this edition of Economic and Labour Market Review (ELMR) an article by Mavis Anagboso sets out some of the reasons why the smaller relative decline in retail activity may not be incompatible with the overall economic story. Although retail spending may be a useful indicator, it only represents a subset of total household spending so it is not impossible for growth rates to diverge.

Certain non-retail parts of household spending have exhibited the sharpest declines in recent months. Spending in pubs, hotels and restaurants has fallen significantly, not surprising given that these are typically discretionary spending that can easily be cut back if households tighten their belts. In fact, substitutions away from eating out towards food stores would support retailing. According to the Beer and Pub Association pubs have been closing at a record rate of 39 per week. In 2008 a total of 1,975 pubs shut, an increase of 40 per cent on the previous year.

Sales of motor vehicles have been extremely depressed since last September, driven by a tightening in credit availability and the weak economic outlook. Again this would push down on household consumption, but not retail sales. Figures published by the Society of Motor Manufacturers and Traders (SMMT) revealed that, year on year, the number of new cars registered in January fell by 30.9 per cent. The weakness of these two expenditure components and the relative buoyancy of retailing corroborate the output story relating to the distribution, hotels and catering sector.

Following the sharp depreciation in the value of sterling there has been some interest in whether retail activity, and also household final consumption in general, might be supported by net tourist expenditure. Evidence from the International Passenger Survey suggests the UK position in net-tourist expenditure has improved in the three months to December 2008, but not by a significant amount, and certainly not sufficiently to account for strong retail sales growth in January. In the three months to September net-tourist spending was in deficit to the tune of £5.2 billion. During the last quarter of 2008 spending by overseas visitors to the UK fell by 1 per cent, but UK residents' expenditure abroad decreased by 6 per cent, pushing the deficit on net-tourist spending down to £4.7 billion.

Internet retailing is a small but rapidly growing part of the industry. ONS has recently started publishing an experimental monthly index of Internet retail sales along side the main release. In January 2009, internet sales were 3.7 per cent of total retail sales, compared to 3.2 per cent a year earlier, a 17 per cent increase in the share of total retailing. The IMRG Capgemini e-retail sales index reported a year on year 19.3 per cent increase in sales in January, and total growth for 2009 is anticipated at around 25 per cent. Clearly strong growth in retailing is happening in a sector away from the high street, and this might account for some of the differences between ONS data and the BRC data, which does not include online sales.

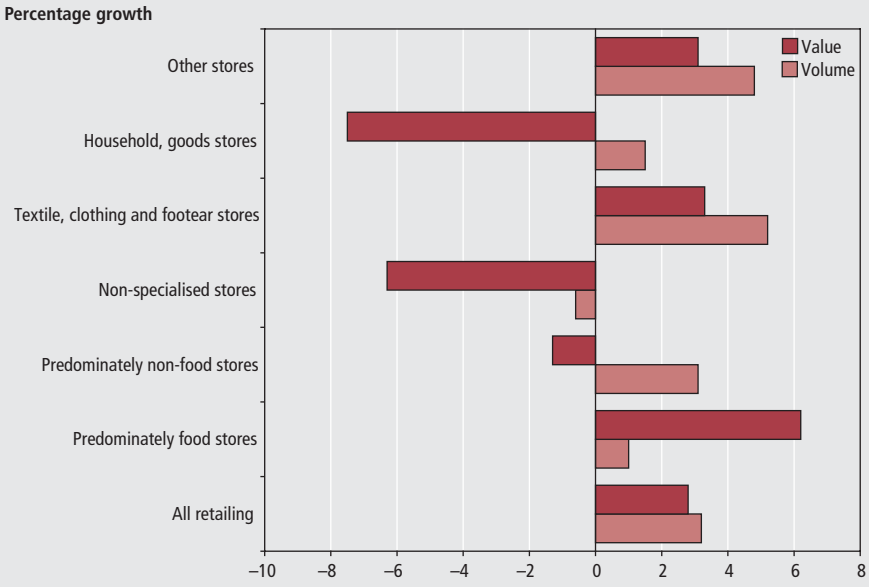
An important issue concerning UK retail spending is the differences between value and volume measures. In **Figure 8**, value and volume measures are presented for each of the main categories comparing growth in the three months to January 2009 with the same three-month period a year earlier.

In volume terms, total retail sales grew by 3.2 per cent over the period of comparison, and in value terms by 2.8 per cent. However, for the sub-components of the RSI there were marked differences between percentage growth rates in volumes and values.

Retail sales at predominately food stores grew by 1 per cent in volume terms, but by 6.2 per cent in value terms. Demand may have been bolstered by a sharp decline in the output of hotels and restaurants, and many of the large food stores have expanded their non-food sales while remaining classified as predominately food stores. However, the large rise in food prices during 2008, and the relative insensitivity of demand to prices, has seen substantial growth in the sales value of this segment.

For predominately non-food stores the picture is the complete opposite. In volume terms growth at 3.2 per cent was robust, but in value terms there was a contraction of 1.3 per cent. A breakdown of this sector shows household good stores and non-specialised stores saw the largest contractions in value terms compared to the volume measures. This suggests that strong retail sales volumes in non-food stores may have been supported by generally falling prices

Figure 8
Volumes and values in retail sales



Source: ONS Retail Sales Inquiry

or by sustained periods of discounting. It might also account for the mixed messages coming from official and business survey data if volumes have been supported by shrinking margins.

As part of planned methodological changes to improve the RSI and bring it in line with other elements of GDP, ONS plans to introduce an annually chain linked RSI referenced to 2005 in May of this year. As a result larger revisions to volume than value measures are expected. It is intended to publish an article outlining these methodological changes and their specific impact on volume measures of retail sales in this journal later in the year.

Fixed investment continues to fall

Fixed investment has played a significant part in both the slowdown in growth at the beginning of 2008 and the movement into recession in the second half of the year. The UK Output, Income and Expenditure release does not provide a detailed analysis by sector but estimates for business investment are available for quarter four. The other sectors, for which data is not yet available, are general government and dwellings and existing buildings. **Figure 9** shows the quarterly growth rate of fixed investment and the weighted contribution to that rate made by business investment.

Throughout 2008, and especially in the second half of the year, business investment has fallen substantially reflecting the weak economic outlook and adverse credit conditions facing the private sector. In the final quarter of 2008 business investment in the manufacturing sector fell by 11 per cent, in the construction sector by 29.8 per cent and in the total service sector by 3.8 per cent.

Despite business investment having a close relationship with total fixed investment, it can be seen in Figure 11 that fixed investment actually fell at a faster rate during the first three quarters of 2008. Over this period the general fall in fixed investment was predominately driven by a significant fall in dwellings.

These trends have been mirrored in various output statistics. Manufactures of basic metals and metal products, an important input into the construction industry, has fallen by over 19 per cent during the course of the year. According to latest ONS figures, in the three months to December, new orders in the construction industry fell by 9 per cent compared with the previous three month period, and by 26 per cent relative to the same three months a year earlier. The fall in new orders has been particularly acute in the private house building sector, where new orders fell by 57 per cent in the final quarter of 2008 compared to the year before.

Trade makes a small contribution to growth

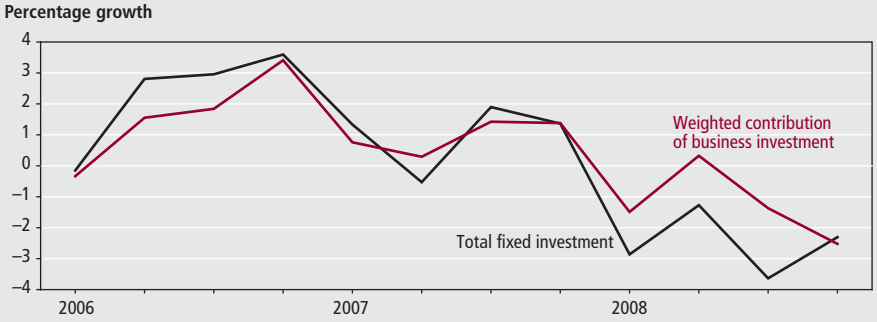
Recovery from the last recession in the early 1990s was aided by a significant depreciation in sterling and a positive contribution from net-trade (the difference between exports and imports). Since the financial crisis gathered pace in the second half of 2008 sterling has weakened considerably against other major currencies. Against the US dollar sterling fell by 33 per cent between August and the end of the year and has remained at a similar level since. The fall against the euro has been more recent, starting in October sterling lost just under 20 per cent of its value by the end of December, almost reaching parity. However, since then there has been a slight recovery with sterling regaining 10 per cent by the end of February.

Sterling's decline largely reflects the view in financial markets that the recession will be particularly deep in the UK due to its relatively large financial sector, a large correction in the housing market, and high levels of household debt. Consequently interest rates will fall faster and lower in the UK diminishing the appetite for sterling denominated financial assets. On top of this is the widely held belief that the UK economy requires rebalancing away from consumption that has led to a large and persistent trade deficit.

Figure 10 shows that net-trade contributed 0.3 per cent to growth in 2008 quarter four as the deficit closed. Although total exports and total imports both fell markedly, the fall in UK exports of services was rather modest in comparison.

Although net-trade has made a positive contribution to growth in the latest quarter there is no clear evidence that the external sector will provide a fillip to growth in the coming year. The reduction in the UK trade deficit mainly reflects the severity of the recession on UK domestic demand and the knock on effects to imports. Business survey data generally reports that export orders have been at record lows, strongly suggestive that any positive competitiveness effect gained from sterling's depreciation

Figure 9
Fixed investment and the weighted contribution of business investment



Source: ONS UK Output, Income and Expenditure and Business Investment

Figure 10
Contributions to growth by trade

Source: ONS UK Output, Income and Expenditure and UK Trade

has been overwhelmed by the large fall in global economic growth. Estimates of US economic growth in the fourth quarter were recently revised down to a contraction of 6.3 per cent on an annualised basis (roughly 1.54 per cent on a quarter on quarter basis), the fastest fall since 1982. The euro zone did not perform much better with output also contracting by 1.5 per cent during the same quarter.

LABOUR MARKET

Falling output feeds through quickly to rising unemployment

The sharp contraction in output since the middle of last year has rapidly fed through to the labour market. During the last three months of 2008 unemployment rose by 146,000 and now stands at 1.97 million. In total, the number unemployed increased by 369,000 last year as the unemployment rate climbed from 5.2 per cent to 6.3 per cent (**Figure 11**).

While unemployment appears to have responded fairly quickly to the downturn, the inactivity rate, by contrast, has remained fairly stable. It is always a concern during times of a depressed labour market that workers, pessimistic about their job prospects, lose motivation and withdraw from actively seeking work. Therefore unemployment figures may understate the true weakness of the labour market.

During the final three months of 2008 the economic inactivity rate of the working age population was 20.8 per cent, and was roughly unchanged throughout the entire year (Figure 11). There is little evidence of a discouraged worker effect feeding through to inactivity. Although showing a slight increase in the three months to December, only 0.6 per cent of the economically inactive gave 'discouragement' as the reason for their inactivity.

Motivation for job search is likely to wane after a long period of unemployment and most of the increase in unemployment during 2008 can be traced to the relatively short-term unemployed. Of the total 1.1 percentage points increase in the unemployment rate between the three month period October to December 2008 and the same period in 2007, almost three quarters were accounted for by a rise in those unemployed for less than six months.

The substantial increase in short-term unemployed is partly the result of a large upswing in redundancies as falling output rapidly passes through to labour demand. In the three months between October and December there were 259,000 redundancies compared to 111,000 in the same period a year earlier. **Figure 12** plots the recent history of the redundancy rate, that is the ratio of the redundancy level for the given quarter to the number of employees in the previous quarter multiplied by 1000. In the latest period for which data is available the redundancy rate jumped to 10.2 from 6.1 in the previous quarter.

Data relating to the industry breakdown of redundancies shows there's been a broad-based shedding of jobs across the entire economy, although there have been relatively larger increases in the construction industry and relatively smaller increases in the education, health and public administration industries.

Given that firms typically face hiring and firing costs in adjusting the size of their labour force, the extent of the increase in redundancies is evidence that they expect a large and protracted downturn in the economy. This view is consistent with the slowdown in vacancies also reported in Figure 12 where job creation appears to have been suppressed in a similar way to investment by the turbulent economic environment. According to the ONS vacancy survey the ratio of vacancies per 100 employee jobs fell to 1.9 per cent in the three months to January, down from 2.6 per cent in the same period a year earlier. Again, the slowdown in job creation appears to be consistent across the entire private sector with all industries except education, health and public administration posting a fall in the vacancy ratio on both the quarter and year.

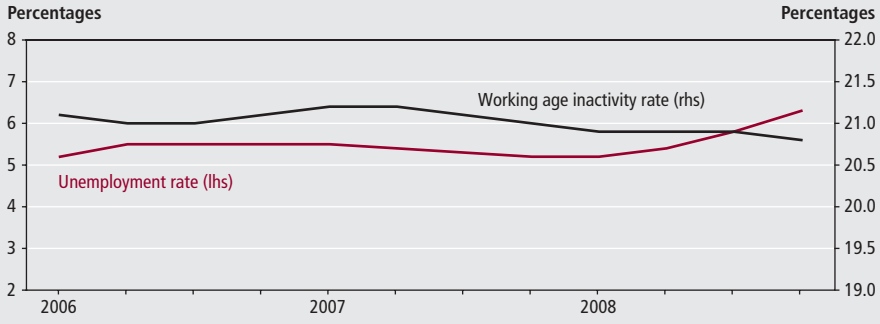
CONSUMER PRICES INFLATION

Inflation expected to fall below target during 2009

Consumer prices in the year to January, as measured by the preferred Consumer Prices Index (CPI) measure, rose by 3 percent. As **Figure 13** shows the latest figures represent a small fall of 0.1 percentage points compared to December.

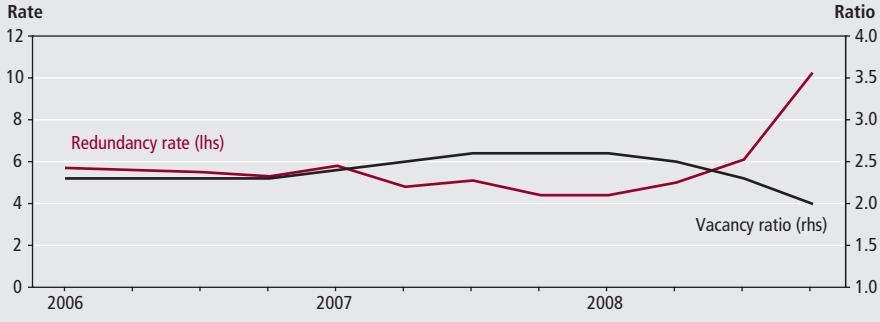
The Methods Explained article in this edition of ELMR discusses the concept and measurement of core inflation. Although ONS does not produce a specific measure of core inflation and neither does the Bank of England target one in setting monetary policy, recent inflation volatility has revived some interest in the issue. In the short-term headline inflation rates may be affected by erratic and temporary price movements that have no lasting impact on inflation, and therefore should not be the target of a policy response.

Figure 11
Unemployment and inactivity rates



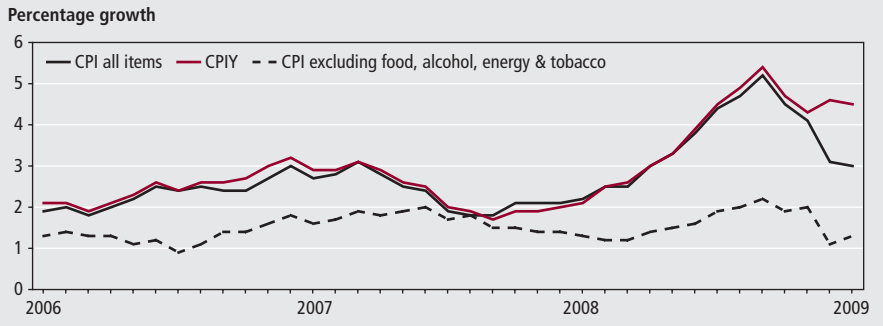
Source: ONS Labour Force Survey

Figure 12
The redundancy rate and vacancy ratio



Source: ONS Labour Force Survey and Vacancy Survey

Figure 13
CPI Inflation and special aggregates



Source: ONS Focus on Consumer Price Indices

Core inflation is therefore meant to be a clean measure of inflation that gives an estimate of the underlying or trend rate of inflation likely to persist into the medium-term rate. Most measures are calculated by identifying and either excluding or down-weighting the transitory and volatile measures of the prices index.

Although they are not official core inflation measures ONS does produce a number of special CPI aggregates that excludes the items which exhibit generally more price volatility. Two examples are presented alongside the headline rate in Figure 13. CPI inflation excluding energy, food, alcoholic beverages and tobacco, based on the percentage change over 12 months, was only 1.3 per cent in January, way below the headline rate reflecting the large increases in food and energy prices during 2008. If these large price increases are reversed, or simply fall out of the calculation, the headline CPI inflation rate would then be expected to fall.

The second measure in Figure 13 is referred to as CPIY, and is the rate of inflation excluding indirect taxes. Specifically, the indirect taxes excluded are Value Added Tax (VAT), excise duties, vehicle excise duty, insurance tax and air passenger duty. In the last two months CPIY has remained above the headline rate, a consequence of the temporary 2.5 percentage points cut in VAT announced in the November Pre-Budget Report and implemented from1 December 2008. Without this temporary tax cut, CPI inflation would actually be higher at 4.5 per cent in January.

Reflecting the direct effects of the VAT reduction, the weak economic outlook, and a reversal of the food and energy price inflation that peaked last summer, the Bank of England's central projection made in the February Inflation Report is for CPI inflation to fall below target and close to a rate of 0.5 per cent by the end of 2009. In the November Pre-Budget Report, HM Treasury forecast CPI inflation of 0.5 per cent in 2009 quarter four, close to the average of independent forecasts which predict a rate of 0.4 per cent.

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	2007	2008	2008 Q2	2008 Q3	2008 Q4	2008 Nov	2008 Dec	2009 Jan
GDP growth – chained volume measures (CVM)									
Gross domestic product at market prices	ABMI	3.0	0.7	0.0	–0.7	–1.5	..	..	..
Output growth – chained volume measures (CVM)									
Gross value added (GVA) at basic prices	ABMM	3.0	0.7	0.0	–0.7	–1.5	..	..	..
Industrial production	CKYW	0.4	–3.0	–1.0	–1.7	–4.5	–2.5	–1.7	..
Manufacturing	CKYY	0.6	–2.9	–1.1	–1.9	–5.1	–3.0	–2.2	..
Construction	GDQB	2.8	1.4	–0.6	–0.4	–1.1	..	..	..
Services	GDQS	3.6	1.3	0.2	–0.5	–1.0	..	..	..
Oil and gas extraction	CKZO	–2.4	–4.8	–0.1	–0.7	–2.1	1.3	–0.3	..
Electricity, gas and water supply	CKYZ	1.1	0.4	–0.2	–0.6	–0.1	–1.5	0.9	..
Business services and finance	GDQN	5.6	2.3	0.5	–0.6	–0.6	..	..	..
Household demand									
Retail sales volume growth	EAPS	4.3	3.5	0.6	–0.1	0.8	0.3	1.6	0.8
Household final consumption expenditure growth (CVM)	ABJR	3.0	1.6	–0.2	–0.2	–0.7	..	..	..
GB new registrations of cars (thousands)[1]	BCGT	2,390	2,112	557	542	338	101	109	..
Labour market[2,3]									
Employment: 16 and over (thousands)	MGRZ	29,222	29,443	29,505	29,407	29,361	29,361	..	..
Employment rate: working age (%)	MGSU	74.6	74.5	74.7	74.4	74.1	74.1	..	..
Workforce jobs (thousands)	DYDC	31,471	31,661	31,661	31,527	..	..	..	..
Total actual weekly hours of work: all workers (millions)	YBUS	936.1	940.7	939.9	940.9	934.0	934.0	..	..
Unemployment: 16 and over (thousands)	MGSC	1,653	1,776	1,685	1,825	1,971	1,971	..	..
Unemployment rate: 16 and over (%)	MGSX	5.3	5.7	5.4	5.8	6.3	6.3	..	..
Claimant count (thousands)	BCJD	863.3	902.4	826.5	908.3	1,078.2	1,079.3	1,159.2	1,233.0
Economically active: 16 and over (thousands)	MGSF	30,875	31,220	31,190	31,232	31,333	31,333	..	..
Economic activity rate: working age (%)	MGSO	78.9	79.1	79.1	79.1	79.2	79.2	..	..
Economically inactive: working age (thousands)	YBSN	7,940	7,872	7,872	7,887	7,858	7,858	..	..
Economic inactivity rate: working age (%)	YBTL	21.1	20.9	20.9	20.9	20.8	20.8	..	..
Vacancies (thousands)	AP2Y	660	617	649	599	532	557	532	504
Redundancies (thousands)	BEAO	127	163	127	156	259	259	..	..
Productivity and earnings annual growth									
GB average earnings (including bonuses)[3]	LNNC	..	..	3.5	3.3	3.2	3.2	3.2	..
GB average earnings (excluding bonuses)[3]	JQDY	..	..	3.7	3.6	3.6	3.6	3.6	..
Whole economy productivity (output per worker)	A4YN	..	..	0.7	–0.2	..	..	..	..
Manufacturing productivity (output per job)	LOUV	..	..	..	..	..	–2.2	–3.8	..
Unit wage costs: whole economy	LOJE	..	..	2.2	3.0	..	..	..	..
Unit wage costs: manufacturing	LOJF	..	..	..	..	..	5.1	6.6	..
Business demand									
Business investment growth (CVM)	NPEL	9.9	–1.2	0.5	–2.1	–3.9	..	..	..
Government demand									
Government final consumption expenditure growth	NMRY	1.7	3.5	0.1	0.5	1.5	..	..	..
Prices (12-monthly percentage change – except oil prices)[1]									
Consumer prices index	D7G7	2.3	3.6	3.4	4.8	3.9	4.1	3.1	3.0
Retail prices index	CZBH	4.3	4.0	4.4	5.0	2.7	3.0	0.9	0.1
Retail prices index (excluding mortgage interest payments)	CDKQ	3.2	4.3	4.4	5.3	3.8	3.9	2.8	2.4
Producer output prices (excluding FBTP)[4,5]	PLLV	1.9	4.7	5.2	5.9	5.0	5.0	5.0	4.1
Producer input prices[5]	RNNK	3.0	21.6	29.9	28.2	9.2	8.2	3.5	2.3
Oil price: sterling (£ per barrel)	ETXR	36.11	52.10	62.35	61.64	35.69	34.50	29.13	31.29
Oil price: dollars ($ per barrel)	ETXQ	72.44	98.37	122.87	116.89	57.24	54.75	43.28	45.23

Seasonally adjusted unless otherwise stated

	Source CDID	2007	2008	2008 Q2	2008 Q3	2008 Q4	2008 Nov	2008 Dec	2009 Jan
Financial markets[1]									
Sterling ERI (January 2005=100)	BK67	103.5	90.9	92.9	91.6	83.6	83.4	78.1	76.6
Average exchange rate /US$	AUSS	2.0018	1.8528	1.9705	1.8918	1.5699	1.5338	1.4859	1.4452
Average exchange rate /Euro	THAP	1.4619	1.2588	1.2615	1.2586	1.1957	1.2041	1.1043	1.0919
3-month inter-bank rate	HSAJ	5.95	2.75	5.88	6.15	2.75	3.85	2.75	2.00
Selected retail banks: base rate	ZCMG						3.00	2.00	1.50
3-month interest rate on US Treasury bills	LUST	3.29	0.11	1.87	0.90	0.11	0.01	0.11	0.23
Trade and the balance of payments									
UK balance on trade in goods (£m)	BOKI	–89,253	–93,150	–23,233	–23,572	–23,079	–8,114	–7,367	..
Exports of services (£m)	IKBB	149,355	163,303	40,444	40,688	41,692	13,573	13,146	..
Non-EU balance on trade in goods (£m)	LGDT	–47,788	–53,577	–13,045	–14,529	–13,768	–5,214	–4,214	..
Non-EU exports of goods (excl oil & erratics)[6]	SHDJ	116.5	124.5	127.8	128.4	115.5	107.5	115.9	..
Non-EU imports of goods (excl oil & erratics)[6]	SHED	131.6	132.1	131.9	134.9	128.5	131.0	126.1	..
Non-EU import and price index (excl oil)[6]	LKWQ	104.2	115.8	113.3	115.8	124.1	125.2	126.2	..
Non-EU export and price index (excl oil)[6]	LKVX	102.5	110.1	108.1	109.8	116.2	116.8	118.5	..
Monetary conditions/government finances									
Narrow money: notes and coin (year on year percentage growth)[7]	VQUU	5.8	7.2	5.7	5.1	7.2	6.8	7.2	7.7
M4 (year on year percentage growth)	VQJW	12.6	12.8	11.4	12.0	16.2	16.2	16.2	17.5
Public sector net borrowing (£m)	–ANNX	35,044	68,690	22,261	14,670	33,610	15,124	16,532	–3,340
Net lending to consumers (£m)	RLMH	13,162	11,153	3,077	2,026	1,630	692	271	403

External indicators – non-ONS statistics

		2008 Jul	2008 Aug	2008 Sep	2008 Oct	2008 Nov	2008 Dec	2009 Jan	2009 Feb
Activity and expectations									
CBI output expectations balance[1]	ETCU	–7	–13	–16	–31	–42	–42	–43	–44
CBI optimism balance[1]	ETBV	–40			–60			–64	
CBI price expectations balance	ETDQ	38	29	24	12	1	3	–15	–14

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.

Independent forecasts

February 2009

UK forecasts

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

2009

	Average	Lowest	Highest
GDP growth (per cent)	*–2.7*	*–3.6*	*–0.8*
Inflation rate (Q4, per cent)			
CPI	*0.4*	*–0.7*	*1.9*
RPI	*–1.9*	*–4.4*	*0.8*
Claimant count (Q4, million)	1.88	1.35	2.20
Current account (£ billion)	–32.6	–69.9	–5.8
Public Sector Net Borrowing (2008–09, £ billion)	127.9	85.7	162.2

2010

	Average	Lowest	Highest
GDP growth (per cent)	*0.5*	*–1.2*	*2.4*
Inflation rate (Q4, per cent)			
CPI	*1.8*	*0.6*	*4.1*
RPI	*2.6*	*0.5*	*5.1*
Claimant count (Q4, million)	2.23	1.25	2.80
Current account (£ billion)	–27.8	–108.4	34.4
Public Sector Net Borrowing (2009–10, £ billion)	131.6	94.7	174.4

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/data_forecasts_index.htm

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* (November 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

FEATURE

Retail sales in the downturn: understanding patterns and trends

Mavis Anagboso
Office for National Statistics

SUMMARY

This article considers the impact of the developing financial crisis on retail sales values up to 2008. It also examines the divergence between the official estimates of retail activity and the British Retail Consortium retailing indicator. It focuses on the value measure of retail sales and analyses recent trends in retailing activity by examining consumer behaviour and other economic factors affecting the value of retail sales.

It is the first of two articles on retailing activity in the UK over the last three years. The second will follow later in 2009 and focus on the volume measure of retail sales, including discussions on the impact of chain-linking on the volume series.

The Retail Sales Index (RSI) is a key indicator of changes in the UK economy. It has two main uses in economic statistics. It measures the output of retail services, as part of the wider service sector (7.4 per cent of total services). It also measures an important element of household spending, both of which are inputs into the compilation of the National Accounts. The results are used by the Bank of England and HM Treasury to inform decision making by government and in formulating financial policies.

The survey is based on sales turnover across retail organisations, from major high street and 'out of town' chains to small stores and catalogue and internet retailers. It is converted to a volume measure using the results of monthly Office for National Statistics (ONS) price surveys which feed into the Retail Prices Index, an ONS headline publication. The ONS headline publication for retail sales is the volume measure of RSI. In normal times this is the measure of main economic interest because it tracks the volume of retail services feeding into Gross Domestic Product (GDP), and it also measures the quantity of goods households buy and which contribute to their wellbeing.

Over the last six months of 2008, conditions in UK retailing have shown changes in structure, which differ across retail store types. These may have contributed to the divergence which has been seen between the ONS headline RSI measure and other industry measures. One of these, the British Retail Consortium (BRC), is a value measure, and has shown lower growth rates than the RSI. For instance, in November 2008, the BRC's measure of the total value of retail sales (month on corresponding month of previous year) showed a 0.4 per cent fall. In the same period, the RSI for the value of sales (not seasonally adjusted) reported a 2.7 per cent growth in the value of retail sales. The CBI Distributive Trades Survey has also shown lower growth.

This article is the first of a two-part analysis that will provide further insight into recent trends in retailing activity and explain some of the reasons for the divergence between the official estimates of retail activity and business surveys. As part of planned methodological changes to improve the RSI and bring it into line with other elements of GDP, ONS plans to introduce an annually chain-linked RSI referenced to 2005 in May 2009. This is expected to lead to somewhat larger revisions to the volume series than to the value series. This article therefore focuses on recent changes in the value of retail sales. The second article will include a discussion of the impact of chain-linking on the volume series for retail sales.

The Retail Sales Index

The RSI is the most comprehensive measure of retail activity in the UK. It is a Laspeyres base-weighted index (with a base year of 2000) that measures movements in the average weekly sales of retailers in Great Britain. In the National Accounts, the index feeds into the Index of Services, which is a

major component of the output measure of GDP.

The RSI is based on data from the retail sales inquiry, a survey of about 5,000 retailers, including all large retailers and a representative sample of smaller businesses. The retail sales inquiry is sampled monthly from the Inter-Departmental Business Register (IDBR) so that it remains representative of the whole retail sector. This ensures that growth areas in retailing, such as that for specialist internet retailers, are reflected in the RSI results. The monthly retail sales First Release shows estimates of the volume (that is, after the estimated effects of prices have been removed) and value (total value of sales in current prices) indices of retail sales in three main categories: predominantly food stores, predominantly non-food stores and non-store retailing and repair. **Table 1** summarises the main categories that make up the RSI.

Although some food stores, for example large supermarkets, are increasingly diversifying into non-food sales, they continue to be recorded as food stores. This is because classification is based on the dominating retail activity of the company. For instance, supermarkets with internet shopping facility will be recorded as food stores as long as food store retailing continues to be the main activity of the company.

Retail trade covers the activities of businesses selling goods directly to consumers. All consumer goods are covered, except for motor vehicles which are recorded as a separate category within the Index of Services. **Figure 1** shows the yearly growth rates of retail sales values and its main components.

Figure 1 shows that, from May 2006 to early 2008, non-food stores were almost always the largest contributor to the growth in retailing activity in value terms. This trend changed in 2008 with three noticeable differences:

- Food stores became the key drivers of retail sales growth
- For the first time in over two years, non-store retailing contributed more to the growth of RSI than non-food stores, and
- In 2008Q4, non-food stores made a negative contribution to retail sales growth

The contraction of sales in non-food stores in the second half of 2008 is marked. In November 2008, the value of sales in non-food stores fell by 3.1 per cent compared with the same period in the previous year. This fall was the biggest since records began in 1986. It was driven by declining rates in all four main categories of this sector (non-specialised stores, textile, clothing and footwear stores, household goods stores and 'other' stores). **Figure 2** shows the growth rate of non-food stores and the contributions to growth of its main components. It shows that, from June to December 2008, household goods stores were consistently the largest contributor to the downward trend observed in non-food stores sales. It also indicates that the category that has displayed the most resilience in terms of turnover value is the 'other stores' category.

RSI in the context of the UK economy

Household consumption expenditure in the UK is mainly driven by changes in the financial position of households. Over the past decade, several factors have led to changes in household wealth. Some of them include:

- Steady rise in average earnings, with a high proportion of households benefiting from employment
- A housing market boom, with house prices rising relative to incomes
- Credit expansion related to the growth in equity and house prices

This changed with tightening in credit supply, starting in 2007, as the global financial crisis started to develop, followed by a fall in house prices.

These factors have subsequently affected the structure of retailing activity over the period. At the peak of the housing market expansion, housing market-related expenditure was the dominant factor driving retail sales activity. Figures 1 and 2 have shown that this is the case as non-food stores (notably household goods stores) have been a key driver of retail sales values. In 2008, there was a noticeable change in the structure of retailing activity as non-food stores recorded a contraction in retail sales values.

In addition to the financial position of households, changes in the value of retail sales are affected by price movements. In times of price inflation, sales values will increase by more than sales volumes, while in times of deflation, sales values will increase by less than sales volumes. Throughout the 18 months since May 2007, prices in non-food retailing have been falling. In non-store retailing they have fallen much faster, and for longer. In food stores, however, prices have risen, with inflation peaking in August 2008 at over 8 per cent.

There is little doubt that heavy discounting towards the end of 2008 affected the pattern of sales. The effect of prices on retailing activity in general will be discussed further in a second article to be published later in 2009. While price movements may cause the value of retailing activities to change, they are often a reflection of changes taking place in the economy.

The next section describes key economic factors that explain recent changes in the pattern of retailing activity.

Pre-2008

In the past decade, consumer spending has been a key driver of economic growth. In this period of expansion, households faced rising incomes as an increase in the

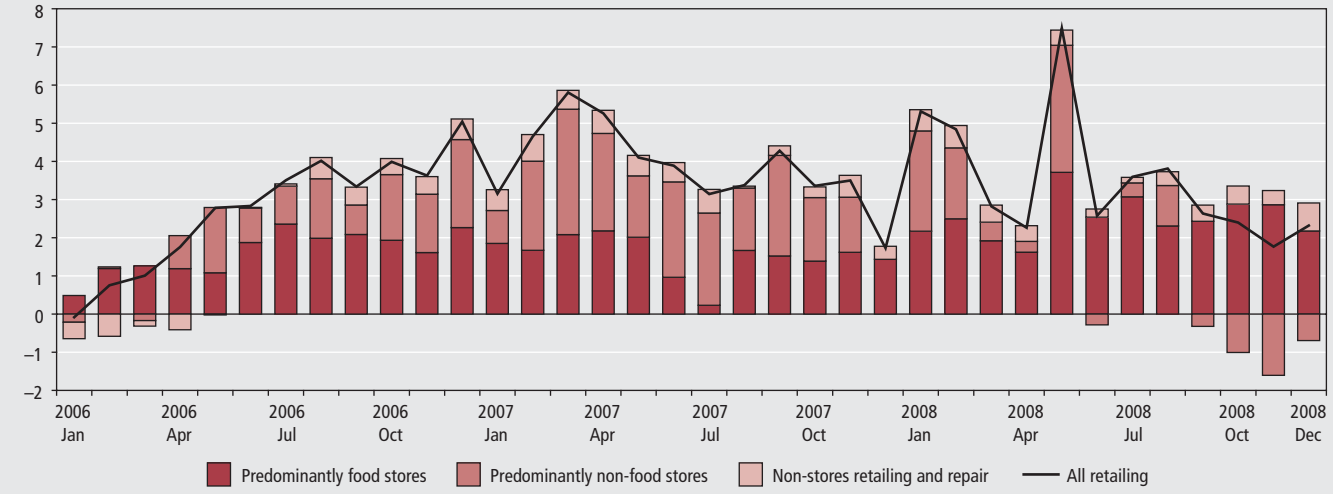
Table 1
RSI main categories

Publication category	Percentage of all retailing (base year 2000)
Predominantly food stores	*43.0*
Non-specialised stores with food, beverages or tobacco predominating, for example, supermarkets	
Specialist food stores	
Retail sales of alcoholic drinks, other beverages and tobacco	
Predominantly non-food stores	*51.3*
Non-specialised stores where sales of food, beverages and tobacco is not predominant, for example, department stores	
Textile, clothing and footwear stores	
Household goods stores, for example, furniture, electrical appliances and hardware stores	
Other non-food stores	
Non-store retailing and repair	*5.7*

Source: UK Standard Industrial Classification 2003

Figure 1
Total value of retail sales and the contributions to growth of its main components[1]

Percentage change, month on same month a year earlier,[2] seasonally adjusted

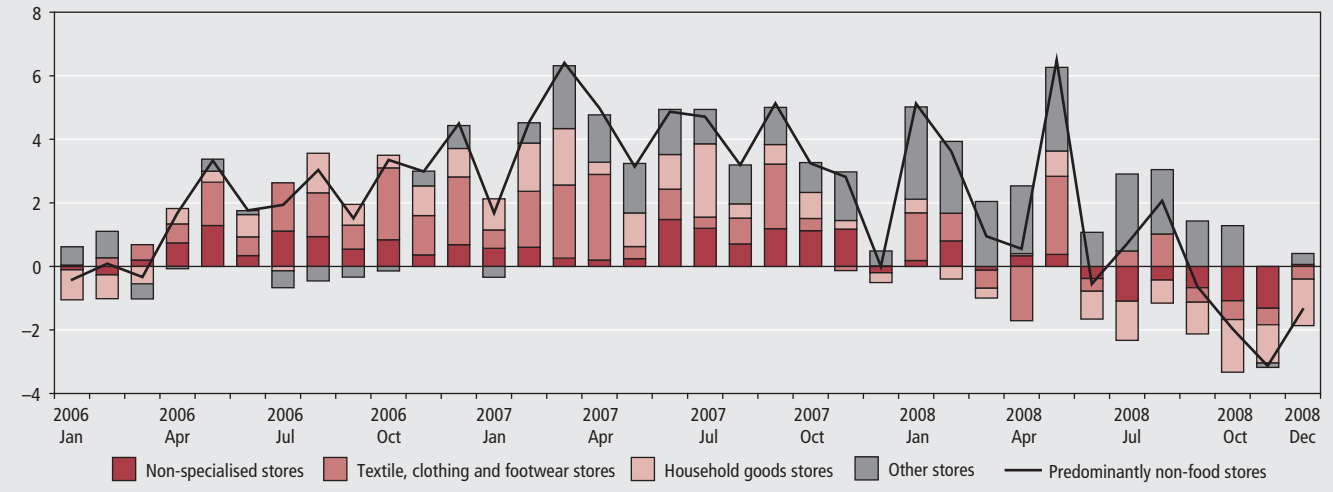


Notes: *Source: Office for National Statistics*

1 The bars on the graph show the weighted contributions of the components to the total growth rate. These contributions have been calculated as the growth rate of the components multiplied by their weights.
2 These are presented as yearly growth rates because one-monthly changes in retail sales can be volatile.

Figure 2
Total value of non-food retail sales and the contributions to growth of its main components[1]

Percentage change, month on same month a year earlier,[2] seasonally adjusted



Notes: *Source: Office for National Statistics*

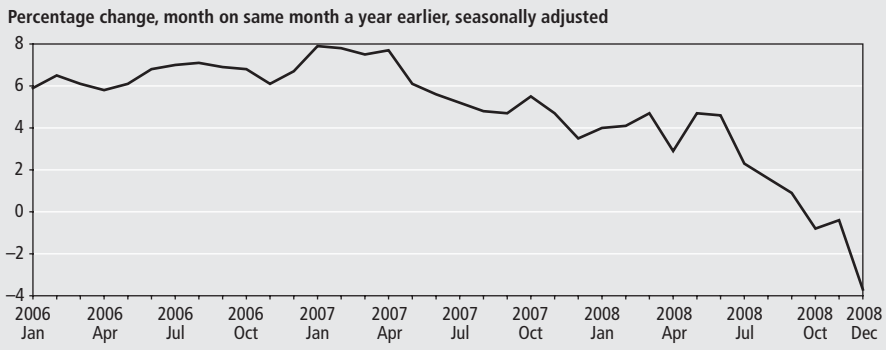
1 Examples of household goods include furniture, lighting equipment, electrical household appliances, hardware, paints and glass. Examples of 'other' non-food stores include stores that sell books, stationery, office supplies and equipment, pharmaceutical and medical goods.
2 At this level of disaggregation, monthly data are more volatile.

demand for labour supported a rise in real earnings. The Average Earnings Index (AEI) shows that, between 1998 and 2008, average earnings increased by an annual average of 4.1 per cent (including bonuses) and 4.0 per cent (excluding bonuses). This has been reinforced by the growth in equity and house prices. For instance, at the peak of the housing market expansion in 2002, the 12-monthly growth in house prices (as reported by the Halifax and Nationwide) averaged 20 per cent. With the supply of houses limited relative to demand, this reinforced the increase in house prices which allowed households access to credit and increased their spending power. **Figure 3** shows the 12-monthly growth rates of the Bank of England's total net lending to households. It shows lending to the household sector (secured and unsecured) continuing to grow through 2006 and 2007, then a sudden decline from the middle of 2008.

As purchases from retail establishments account for about 73 per cent of household final consumption on goods and around one-third of total household final consumption, the retail sector has consequently benefited from 'wealthier' households; up until mid-2008, households' extra income was used to support additional debt and spending. Retail sales values and household expenditure on retail goods showed strong positive growth in 2006 and 2007 (see **Figure 4**).

The effect of the housing market on retail sales is evident from the pattern of household expenditure of items related to the housing market. For instance, while total consumer spending on retail goods displayed strong growth between 2006 and 2008 (average quarterly growth of 4.5 per cent), aspects of consumer spending such as expenditure on furnishings showed particularly strong growth, reflecting the

Figure 3
Bank of England's M4 lending to the household sector[1]



Note: *Source: Bank of England*

1 M4 is a measure of the quantity of money supply. Lending to households comprises secured and unsecured lending.

Figure 4
Household final consumption expenditure[1,2] on retail goods and retail sales

Notes: *Source: Office for National Statistics*

1 The retail expenditure series used in this article have been estimated based on ONS assumptions of what retail establishments are.
2 The above series are not expected to track each other precisely as there are major differences in coverage and definition (see Dolling *et al* 2005). While retail sales data are based on sampled data from the retail sales inquiry, consumer spending is based on sampled data from a number of sources, with the Expenditure and Food Survey being the most frequently used source (about 30 per cent weight in the main aggregate). Other sources include retail sales, trade sources and other government departments.

thriving housing market. In 2007Q3, total spending in retail establishments grew by 5.4 per cent compared with the same period in the previous year. In the same period, expenditure on household furniture and carpets and other floor coverings grew by 7.0 and 10.7 per cent, respectively. A similar story is seen from the RSI data, which show that retail sales growth in this period was mostly driven by retail sales in predominantly non-food stores that sell household items such as furniture, lighting equipment, electrical household appliances and television goods (note that these items are also sold in some predominantly food stores and non-stores).

2008

In 2008Q2, the ONS quarterly estimate of GDP remained flat, bringing to an end a sequence of 64 successive quarters of positive growth – the longest peace-time expansion of the UK economy on record. By 2008Q4, ONS had reported two successive quarters of contraction, the common understanding of a recession. The general consensus among economic commentators is that the source of the current recession is traceable to the 'unsustainable rises in lending, bond, equity and house prices and compression of risk premia that have been evident since the start of the decade across many developed economies' (Blanchflower 2009).

The collapse of financial institutions such as Lehman Brothers, the bailout of AIG (American Insurance Group) and the nationalisation of Bradford and Bingley led to direct economic effects through loss of savings. In addition, reduced business confidence was reflected in falling business investment and there was a sharp fall in consumer confidence (as shown by the GfK Consumer Confidence Index) in the second half of 2008. With the exposure of vulnerabilities in the banking system, 'banks began to deleverage, by securing injections of new capital, reducing lending, and by selling assets' (Bank of England 2008). This process contributed to a marked slowdown in money and credit growth. The Bank of England's net lending data show that the 12-monthly growth rate of net lending contracted from +4.6 per cent in June 2008 to –3.7 per cent in December 2008 (see Figure 3).

As access to credit became much tighter, it reinforced the decline of the housing market which had already begun in late 2006. **Figure 5** shows the growth in loans approved for house purchases. It shows a sharp deterioration in the loans approved for home purchases from 2007.

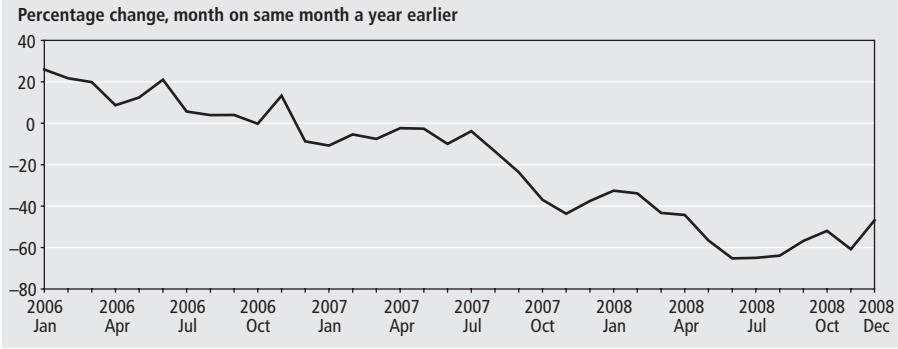
With the creditworthiness of households diminished by falling house and equity prices, households' access to lending (both secured and unsecured) has reduced from previous levels. A survey carried out on behalf of the Bank of England shows that, in the course of 2008, households reported that credit had become harder to access (see Hellebrandt and Young 2008). It also suggests that tighter credit conditions have restrained household spending: fewer households were reported to have taken out an additional secure loan to fund spending on household goods or home improvements compared with previous years. As households face declining wealth in the current economic climate, they have reacted by cutting down on credit-driven discretionary spending.

In addition to a contraction in credit in that period, households faced record levels of energy and food prices feeding through as steep increases in commodity prices were passed on to consumers. This had an adverse effect on real disposable income (see **Figure 6**) and further reinforced the slowdown in aggregate demand of non-discretionary items.

In 2008, the RSI continued to show positive growth rates of retail sales values. However, Figures 1 and 2 have shown that, in 2008, there was a noticeable shift in the pattern of retail sales consistent with a modification of consumer behaviour in response to the changing economic climate.

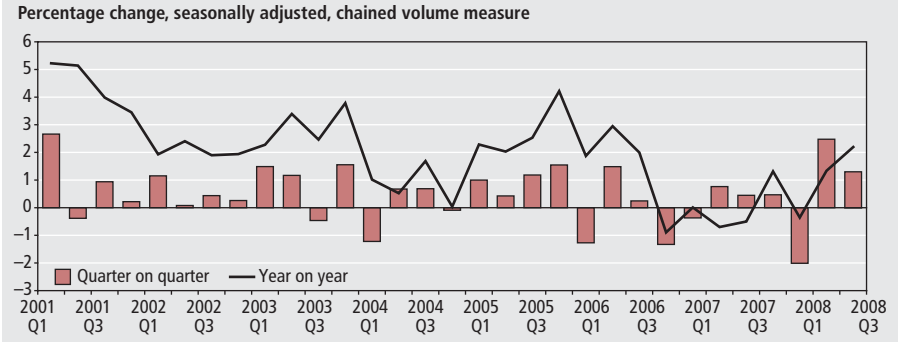
The slowdown of the housing market, banking crisis and loss of confidence has led to a marked slowdown in lending to households. This has led to a reduction in discretionary spending in general and, notably, credit-driven expenditure. One aspect of consumer spending that has seen a sharp fall is expenditure on motor vehicles. As most car purchases are financed through

Figure 5
Number of loans approved for house purchases



Source: British Bankers Association

Figure 6
Real Household Disposable Income



Source: Office for National Statistics

credit, this aspect of spending has been hard-hit by the credit squeeze.

Figure 7 shows the 12-monthly growth rates of the output of the motor trades division. It shows that, in November 2008, the output of the sector fell by 19.6 per cent compared with November 2007. This is the largest fall since records began in 1995.

Note that the RSI does not cover car sales and so the sharp fall in this sector will not be reflected in the RSI. The RSI captures the fall in credit-driven expenditure associated with the housing market. In 2008Q4, there was a sharp contraction in non-food store sales that was largely driven by the contraction of sales in household goods stores. This is in contrast to previous years when the sector expanded rapidly as houses increased in value and households had easier access to credit. In addition, the declining rates of sales in non-specialised stores and textile, clothing and footwear stores also contributed to the negative growth of non-food stores (see Figure 2). Shops such as Woolworths, MFI, Adams and Viyella fall into these categories of non-food stores.

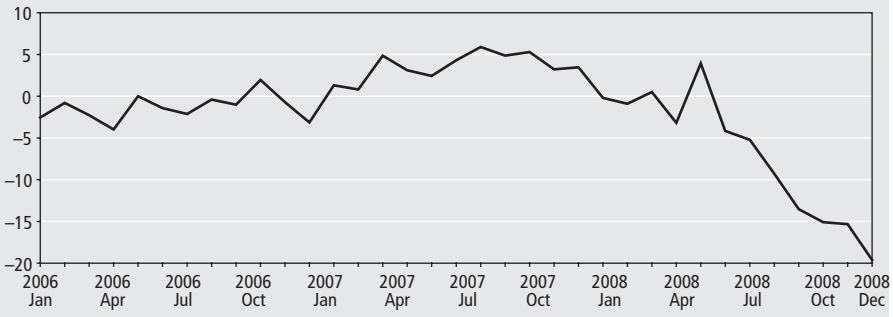
While non-food stores recorded negative growth in 2008Q4, food stores and non-store retailers continued to show positive growth, leading to positive growth of RSI values despite the economic downturn. The positive growth of food sales is partly a reflection of most food items being necessities and thus generally price inelastic. In 2008, food stores consistently recorded positive price inflation while heavy discounting was prevalent among non-food stores and non-store retailers. As the value measure does not take out the effect of prices, this may partly explain the strength of this category in relation the others. Furthermore, there is also evidence of food stores benefiting from stronger sales at the expense of restaurants. In most months of 2008, hotels and restaurants showed negative growth rates while food stores' sales values showed positive growth.

Non-store sales constitute approximately 5.7 per cent of total retail sales (based on 2000 weights). Among the three main categories of retail sales, this has historically been the smallest contributor to retail sales growth (in both volume and value terms). However, from September to December 2008, non-store retailing and repair, which include internet sales, was the second largest contributor to the growth in the value of retail sales. In that period, non-food stores contributed negatively to total retail sales growth. This perhaps suggests that consumers, in search of ways to maximise the utility of their limited resources, may be turning away from traditional stores to online retailers in search of bargains. Thus, non-store retailers may be benefiting from stronger sales at the expense of store retailers. Additionally, non-store retailers may be able to withstand the current economic climate better than store retailers, partly as a result of relatively low fixed costs. In 2008Q4, the performance of online retailing stores differed from what was observed in most high streets. Indeed, over the Christmas period, record internet sales were reported in the press by retailers such as Asos, which claimed a 118 per cent increase in year-on-year sales over the nine weeks to January 2009.

Do the RSI estimates of sales values fit other measures of the recession?

So far, this article has shown that the recent structure of retail sales fits well with overall household behaviour in the new economic climate. Households have faced declining wealth and higher utility bills simultaneously and they have reacted to this by cutting back on discretionary spending. There are a number of reasons why retail

Figure 7
Motor trades output



Source: Office for National Statistics

sales values continued to grow in 2008 despite the recession.

The financial position of households is affected by labour market conditions and households' access to credit. While there has been a sharp contraction in lending to households, average earnings have continued to grow. In 2008, the average earnings of individuals maintained steady growth. The ONS AEI – excluding bonuses – registered a 12-monthly growth of 3.6 per cent to November 2008, unchanged from the growth reported in June. While the story is slightly different when bonuses are included in the AEI (the AEI including bonuses was 2.7 per cent in November, down from 3.4 per cent recorded in June), it nevertheless presents the picture in which the current value of household income had not fallen.

Another measure that provides an indication of how household behaviour could change in response to the current climate is the proportion of disposable income spent on retail consumption. **Figure 8** shows household final consumption expenditure on retail goods as a proportion of gross household disposable income.

Figure 8 shows that the proportion of disposable income spent on retail goods has increased from 31.9 per cent in 2006Q1 to 32.7 per cent in 2008Q3. It suggests that, under these circumstances, households might not view their current retail spending as profligate, which could explain why the slowdown in spending has not been more severe. When spending on retail goods is looked at as a proportion of total household final consumption expenditure, a similar story emerges. At 33.6 per cent in 2008Q3, the proportion is largely unchanged from its value of 33.4 per cent in 2006Q1.

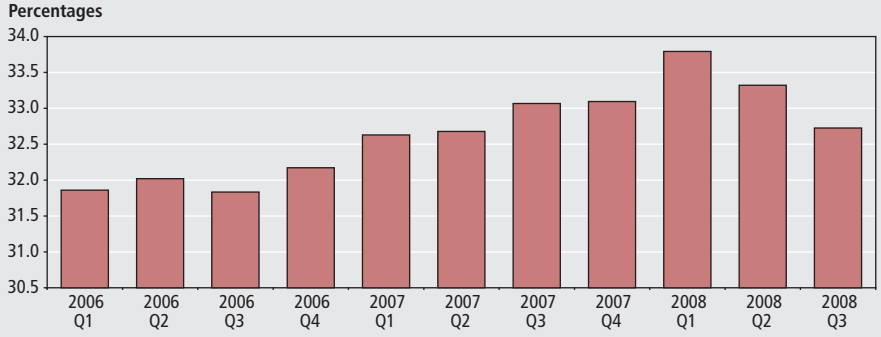
Another factor that could potentially explain why the RSI has not seen a sharper fall is the effect of external demand. In December 2008, the sterling effective exchange rate index averaged 78.1, 25.6 per cent below its August peak in July 2007. The fall in sterling is expected to create additional demand for UK retail goods. The ONS International Passenger Survey shows initial support for this as the expenditure of overseas visitors to the UK showed strong growth in 2008Q4. It shows that overseas expenditure in the UK increased by 10.1 per cent in November compared with the same month in 2007 (see **Figure 9**). Additionally, the weakening of sterling could also create a positive effect on domestic demand as fewer people are travelling abroad. This will be looked into in further detail as more tourism data become available.

Alternative measures of retail activity

In addition to official estimates of retail sales activity, alternative estimates of retail sales are available from business surveys conducted by trade industry groups. These surveys are often published ahead of the RSI and seen as a first indication of retail activity in the UK. Two highly respected surveys looked at by the Bank of England and city analysts are the BRC-KPMG retail sales monitor and the CBI Distributive Trades Survey. The former is a survey of retail values and the latter is a survey of retail volumes. The BRC survey will be discussed in this article.

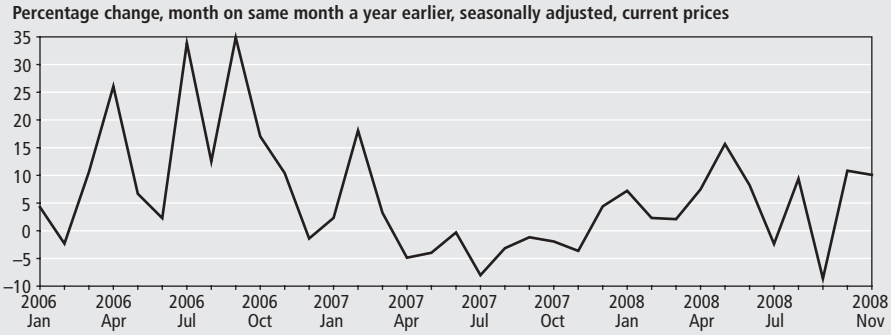
The BRC retail sales monitor measures changes in the value of retail sales from a sample of approximately 70 participants across the UK retail industry. The monitor measures the value of spending and does not adjust for price changes. BRC retail sales growth is reported both in total and on a 'like for like' basis. The former reports the growth in retail sales across the whole retail industry, while the latter only measures the

Figure 8
Total household consumption expenditure on retail goods as a proportion of gross household disposable income



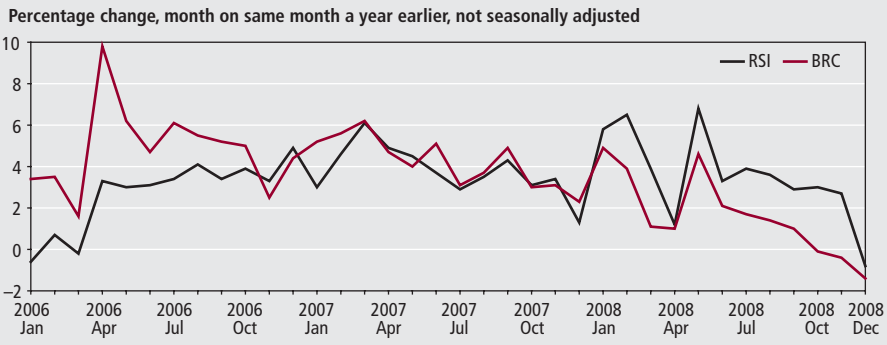
Source: Office for National Statistics

Figure 9
Expenditure of overseas visitors to the UK



Source: Office for National Statistics

Figure 10
BRC series and ONS value RSI for all retailers



Source: Office for National Statistics, British Retail Consortium

Table 2
Main differences in convergence between the RSI and the BRC retail indicator

RSI	BRC
Survey of 5,000 retailers of all sizes, Great Britain only	A range of mainly large retailers accounting for some 60 per cent of total UK sales value
Covers all kinds of retailers, including mail order/internet retailers and market stores	A representative range of retailers across all sectors, but excluding market stalls
60 per cent response at first release, usually representing 90 per cent of the sales of those selected	100 per cent response every month
Sample updated each month, in accordance with the profile of the British retail industry	Converge as BRC membership

Source: Office for National Statistics, British Retail Consortium

change in comparable sales, excluding any spending in stores that opened or closed in the intervening year. The RSI measures sales across the whole economy including new stores. It does not report sales on a like for like basis and so valid comparisons between the RSI and BRC retail indicators must be done on a total sales basis. The RSI for the value of sales, not seasonally adjusted, is the most appropriate measure to compare with the BRC series. **Figure 10** shows that, over time, both series have a common trend. However, there is a divergence between the series in the second half of 2008, though the gap narrowed in December 2008.

Differences between the two indicators in coverage and the method of compilation can lead to apparent discrepancies in the published figures. Palmer and Hynard (2007) have highlighted the main methodological differences between the indicators. The main coverage differences are summarised in **Table 2**.

As a demonstration of how the methodological differences in the two surveys can lead to differences in reported growth rates, **Figure 11** shows a comparison between RSI figures (excluding the sales of small businesses) and the BRC. The correlation between both indicators increases from 0.70 to 0.77 when the sales of small businesses are excluded from the RSI.

Conclusions

Over the course of 2008, volatility in financial markets triggered what is considered by some to be the most serious banking crisis in modern economic history. With credit now highly rationed and households uncertain about future labour market prospects, spending behaviour has been modified accordingly. Spending on household goods that were supported by the thriving housing market has been cut back as house prices have fallen sharply. However, spending on food items and non-store goods has been more resilient, as household incomes have been sustained despite tighter credit conditions.

The RSI data show that retail sales in non-food stores (particularly those that sell household goods) have contracted sharply in the second half of 2008. Food store sales were the key driver of retail sales in that period followed by non-store retailing. Price movements can partly explain the changes in the growth rates towards the end of the year. This will be explored in a second article to be published later in 2009.

CONTACT

elmr@ons.gsi.gov.uk

REFERENCES

Bank of England (2008) 'Quarterly Inflation Report', *Bank of England,* November 2008.

Blanchflower D (2009) 'Macroeconomic policy responses in the UK?', *Open lecture at the Globalisation and Economic Policy Centre*, 29 January 2009 at The University of Nottingham.

Dolling M, Herbert R and Skipper H (2005) 'Early estimates of Consumer Spending' at www.statistics.gov.uk/cci/article.asp?id=1036

Hellebrandt, T and Young, G (2008), 'The financial position of British households: evidence from the 2008 NMG Research survey', *Bank of England Quarterly Bulletin,* November, pp 384–92.

Palmer N and Hynard J (2007) 'Comparing ONS's retail sales index with the BRC's retail sales monitor', *Economic & Labour Market Review* 1(4), pp 47–9 and at www.statistics.gov.uk/cci/article.asp?id=1773

Figure 11
BRC total sales and ONS value RSI for all large and total retailers

Percentage change, month on same month a year earlier, not seasonally adjusted

Source: Office for National Statistics, British Retail Consortium

FEATURE

Clive Dobbs
Office for National Statistics

Patterns of pay: results of the Annual Survey of Hours and Earnings, 1997 to 2008

SUMMARY

The Annual Survey of Hours and Earnings (ASHE) is the most detailed and comprehensive source of information on levels of earnings, make-up of total earnings and distribution of the earnings of individual employees.

The first few sections of this article present summary analyses (overall medians, make-up and distribution of earnings) from the results of the 2008 ASHE, comparing them with the 2007 results (and where relevant the 1997 to 2007 back series). While these figures are of interest, they can hide wide variations between different industries, occupations, regions and age groups. The concluding sections of the article give summary analyses of each of these factors.

The main source for information on the distribution of earnings in the Office for National Statistics (ONS) is the Annual Survey of Hours and Earnings (ASHE). It is the most detailed and comprehensive source of UK information on:

- levels of earnings (separately for type of worker and for gender)
- make-up of total earnings (split between basic pay and other components)
- distribution of the earnings of individual employees (the extent to which they are dispersed around the median)

It focuses on medians rather than means and on the distributions of paid hours worked (in total and on overtime). The median is the value below which 50 per cent of employees fall. The median is preferred to the mean for earnings as it is less affected by extreme values and the skewed distribution of earnings data. However, the means are still available in the annually published results.

More details on the methodology for the survey were published in November 2004.[1]

For 2004, results are available that exclude supplementary information so that they are comparable with the back series generated by the imputation and weighting of the 1997 to 2003 New Earnings Survey (NES) data. From 2004 to 2006, results are available on the same basis (they all have the 2004, 2005 and 2006 changes incorporated into them). The methodological changes made in 2007 have also been taken back to 2006 so that 2006, 2007 and 2008 results are comparable. This means that by producing two versions of 2004 results and two versions of 2006 results, ONS is able to produce a continuous series of growth rates over this period. The survey changes introduced since 2004 are detailed in the technical note at the end of the article.

Both sets of 2004 and 2006 results are included in tables supporting this article, available on the ONS website.[2]

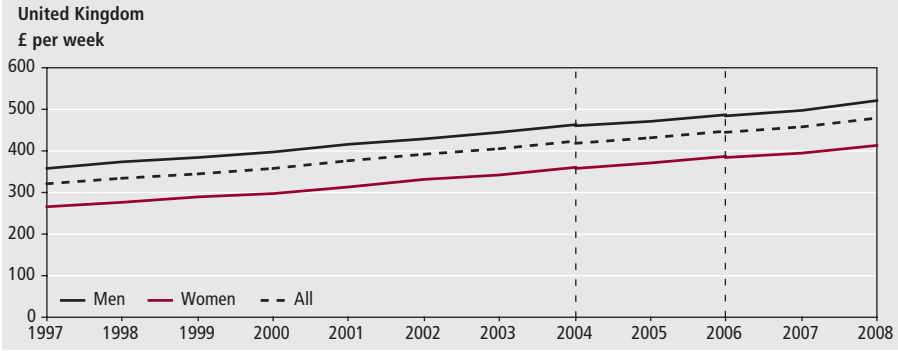
Summary results for full-time employees

Median gross weekly earnings for full-time employees on adult rates working a full week in April 2008 were £479 (see **Figure 1**). At £521, the median gross weekly earnings of full-time men on adult rates, whose pay for the pay period was not affected by absence, increased by 4.6 per cent compared with a 4.4 per cent rise for women (to £412). Since 1997, however, median gross weekly earnings for full-time women have increased significantly more than for full-time men (55.3 per cent compared with 46.0 per cent).

Median gross annual earnings of all full-time employees on adult rates in the same job for at least a year were £25,100 for the 2007/08 tax year. Median gross annual pay for full-time men was £27,500, up 4.6 per cent from 2007; for full-time women it was £21,400, up 4.6 per cent.

Median hourly earnings excluding overtime of all full-time employees were £11.87 in April 2008, representing an

Figure 1
Median gross weekly earnings of full-time employees: by gender,[1] April 1997 to April 2008



Notes: *Source: Annual Survey of Hours and Earnings*

1 Full-time employees on adult rates whose pay for the survey period was unaffected by absence. Broken vertical lines represent discontinuities in 2004 and 2006 ASHE results.

increase of 4.5 per cent since April 2007. Full-time male employees saw an increase in median hourly earnings of 0.3 percentage points more than that for women (4.4 per cent compared with 4.1 per cent).

There has been a slight fall since 1997 in the median total paid hours worked per week by employees in full-time employment and for whom weekly paid hours were reported (37.5 in 2008 compared with 37.9 in 1997). In April 2008, men worked 39.0 paid hours per week and women 37.1 hours.

Summary results for part-time employees

Part-time employees earned a median hourly rate excluding overtime of £7.49 in April 2008, an increase of 3.4 per cent over the year. For part-time men, the increase was 2.0 per cent over the year, to £7.26, while for part-time women it was 3.2 per cent, to £7.51. Since 1997, female employee hourly rates have remained above the levels for male employees (see **Figure 2**) with little change to the pay gap during this period.

There has been a slight increase in the ratio of part-time to full-time median hourly earnings excluding overtime since 1997. In 2008, median hourly earnings excluding overtime of part-time workers were 63.1 per cent of those for full-time workers (compared with 60.6 per cent in 1997). For part-time men they were 58.1 per cent of full-time male earnings (compared with 56.8 per cent in 1997) and for part-time women 68.9 per cent (68.4 per cent in 1997) (see **Figure 3**).

The proportion of part-time male employees in the total workforce rose from 3.7 to 5.9 per cent between 1997 and 2008, but is still well below the proportion of part-time female employees, which rose from 19.5 to 20.3 per cent over the same period.

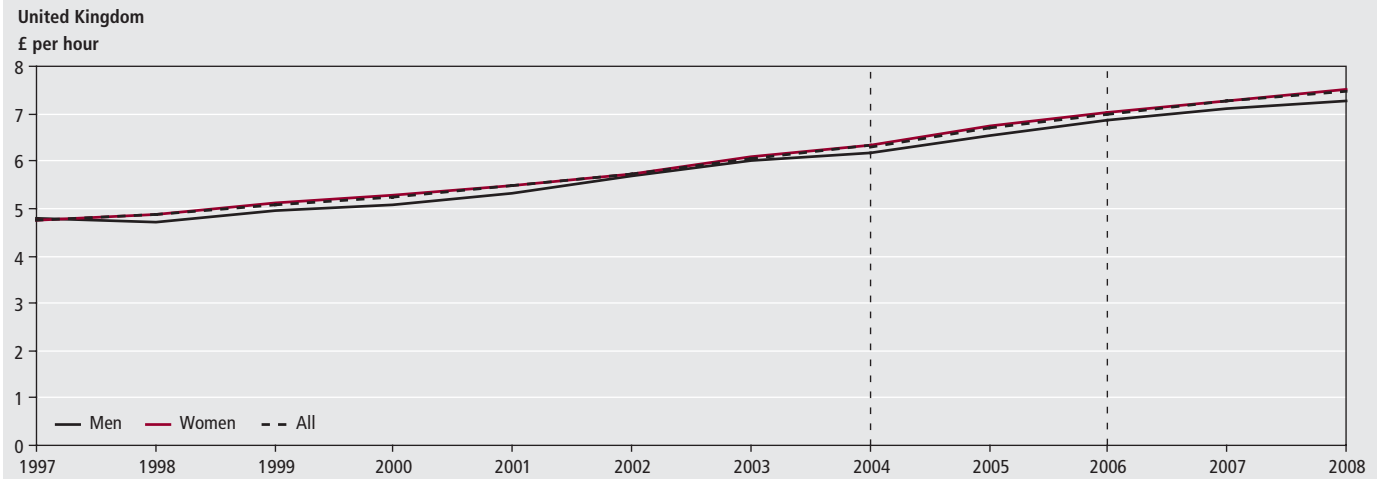
Part-time female median hourly pay is higher than the equivalent for males, partly due to a higher proportion of females working part-time throughout their careers. **Figure 4** shows the distribution of part-time employees by gender and by age. It illustrates a higher proportion of females working part-time in the higher income age groups (aged 30 to 39, 40 to 49 and 50 to 59). Male part-time working is higher in the younger age groups as well as in the 60 and over age group.

Pay differences between men and women

Various methods can be used to measure the earnings of women relative to men. ONS prefers to use hourly earnings excluding overtime and focuses on estimates for full-time employees. Including overtime can skew the results because men work relatively more overtime than women. Including part-time employees could have a similar effect, because women make up a much bigger proportion of part-time employees than men.

The hourly earnings excluding overtime were £10.91 for full-time women on adult rates whose pay for the pay period was unaffected by absence and £12.50 for men. The gender pay gap was 17.4 per cent in 1997 and has since narrowed steadily to 12.8 per cent in 2008. The gender pay gap for mean hourly earnings excluding overtime is wider than for medians and has fallen from 20.7 to 17.1 per cent over the same time period (see **Figure 5**).

Figure 2
Median hourly earnings of part-time employees: by gender,[1] April 1997 to April 2008

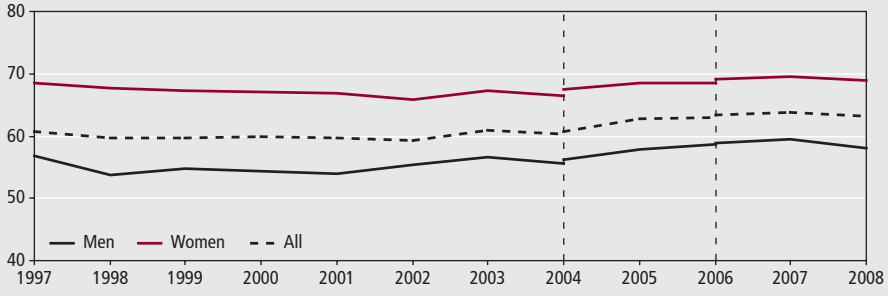


Notes: *Source: Annual Survey of Hours and Earnings*

1 Hourly earnings excluding overtime for part-time employees on adult rates whose pay for the survey period was unaffected by absence. Broken vertical lines represent discontinuities in 2004 and 2006 ASHE results.

Figure 3
Ratio of part-time to full-time median hourly earnings,[1] April 1997 to April 2008

United Kingdom
Percentages

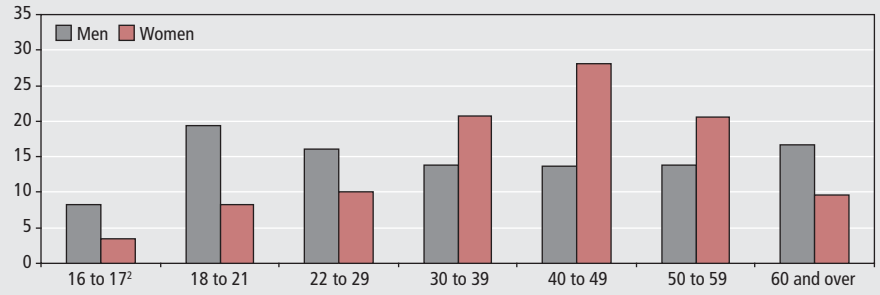


Notes: *Source: Annual Survey of Hours and Earnings*

1 Hourly earnings excluding overtime for employees on adult rates whose pay for the survey period was unaffected by absence.
Broken vertical lines represent discontinuities in 2004 and 2006 ASHE results.

Figure 4
Distribution of part-time employees:[1] by gender and age group, April 2008

United Kingdom
Percentages

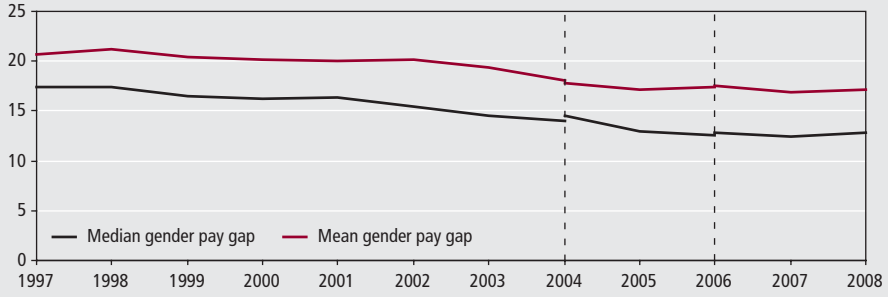


Notes: *Source: Annual Survey of Hours and Earnings*

1 Part-time employees on adult rates whose pay for the survey period was unaffected by absence,
2 Results for 16 to 17-year-olds include employees not on adult rates of pay.

Figure 5
Pay gap between women's and men's hourly earnings,[1] April 1997 to April 2008

United Kingdom
Percentages



Notes: *Source: Annual Survey of Hours and Earnings*

1 Hourly earnings excluding overtime for full-time employees on adult rates, whose pay for the survey period was unaffected by absence.
Broken vertical lines represent discontinuities in 2004 and 2006 ASHE results.

When measured using median hourly earnings excluding overtime, the gender pay gap has narrowed by more than a quarter in the ten years since 1997.

The stronger growth in full-time men's hourly earnings excluding overtime compared with women's has meant that the gender pay gap has increased to 12.8 per cent, up from 12.5 per cent in 2007 when it was at its lowest point. The gender pay gap for all employees also increased in 2008 to 22.5 per cent, up from 21.9 per cent in 2007.

Median hourly earnings excluding overtime for part-time women are higher than those of part-time men. In 2008, the gender pay gap based on median hourly earnings for part-time employees decreased to –3.5 per cent, down from –2.9 per cent in 2007. Mean hourly earnings excluding overtime for part-time women are lower than those of part-time men. Nevertheless, the gender pay gap based on mean hourly earnings also decreased, to 13.2 per cent, down from 13.6 per cent over the same period.

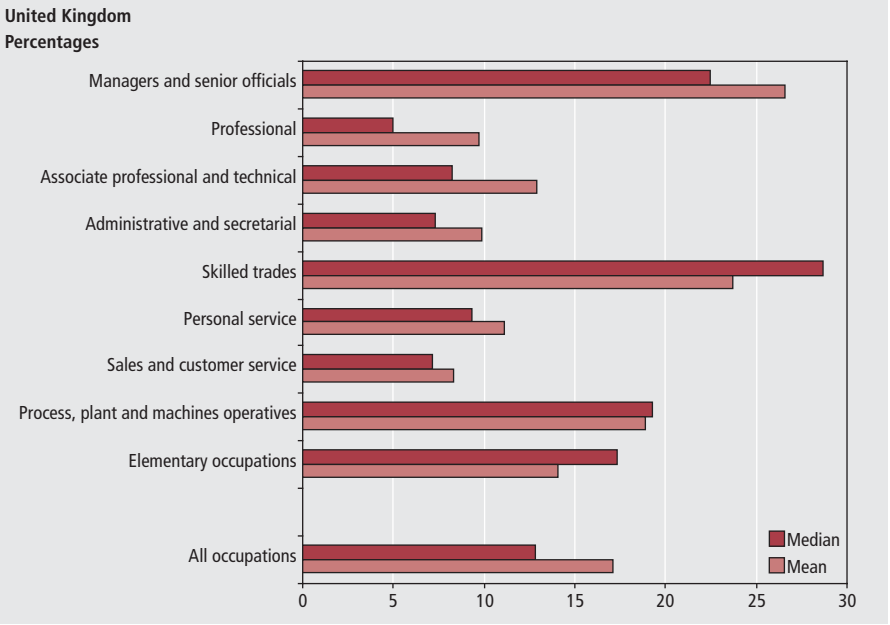
Although median and mean hourly pay excluding overtime provides a useful comparison of men's and women's earnings, it does not reveal differences in rates of pay for comparable jobs. This is because such measures do not highlight the different employment characteristics of men and women, such as the proportion of each gender in different occupations and their length of time in jobs.

Figure 6 shows the median and mean gender pay gaps for 2008 broken down by the Standard Occupation Classification (SOC) 2000 major occupational groups. The median gender pay gap is narrowest for 'Professional occupations' (5.0 per cent). The widest median gender pay gap is for 'Skilled trades occupations' (28.7 per cent). The narrowest mean gender pay gap is for 'Sales and customer service occupations' (8.4 per cent) and the widest is for 'Managers and senior officials' (26.6 per cent).

There are large variances in the gender pay gap for part-time employees broken down by SOC 2000 major classification. In 2008, the median gender pay gap is widest for 'Skilled trades occupations' (19.4 per cent) and narrowest for 'Administrative and secretarial' (–9.2 per cent), where women's hourly earnings excluding overtime are higher than those for men. The mean gender pay gap is, as for the median, widest for 'Skilled trades occupations' (32.6 per cent) and narrowest for 'Administrative and secretarial' (–2.5 per cent).

The differences between median and mean gender pay gaps reflect the extent to which high earners skew the earnings distribution for men or women. For example, the higher mean pay gap relative to median for full-time professional occupations reflects a small number of very high-earning males in the distribution, whereas the lower mean pay gap relative to median in full-time skilled trades occupations is due to the female mean being skewed by a relatively larger proportion of

Figure 6
Pay gap between women's and men's hourly earnings:[1] by occupation,[2] April 2008



Notes: *Source: Annual Survey of Hours and Earnings*

1 Hourly earnings excluding overtime for full-time employees on adult rates, whose pay for the survey period was unaffected by absence.
2 Standard Occupational Classification (SOC) 2000.

high earners in an occupation group with a small number of women.

A regional analysis and an age analysis of the pay difference between the sexes are included later in the article.

The make-up of earnings

ASHE splits gross weekly earnings into four components: overtime, payments by results/ incentive payments, premium payments for shift work, and the residual – which includes basic pay and allowances. The first three components vary quite considerably by type of worker.

The 2005 ASHE questionnaire introduced a discontinuity in the make-up of gross weekly earnings regarding payments by results/incentive payments and this change was taken back to 2004 results. ASHE results for 2004 to 2008 include incentive pay paid and earned in the pay period, but exclude payments made less often than every pay period. As a result of this change in definition, there are a lower proportion of payments by results for these years than for earlier years. Because of this, the amount of incentive pay earned in the pay period is understated. However, the estimates are improved because the new definition results in greater consistency, as the data reported will not depend on the return date of the questionnaire or when bonuses are paid, as in previous years.

The proportion of additional payments for full-time male employees was higher than that of their female counterparts over the period 1997 to 2008. In 2008, full-time male employees earned £48 additional payments, accounting for 7.6 per cent of their total pay, whereas women's additional payments (£20) accounted for just 4.0 per cent of their total pay. Additional payments for part-time employees accounted for 8.5 per cent of men's total pay and 5.5 per cent of women's total pay.

The distribution of earnings

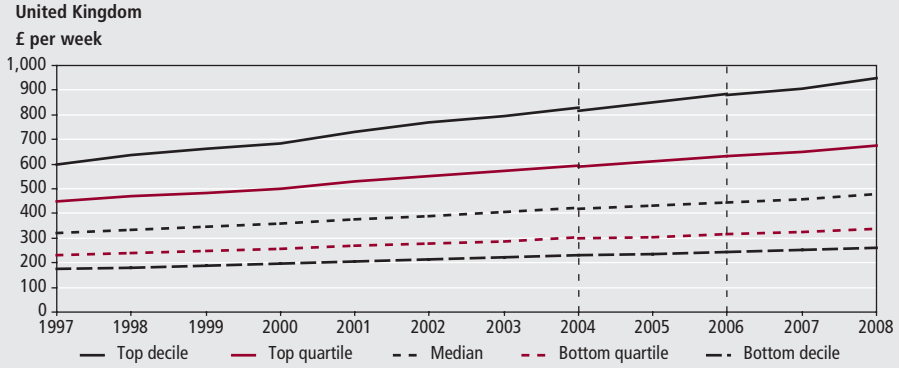
Figure 7 displays the distribution of gross weekly earnings among full-time employees for the years 1997 to 2008. The median level of gross full-time weekly earnings in 2008 was £479 per week. This is lower than the mean (£574), since the latter is boosted by the number of people at the top end of the distribution with extremely high earnings. For 2008, at the bottom of the distribution, a tenth of full-time employees earned less than £262 per week, whereas at the other end of the scale a tenth earned more than £947 per week. The ratio of the highest to lowest decile for gross weekly earnings (3.6 in April 2008) gives a measure of the distribution of weekly pay. This measure has been almost unchanged since 1997, when it was 3.5.

In the year to April 2008, gross weekly earnings of full-time employees in the top decile of the distribution grew faster than those in the bottom decile (4.4 per cent against 3.5 per cent, respectively). Between 1998, when the National Minimum Wage (NMW) was introduced, and 2008, the top decile increased by 49.0 per cent against a bottom decile increase of 45.0 per cent. **Figure 8** shows the pattern of growth in the top and bottom deciles of gross weekly earnings for full-time employees and for the Retail Prices Index (RPI) since 1997. Over the last two years, the RPI increased above the bottom decile, whereas the trend for most years since 1997 was for the top and bottom end of the distribution of gross weekly earnings of full-time employees to increase above the RPI.

Results by industry

Median gross weekly earnings for full-time employees in April 2008 was highest in the 'Mining and quarrying' sector, at £648. This was £35 per week more than the second highest, the 'Electricity, gas and water supply' sector. Over the period

Figure 7
Distribution of gross weekly earnings for full-time employees,[1] April 1997 to April 2008

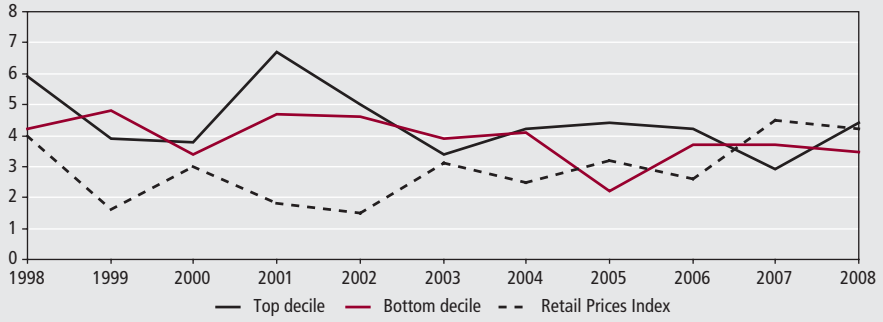


Notes: *Source: Annual Survey of Hours and Earnings*

1 Full-time employees on adult rates whose pay for the survey period was unaffected by absence. Broken vertical lines represent discontinuities in 2004 and 2006 ASHE results.

Figure 8
Earnings growth in top and bottom deciles for full-time employees[1] and changes in RPI, April 1998 to April 2008

United Kingdom
Percentage change, year on year



Note: *Source: Annual Survey of Hours and Earnings*

1 Full-time employees on adult rates whose pay for the survey period was unaffected by absence.

1997 to 2008, 'Financial intermediation' has also featured as the highest median gross weekly earning sector. The weekly earnings for the 'Mining and quarrying' sector and also the 'Electricity, gas and water supply' sector are boosted by longer paid hours worked by employees in these sectors relative to other sectors.

In 2008, the median gross annual earnings of £35,400 for the 'Mining and quarrying' sector were more than double that of the 'Hotels and restaurants' sector which, for all the years 1997 to 2008, was the lowest-paid sector.

The 'Financial intermediation' sector had the highest median hourly earnings excluding overtime for full-time employees (£16.47) followed by the 'Mining and quarrying' sector (£15.20).

The mean gross annual earnings for the 'Financial intermediation' sector are significantly higher than those of any other sector because of the skewed effect of extremely high earners on the earnings distribution.

The 'Hotels and restaurants' sector has the lowest median gross weekly earnings. At £297, full-time employees' earnings were some £55 per week lower than the median for 'Agriculture, hunting and forestry' (the second lowest paid). Median hourly earnings excluding overtime for the 'Hotels and restaurants' sector was £7.00, once again lower than the 'Agricultural, hunting and forestry' sector (£7.67).

Median gross weekly earnings in manufacturing were 3.3 per cent higher than in services (gross weekly earnings of £487 and £472, respectively).

Part-time median hourly earnings excluding overtime were highest in the 'Electricity, gas and water supply' sector (£10.58) and lowest in the 'Hotel and restaurants' sector (£5.58). These are among the top and bottom earners for full-time employees.

The broad industrial groupings described above can hide substantial variation within the sectors. ASHE, however, allows more detailed industrial analyses. For example, it is possible to identify the highest and lowest-paid industry divisions (two-digit Standard Industrial Classification 2003). Such analyses reveal that, in addition to those employees noted earlier within the 'Mining and quarrying', 'Financial intermediation' and 'Electricity, gas and water supply' sectors, full-time employees involved in the 'Manufacture of coal and lignite; extraction of peat', 'Extraction of crude petroleum and natural gas; service activities incidental to oil and gas extraction excluding surveying' and 'Manufacture of coke, refined petroleum products and nuclear fuel', were among the highest paid per week in April 2008.

Various branches of the manufacturing and the retail sectors make up much of the ten lowest-paid industries. 'Hotels and restaurants' was the lowest-paid sector of all.

Public and private sector earnings

The adjustments made to the 2004 data in order to produce estimates comparable with the 2005 data also impact on the gap between public and private sector earnings. The exclusion of incentive payments paid outside the pay period pulls down the private sector estimates because private sector employees receive a higher proportion of incentive pay than public sector employees. Also, public sector employees receive greater proportions of pay for other reasons. Consequently, because of the adjustments to the 2004 data, private sector estimates have decreased and public sector increased.

The gap between private and public sector median earnings for full-time employees showed little change in April 2008. Private sector median gross weekly earnings were £460, up 4.6 per cent on 2007. For the public sector, the comparable figure was £523, up 4.3 per cent. Public sector mean gross weekly earnings (at £582) were higher than the private sector (at £574). As with gender pay, the difference in gross weekly earnings does not reveal differences in rates of pay for comparable jobs. This is due to the types of occupation in the public and private sector being quite different.

Results by occupation

ASHE 2008 data for occupation is coded to SOC 2000, which was introduced in 2002; before then, SOC 1990 was used.

The occupational major group (as defined within SOC 2000) with the highest median gross weekly earnings for full-time employees was 'Managers and senior officials' at £693. This group had the highest median gross annual salary (£36,700), which was more than £1,000 higher than that for 'Professional occupations'. Those in 'Professional occupations' had the highest median hourly earnings excluding overtime (£19.02). This was nearly £1 higher than the median for 'Managers and senior officials' (£18.05), the second most highly paid major group on an hourly basis.

'Professional occupations' have had the highest median hourly earnings excluding overtime since SOC 2000 was introduced in 2002. Apart from in 2005, 'Managers and senior officials' had the highest median annual earnings and median gross weekly earnings over the same period. This can be explained because the 'Managers and senior officials' group receive higher annual incentives and also work longer paid hours per week than full-time employees in the 'Professional occupations' group.

'Sales and customer service occupations' were, as for the years since the introduction of SOC 2000, the lowest-paid median gross weekly major group, at £287 per week for full-time employees. This major group includes occupations that are generally acknowledged to be low-paid, such as 'Retail cashiers and check-out operators' and 'Market and street traders and assistants'.

In April 2008, the increase in median gross weekly earnings was highest for 'Skilled trades occupations' (4.9 per cent) and lowest for 'Professional occupations' (2.4 per cent).

In the 2008 survey, the highest-paid unit

group occupation (four-digit SOC 2000) for full-time employees was 'Directors and chief executives of major organisations', with median gross weekly earnings of £1,878. The next highest-paid occupation was 'Senior officials in national government', with median gross weekly earnings of £1,276 per week. With median gross weekly earnings of £227, 'Leisure and theme park attendants' were the lowest paid of all full-time adult employees.

With median hourly earnings excluding overtime of £38.78, 'Medical Practitioners' was the highest-paid part-time occupation; the lowest at £5.52 were 'Waiters and waitresses' and 'Bar staff'. Interestingly, £5.52 is the national minimum rate for those aged 22 and over.

Results by region

London tops the regional list in terms of median full-time gross weekly earnings, with £613 in April 2008. This was more than £100 above the next highest, the South East. London's high levels of pay are largely due to the fact that a high proportion of its labour force is employed in higher-paying industries and occupations, and also because many employees are entitled to allowances for working in the capital. Northern Ireland (with median full-time gross weekly earnings of £418) was at the bottom of the regional list, with the North East and Wales (at £421) only £3 higher. Median gross weekly earnings for UK full-time employees were £479.

Employees in the East Midlands received the largest increases in median gross weekly earnings (5.0 per cent, to £443).

Since 1997, similar patterns were observed for median gross annual pay and median hourly pay excluding overtime, with London topping the list followed by the South East. The North East, Wales and Northern Ireland have the lowest pay levels across the regions.

It should be noted that earnings comparisons take no account of different price levels between regions and therefore do not indicate differences in the standard of living. Neither do they take account of the different mix of occupations and therefore cannot be used to claim that pay for like work is different. A region could have a lower level of median earnings than another if it has a higher proportion of employees in industries or occupations with relatively lower earnings.

In the UK, the gender pay gap (when measured using the median full-time hourly earnings excluding overtime) was 12.8 per cent. The largest gender pay gap was 16.7 per cent in the South East region; the smallest was in Northern Ireland (at 2.6 per cent). Over the period 1997 to 2008, the largest reduction in the gender pay gap was in Northern Ireland (16.5 per cent to 2.6 per cent); the smallest was in London (15.1 per cent to 13.4 per cent). **Figure 9** illustrates the gender pay gap for median hourly earnings excluding overtime for the four home countries.

Results by age group

In 2008, median gross weekly earnings for full-time employees climbed steadily with age to reach a maximum for those aged 40 to 49, declining thereafter. However, if the median earnings of men and women are considered separately, then women's earnings peaked earlier than those of men. This pattern is repeated over the period 1997 to 2008. Median gross weekly earnings of full-time women climbed with age to reach a maximum of £480 for those aged 30 to 39. Full-time men's median gross weekly earnings reached their maximum of £598 for those aged 40 to 49 (see **Figure 10**).

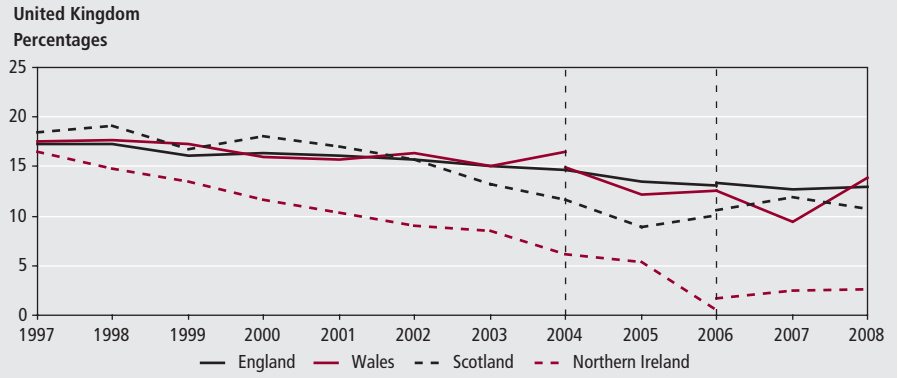
The largest increase in the median gross weekly wage between April 2007 and April 2008 was recorded among full-time employees aged 50 to 59, whose weekly earnings increased by 5.1 per cent to £504.

Figure 11 shows the mean and median gender pay gaps by age group. The gender pay gap increases and peaks in those aged 40 to 49 but remains at a high level in the 50 to 59 age group.

Comparisons with the Average Earnings Index and Average Weekly Earnings surveys

Each month, ONS also collects information on earnings from the Monthly Wages and Salaries Survey, used to construct the Average Earnings Index (AEI) and Average Weekly Earnings (AWE). This survey asks

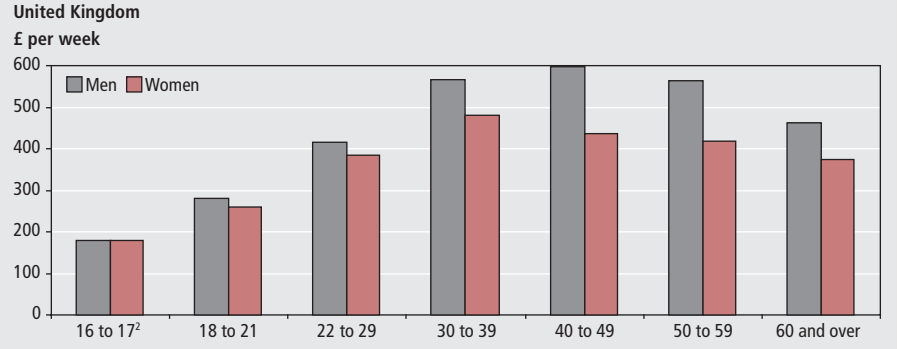
Figure 9
Pay gap between women's and men's earnings: by country,[1] April 1997 to April 2008



Notes: *Source: Annual Survey of Hours and Earnings*

1 Median hourly earnings excluding overtime for full-time employees on adult rates whose pay for the survey period was unaffected by absence.
Broken vertical lines represent discontinuities in 2004 and 2006 ASHE results.

Figure 10
Median gross weekly earnings: by gender and age group,[1] April 2008

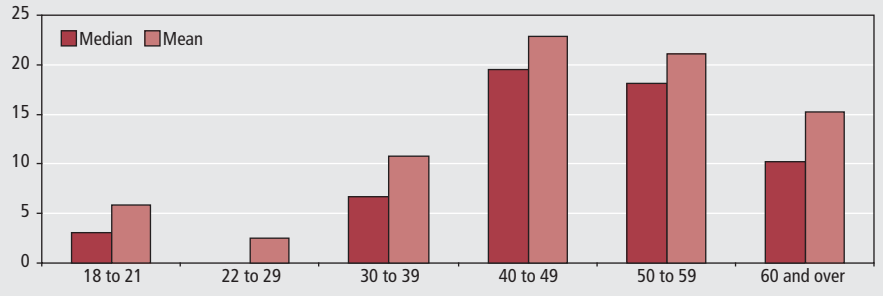


Notes: *Source: Annual Survey of Hours and Earnings*

1 Full-time employees on adult rates whose pay for the survey period was unaffected by absence.
2 Results for 16 to 17-year-olds include employees not on adult rates of pay.

Figure 11
Pay gap between women's and men's hourly earnings: by age,[1] April 2008

United Kingdom
Percentages



Note: *Source: Annual Survey of Hours and Earnings*

1 Hourly earnings excluding overtime for full-time employees on adult rates, whose pay for the survey period was unaffected by absence.

9,000 employers to provide information about total pay and numbers of employees, but does not ask more detailed questions about, for example, the gender and occupations of their staff. At present, AWE is published as an experimental statistic and is still undergoing development, which may lead to changes/refinements to its methodology before it becomes a National Statistic in 2009.

The AEI is used to provide an estimate of the growth in earnings per head, while the AWE is used to produce estimates of levels of pay.

It is therefore not possible to make detailed comparisons of the level in earnings between the AEI and ASHE. The closest measure that can be derived from these surveys is for gross pay. In the year to April 2008, the ASHE estimate of the growth in median gross weekly pay was 4.6 per cent. The comparable estimate from the AEI was 3.8 per cent and, for the experimental AWE, 4.9 per cent. For the public sector, comparable growth rates were 4.3 per cent (ASHE), 3.8 per cent (AEI) and 3.9 per cent (AWE). For the private sector they were 4.6 per cent (ASHE), 3.7 per cent (AEI) and 5.2 per cent (AWE).

Low pay jobs

The number of UK jobs paid below the NMW in April 2008 was 288,000, amounting to 1.1 per cent of all jobs in the labour market. The estimate was produced using a methodology based solely on ASHE, which replaced the NES.

In April 2008 there were three rates for the NMW: one for those aged 16 to 17 (£3.40 per hour), one for those aged 18 to 21 (£4.60 per hour) and one for those aged 22 and over (£5.52 per hour).

The number of jobs paid below the NMW were:

- 17,000 jobs (3.9 per cent) held by those aged 16 to 17
- 47,000 jobs (2.6 per cent) held by those aged 18 to 21, and
- 224,000 jobs (0.9 per cent) held by those aged 22 and over

People in part-time work were more than twice as likely as people in full-time work to be paid less than the NMW, with 1.8 per cent of part-time jobs and 0.8 per cent of full-time jobs falling below this level. Jobs held by women were more likely to fall below the NMW than those held by men (1.4 per cent compared with 0.8 per cent). This was primarily due to the greater number of women in part-time jobs.

It is important to note that these estimates do not measure non-compliance with the NMW legislation. ASHE does not indicate whether individuals fall into a category that is exempt from the legislation, such as apprentices or new trainees.

Notes

1 See www.statistics.gov.uk/cci/article.asp?id=985
2 See www.statistics.gov.uk/statbase/product.asp?vlnk=14123

CONTACT
elmr@ons.gsi.gov.uk

TECHNICAL NOTE

Survey details

The Annual Survey of Hours and Earnings (ASHE) is based on a sample of employee jobs taken from HM Revenue & Customs PAYE records. Information on earnings and paid hours is obtained in confidence from employers. It does not cover the self-employed nor does it cover employees not paid during the reference period. In 2008, the information related to the pay period which included 16 April. The 2008 ASHE is based on approximately 146,000 returns.

ASHE replaced the New Earnings Survey (NES) as ONS's main source of information on the distribution of earnings. Articles describing the ASHE methodology and the impact of its introduction on 1997 to 2004 are available on the ONS website at www.statistics.gov.uk/statbase/product.asp?vlnk=13101

The main differences between ASHE and NES are:

- ASHE results are weighted to the number of jobs given by the Labour Force Survey (LFS)
- ASHE imputes for item non-response
- the coverage of employees for ASHE is greater than that of NES
- the median replaces the mean as the headline statistic. The median is the value below which 50 per cent of employees fall. It is preferred over the mean for earnings data as it is less influenced by extreme values and because of the skewed distribution of earnings

Changes in 2004

Since 2004, survey supplementary information has been collected to improve coverage and make the survey more representative. This includes employees who have either changed or started new jobs between sample selection from HMRC records and the survey reference period in April.

Changes in 2005

A new questionnaire was introduced for the 2005 survey. This questionnaire brings significant improvement to the quality of the results. More details on the impact of introducing the new questionnaire can be found at www.statistics.gov.uk/cci/article.asp?id=1294

Changes to the wording and definitions mean that some of the information requested from respondents will differ from that supplied in past surveys. The introduction of the pay 'for other reasons' question has resulted in the inclusion of earnings information which may not have been collected in the past. Results for 2004 including supplementary information have been reworked to allow for this missing pay. For more details on the methodology involved in estimating pay for other reasons, see the ONS website at www.statistics.gov.uk/cci/article.asp?id=1299

Also, the definition of incentive/bonus pay changed for 2005 to only include payments that were paid and earned in April. This brings the definition more in line with that used in the Average Earnings Index (AEI) and will result in greater consistency of ASHE results. Results for 2004 including supplementary information have been reworked to exclude irregular bonus/incentive payments to make them consistent with results from 2005 onwards.

Changes in 2006

In 2006, ASHE moved to the ONS standard for geographic areas using Output Areas as the building block to higher-level geographic breakdowns. Previously, ASHE geographies were created by matching returned postcode information against the Inter-Departmental Business Register to give various levels of geographic information. The key points are:

- ASHE results for geographic areas are produced in line with the ONS standard and this allows further geographic analysis variables to be produced
- The quality of geographic results has improved

In addition, from 2006, the LFS has moved from using seasonal quarters to calendar quarters. As ASHE uses LFS data in the calculation of aggregation weights, it was necessary to move from using data taken from the LFS spring quarter to LFS quarter two.

The inclusion of supplementary information since 2004, the introduction of a new questionnaire in 2005, and the move to using new ONS geographies and LFS calendar quarters in 2006 has meant that the ASHE results are discontinuous in 2004. Therefore, a consistent series which takes into account all of these identified changes has been produced going back to 2004. For 2004, results are also available that exclude supplementary information so that they are comparable with the back series generated by imputation and weighting of the 1997 to 2003 NES data.

Changes in 2007

In March 2007, ONS released information on its statistical work priorities over the period 2007/08. ONS announced that the sample size of ASHE was to be reduced by 20 per cent. ASHE results for 2008 are based on approximately 146,000 returns, down from 175,000 in 2006. The impact of this change was minimised by reducing the sample in an optimal way, with the largest sample reductions occurring in industries where earnings are least variable. The sample cut did not affect Northern Ireland, neither did it affect a number of organisations with an agreement to provide information electronically.

ONS also introduced a small number of methodological changes, which improved the quality of the results. These included changes to the sample design itself, as well as the introduction of an automatic occupation coding tool, ACTR.

The key benefits of moving to ACTR coding are:

- an improvement in the quality and consistency of ASHE results
- out-of-date codes will be updated annually
- ACTR provides ASHE and ONS with a standard tool for coding occupation

The methodological changes made in 2007 have been taken back to 2006 so that, from 2006 to 2008, results are available on the same basis. For 2006, results are also available on the same basis as 2004 and 2005.

Changes in 2008

In May 2008, the LFS was reweighted to the latest (2007/08) population estimates. Previously, LFS results were based on population totals published in 2003. ASHE uses LFS to calculate aggregation weights. The revised LFS figures have been used for 2007 (revised) and 2008 ASHE results. The impact of the new weights on the ASHE results for 2007 is small.

Further information can be found on the ONS website at
www.statistics.gov.uk /downloads/theme_labour/ashe/changeinashe07.pdf

Definitions

The earnings information collected relates to gross pay before tax, National Insurance or other deductions, and generally excludes payments in kind. With the exception of annual earnings, the results are restricted to earnings relating to the survey pay period and so exclude payments of arrears from another period made during the survey period. Any payments due as a result of a pay settlement but not yet paid at the time of the survey will also be excluded.

For particular groups of employees, changes in median earnings between successive surveys may be affected by changes in the timing of pay settlements, in some cases reflecting more than one settlement and in other cases no settlement at all.

Most of the published ASHE analyses relate to full-time employees on adult rates whose earnings for the survey pay period were not affected by absence. They do not include the earnings of those who did not work a full week, and those whose earnings were reduced because of, for example, sickness or short-time working. Also, they do not include the earnings of employees not on adult rates of pay, most of whom will be young people. Some more information on the earnings of young people and part-time employees is available in the detailed annual published ASHE results. Full-time employees are defined as those who work more than 30 paid hours per week or those in teaching professions who work more than 25 paid hours per week.

Factors contributing to earnings growth

The increase in average earnings from one year to the next reflects several factors: pay settlements implemented between the April survey dates; changes in the amount of paid overtime and other payments relative to basic pay; and the structural effects of changes in the composition of the ASHE sample and the employed labour force.

Revisions

In line with normal practice, this article contains revised estimates from the 2007 survey results published on 7 November 2007. These take account of some corrections to the original 2007 data which were identified during the validation of the results for 2008, as well as late returns.

Other earnings information

The monthly AEI, based on the Monthly Wages and Salaries Survey of 9,000 employers, provides information on changes in mean earnings for broad industrial sectors. No information is available on occupation, paid hours worked, and other characteristics of the workforce.

The LFS collects information on the earnings and hours of about 15,000 households over each quarter. In addition it collects data on a wide range of personal characteristics, including education level and origin. This enables the preparation of statistics on levels and distribution of earnings similar to ASHE but with lower precision due to the much smaller sample size.

Publication arrangements

National averages of earnings hide wide variations between different collective agreements, industries, occupations, regions and age groups. The published tables containing the detailed annual ASHE results for UK include analyses of each of these and are now available on the ONS website at www.statistics.gov.uk/statbase/product.asp?vlnk=13101

Low pay estimates show the number of jobs paid below the National Minimum Wage in the UK. The estimates were produced using a methodology based solely on ASHE. Further information on the low pay methodology and detailed results are now available at www.statistics.gov.uk/statbase/product.asp?vlnk=5837

FEATURE

Multi-factor productivity: estimates for 1998 to 2007

Alex Turvey
Office for National Statistics

SUMMARY

Multi-factor productivity (MFP), sometimes referred to as 'total-factor productivity' or 'growth accounting', is a method of analysing productivity which allows for a more in-depth assessment of performance at a whole economy or sectoral level. It apportions growth in output to contributions from capital, from labour and a residual MFP which represents the 'productivity change' not explained by the growth in either labour or capital inputs. This approach permits more detailed analysis of what is driving output growth compared with the traditional 'headline' measures of productivity, which use only labour as their factor input. This article presents multi-factor productivity results for 1998 to 2007 using an experimental quality-adjusted labour input measure and experimental estimates of capital services growth as inputs. The analysis has been produced for the whole economy, the market sector and some broad industry groupings.

Annual publication of multi-factor productivity (MFP) estimates is an important development for productivity analysis by the Office for National Statistics (ONS), as the framework applied – the growth-accounting framework – provides a better understanding of the contributions to output growth. This is achieved by showing how much is due to growth in labour (in terms of hours actually worked or its quality) and how much is due to growth in capital, for example, by increased use of plant and machinery, information and communication technology (ICT) or any other form of capital. The residual of output growth that cannot be explained by growth in these inputs is referred to as MFP. The use of a growth-accounting framework provides a much more incisive and detailed assessment of what is driving growth in output and productivity, particularly in comparison with the more conventional, but simpler, labour input-based productivity measures.

Traditionally, the MFP residual is thought to have principally captured technical change, but in practice it also captures a number of other effects. These include improvements in management techniques and processes, improvements in the skill level of the workforce not captured by the quality adjustment of labour, and returns from intangibles such as research and development (R&D), brand equity, firm-specific human capital, organisational capital and design. These are not currently measured in National Accounts investment series, although R&D has been provisionally recorded in a satellite account by Galindo-Rueda (2007) and work is ongoing to fully integrate R&D and other intangibles into the National Accounts in the near future (see, for example, Giorgio Marrano *et al* 2007). The MFP term will also include adjustment costs, economies of scale, cyclical effects, inefficiencies and errors in the measurement of output or inputs.

The measures of labour and capital used in these MFP calculations attempt to more accurately measure the contributions of labour and capital to production by using data on their marginal user costs (wages and rental prices, respectively) to adjust their input, giving a more accurate picture of what has been driving output growth. The quality-adjustment process applied to the labour measure means some insight can be gained into the contribution of labour composition, or skills. Skills are listed as one of the five key drivers of productivity by HM Treasury and the Department for Business, Enterprise & Regulatory Reform (BERR); it is part of government policy to improve the skill level of the UK workforce in order to reduce the productivity gap with the US and other industrialised nations. The results in this article estimate the contribution of skills by splitting the impact of labour into contributions from the volume of hours and labour composition.

MFP analysis is also a useful tool for checking the consistency of output and input data and identifying measurement issues in these areas. For instance, a persistent decline in MFP growth is

not compatible with a sector that is consistently growing in terms of its output. This is particularly relevant to service sector industries, especially financial intermediation and business services, and also public services, where output is inherently difficult to measure. It is in these sectors where quality improvement in output is most prevalent, but also most difficult to capture in official output data.

This article presents MFP results for the period 1998 to 2007 for the whole economy and six broad industry groupings. Due to the short back series for labour input in the market sector, estimates for MFP in this sector cover only the period 2001 to 2007.

Growth accounting

Growth accounting apportions growth in output to growth in the factor inputs and growth in a residual, MFP. This analysis uses gross value added (GVA) as its output measure, and capital and labour as inputs. However, there is more than one way to account for growth in output. **Box 1** outlines the different approaches to growth accounting, focusing on the ongoing EU KLEMS project.

Regardless of the particular method of growth accounting used, the meaning of the MFP residual is the same: it can be interpreted as an approximation of growth in 'disembodied technical change', that is, advances in technology not embodied in capital. Examples of such a change are increased knowledge through R&D or improvements in organisational structure or management. In general, it captures any improvement in output that is not driven by the data on factor inputs. It should be noted that the MFP term does not include 'embodied technical change', that is, advances in the quality of capital or other inputs which are already captured when calculating their contribution. An example of this would be the rapid improvement in the quality of ICT over the last 20 years.

In a sense, MFP growth can be thought of as increased efficiency. This can be achieved in a number of different ways. For instance, if a firm changes its organisational structure and this results in increased efficiency, it can be thought of as growth in MFP. The increase in productivity is not due to an increase in the quantity or quality of capital or labour, but instead an improvement in how they are utilised.

Another important source of MFP growth is the use of ICT. For example, consider two firms that invest equally in ICT, but one employs it better to link its business processes so that sales, stock replenishment, customer service resources and marketing are all automatically linked with no need for manual intervention. Although they have made the same investment in ICT capital, the way the capital has been utilised means that one firm enjoys a much greater boost to productivity. This also illustrates that MFP growth can be the result of the combination of capital and the skill level of the workforce or management.

Methodology

A standard Cobb-Douglas production function, as shown below in equation (1), states that output is a function of capital (K), labour (L) and a generic term (A) which represents disembodied technical change (MFP) and some other factors discussed previously:

$$Y(t) = A(t)K^{\alpha_K}(t)L^{\alpha_L}(t) \qquad (1)$$

Therefore, in continuous time, growth in output can be represented as a share-weighted sum of growth in capital, labour and the Solow residual (A) (Solow 1957), as shown in equation (2):

$$\frac{\dot{Y}(t)}{Y(t)} = \frac{\dot{A}(t)}{A(t)} + \alpha_K \frac{\dot{K}(t)}{K(t)} + \alpha_L \frac{\dot{L}(t)}{L(t)} \qquad (2)$$

where α_K and α_L are the output elasticities for capital and labour, respectively. Since a Cobb-Douglas production function has been used with the assumption of constant returns to scale, α_K and α_L sum to one. Under the assumption of perfect competition, firms will hire labour and invest in capital up to the point where its price or wage equals its marginal product (that is, the value of what it produces). Therefore, the coefficient for capital, α_K, is equal to the share of total income that accrues to capital, captured by gross operating surplus (GOS) in the National Accounts, and the corresponding coefficient for labour equals its share of income, as measured by compensation of employees (CoE). A slight adjustment is made for the self-employed, as all self-employed income is contained in the series mixed income – this issue is discussed later in the article.

More generally, in discrete time, output growth can be approximated as follows:

$$\Delta \ln Y(t) = [1 - \overline{s}_L(t)]\Delta \ln K(t) + \overline{s}_L(t)\Delta \ln L(t) + \Delta \ln A(t) \qquad (3)$$

This states that growth in log GVA is equal to an average of growth in log capital input weighted by the capital income share and growth in log labour input weighted by the labour income share plus growth of the disembodied technical change parameter (the MFP residual).

Box 1

Methods of growth accounting

There are two approaches to accounting for growth in output that may be used for productivity analysis. The approach taken here is to calculate the contributions to growth in GVA, that is, the added value generated in the production process after removing the costs of intermediate consumption. This method is able to apportion GVA growth to growth in capital and labour, by far the most important inputs into the production process, with relatively minor data requirements – all the data needed to compile the quality-adjusted labour input (QALI) and capital services input are readily available to ONS in the National Accounts and Labour Force Survey (LFS).

The other possible approach is to calculate the contributions to growth in gross output, including from those intermediate inputs which are omitted from the GVA-based method of growth accounting. An example of this is the ongoing EU KLEMS project, which apportions output growth to growth in capital, labour, energy, materials and services. Conceptually, this approach is superior to the one used in this article, as it explains the causes of output growth to a greater degree of detail, leaving a smaller MFP residual (see, for example, Van Ark *et al* 2007).

However, the data requirements of KLEMS growth accounting are commensurately higher, which present some barriers to implementation in the short term. In particular, the National Accounts data requirements are much greater, particularly of constant price Supply and Use tables, which are not currently published by ONS. Once constant price Supply and Use tables are available, ONS will be able to calculate the contribution of intermediate inputs to growth in gross output within, or in a similar framework to, KLEMS growth accounting.[1]

More specifically, $\bar{S}_L(t)$ is the average of the labour share of total income in the current and previous period, and the weight for capital is simply one minus the share for labour. So:

$$\bar{s}_L(t) = [s_L(t) + s_L(t-1)]/2 \quad (4)$$

Therefore, the actual calculation is simply a rearrangement of equation (3):

$$\begin{aligned}\text{MFP growth} = {} & \Delta \ln Y(t) \\ & -[1-\bar{s}_L(t)]\Delta \ln K(t) \\ & -\bar{s}_L(t)\Delta \ln L(t)\end{aligned} \quad (5)$$

The same technique can be used to decompose labour productivity growth into the contributions of physical capital deepening (capital income share multiplied by growth in physical capital per hour worked), labour composition (the quality adjustment made during the production of QALI) and MFP growth, as shown in equation (6):

$$\begin{aligned}\Delta \ln\left[\frac{Y(t)}{H(t)}\right] = {} & [1-\bar{s}_L(t)]\Delta \ln\left[\frac{K(t)}{H(t)}\right] \\ & +\bar{s}_L(t)[\Delta \ln L(t) - \Delta \ln H(t)] \\ & +\Delta \ln A(t)\end{aligned} \quad (6)$$

where H(t) and L(t) represent standard and quality-adjusted hours, respectively. A standard aggregation of hours treats labour as a homogenous input, whereas the use of a quality-adjusted measure explicitly recognises the heterogeneity of labour and uses its profile in terms of education, experience, sex and industry to measure the added value generated by accounting for the differing skill levels of workers.

Source data

Labour input

The labour input used for MFP analysis is the experimental QALI measure. The main data source for QALI is the LFS, which is a continuous household-based survey that covers approximately 53,000 households every quarter. It contains information on educational attainment, industry, sex and age. Under the assumption that different worker types have differing levels of marginal productivity, and are paid as such, labour hours are adjusted with regard to these characteristics according to the share of the different worker types in total labour income. Further detail on the QALI methodology, as well as the latest estimates, can be found in Goodridge (2009).

The advantage of QALI over a standard measure of labour is that the contribution of skills is captured, at least partially, and is not attributed to a change in MFP. In practice, however, some of the quality changes in labour will still be present in the MFP term. A significant drawback to using QALI is the relatively short time period covered: due to breaks in the qualification variable, the series can only be produced from 1997 onwards. As a result, this constrains the time series for MFP analysis.

Capital services

Capital services estimates are used as the capital input for this analysis. Capital services are the flow of services into the production of output that are generated by the capital stock, as opposed to the capital stock itself. They differ from National Accounts measures of capital stock in that they use rental prices instead of purchase prices to weight together growth in the net stock of assets. The use of rental prices better reflects the user cost of a particular asset in a given period and, assuming competitive markets, the relative productivity of the asset. Another advantage of capital services is the greater asset detail compared with the National Accounts net stock measures, in particular, the separate treatment of short-lived, productive ICT assets such as computers, purchased and own-account software. Further information about capital services, and the latest estimates, can be found in Wallis and Turvey (2009).

Output and factor income shares

The output measure used in this article is an annually chain-linked volume measure (last rebased in 2003) of GVA at basic prices, consistent with that published in *Blue Book 2008*. The measure does not contain any adjustments made as part of the National Accounts balancing process, as these adjustments do not reflect the production of goods and services and so should not be included when measuring productivity. Actual and imputed rents of owner-occupied dwellings are removed from GVA as they are not a true measure of output and dwellings are not part of the productive capital stock. Therefore, they are excluded to ensure consistency with the capital input data.

Since balancing and coherence adjustments are applied at divisional level, and in some cases the market sector is made up of parts of different divisions rather than totals, the market sector GVA measure used contains adjustments made as part of National Accounts balancing.

The labour share of total income is equal to CoE from the National Accounts plus the labour compensation of the self-employed, as a proportion of GVA. The capital share is simply one minus the labour share. Since there is no National Accounts series for the labour income of the self-employed (the National Accounts series for self-employed earnings is 'mixed income', which includes both the returns to capital and labour in the self-employed sector), this is estimated by splitting mixed income using the relative proportions of CoE and GOS in the employed sector, assuming labour and capital generate the same proportional returns in the self-employed sector. For more detail on the issues surrounding the calculation of factor income shares, please consult Goodridge (2008).

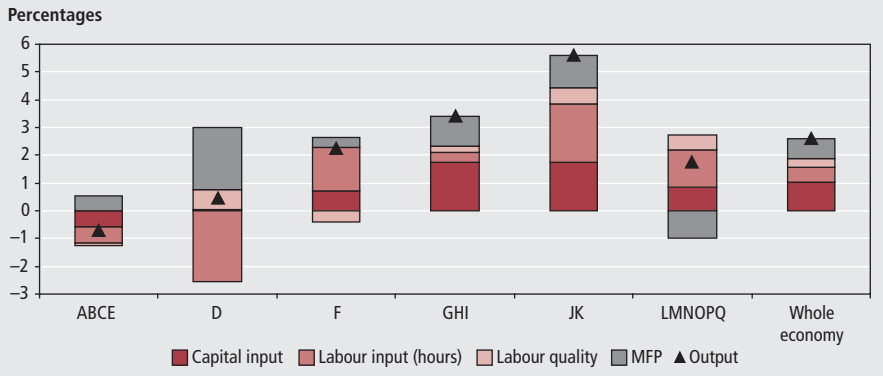
Results

This section presents growth accounting results for 1998 to 2007 for the whole economy and six broad industry groupings. Estimates for the market sector refer to the period 2001 to 2007, due to the shorter back series of labour input data. Due to the volatility of year-on-year MFP growth, it is difficult to assess the contribution of MFP to output growth from year to year. As such, the results are presented as averages over the period studied.

Figure 1 shows the decomposition of output growth into contributions from the factor inputs, capital and labour, and MFP growth. The contribution of labour has been split into two components, growth in hours and growth in labour composition, which represents the change in quality of labour input, taking account of factors such as skills and experience. For the whole economy, MFP growth is estimated to have been 0.7 per cent per annum between 1998 and 2007, a contribution to average output growth over the period of approximately one-quarter. The greatest contribution to growth in GVA (of almost two-fifths) came from capital input, which is likely due to rapid growth in capital services, particularly from ICT assets, which peaked in the late-1990s and has remained strong throughout the period. Growth in labour composition contributed around 13 per cent of output growth between 1998 and 2007.

Looking at broad industry groups, which are described in **Table 1**, the strongest MFP growth has occurred in manufacturing (D), while there has also been strong growth in financial intermediation and business services (JK) and the combined sector of the distributive trades, transport and communications (GHI). All industry groups besides agriculture and utilities

Figure 1
Decomposition of annual average output growth, 1998 to 2007



Source: Office for National Statistics

experienced positive contributions from capital services, while the positive contributions from labour composition in many sectors, especially in the service industries, show an increased utilisation of skilled labour in these sectors.

The negative MFP result for the public and personal services industry group (LMNOPQ) may be due to the fact that the majority of these industries are in the non-market sector. They do not face the same degree of competitive pressure as firms in the market sector to better utilise factor inputs to deliver efficiency improvements over and above those arising from capital investments. Alternatively, measures of government output, produced by the UK Centre for the Measurement of Government Activity, may not yet be fully capturing changes in quality; work is ongoing to further develop these measures.[2]

To ensure consistency with the time series for the market sector, **Figure 2** shows the decomposition of output growth over the period 2001 to 2007. In the market sector, average MFP growth during these years was approximately 1.1 per cent, compared with 0.8 per cent for the whole economy. This difference was driven by the public and personal services industry, which contains non-market sector output. As during the period 1998 to 2007, the industry had negative MFP growth.

Between 2001 and 2007, the contribution of capital services to output growth was greater in the market sector than for the whole economy, while the contribution of labour composition was approximately equal. Again, these are due to the performance of the non-market sector, which had a lower contribution from capital and similar contribution from labour composition compared with the market sector.

Figure 3 presents the decomposition of labour productivity growth into contributions from capital deepening (the amount of capital available for use in production per worker hour), labour composition and MFP. While similar to the above analysis, it additionally shows what has been driving growth in headline productivity measures over the period. The chart shows that growth in labour composition contributed 0.3 percentage points (or 18 per cent) to labour productivity growth at the whole economy level. While this contribution is smaller than those from capital deepening and MFP, it represents an increase from the previously published estimate in Goodridge (2008).

At the industry level, labour productivity growth between 1998 and 2007 was strongest in manufacturing, driven by the largest contributions of any industry from MFP and labour composition. There were also significant contributions from labour composition in financial and business services and in public and personal services. The strong labour productivity growth in manufacturing likely reflects the industry's relatively high degree of capital intensity and shrinking workforce – a relatively large, and increasing, proportion of output can be produced with fewer workers as capital substitutes for labour in the production process. In contrast, many service industries are very labour intensive, in that labour is required to deliver the service itself: examples include hairdressing and legal services.

Nonetheless, the industries with the greatest contributions to labour productivity growth from capital deepening over the period are both in the service sector – distributive trades, transport and communications, and financial intermediation and business services. This is probably due to large investments in ICT over the period, which have spurred product and process innovation. Investment in ICT is also likely to be driving the strong growth in MFP in distributive trades, transport and communications and financial intermediation and business services, as well as in manufacturing, for example, by enabling firms to organise and structure themselves in more efficient ways.

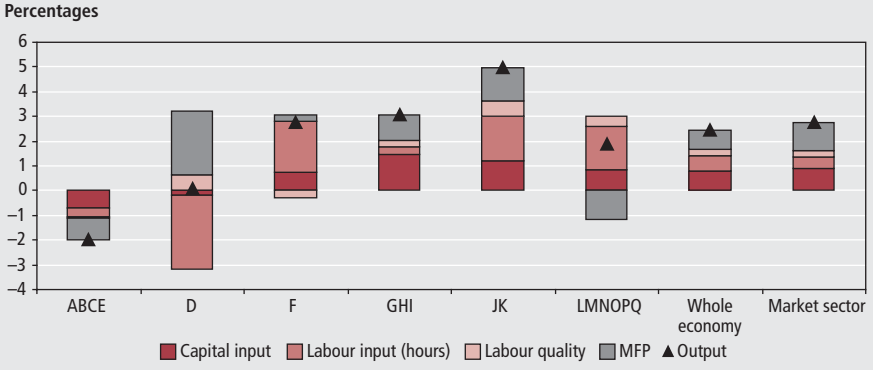
Figure 4 shows the decomposition of labour productivity growth for 2001 to 2007, to enable comparisons between the whole economy, industry and market sector estimates. The results are very similar to those for the decomposition of output

Table 1
Industry description

Industry	Industry description
ABCE	Agriculture, hunting, forestry, fishing, mining quarrying, utilities
D	Manufacturing
F	Construction
GHI	Wholesale and retail trade, hotels and restaurants, transport storage and communications
JK	Financial intermediation, real estate, renting and business activities
LMNOPQ	Public administration and defence, education, health and social work, other social and personal services, and extra-territorial activities

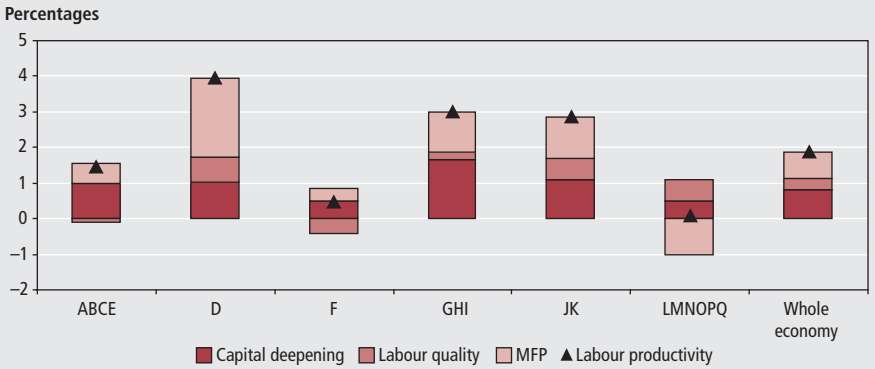
Source: Office for National Statistics

Figure 2
Decomposition of annual average output growth, 2001 to 2007



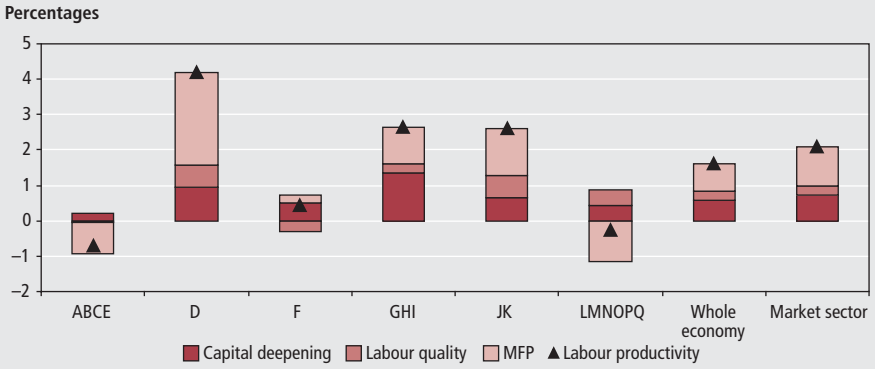
Source: Office for National Statistics

Figure 3
Decomposition of annual average labour productivity growth, 1998 to 2007



Source: Office for National Statistics

Figure 4
Decomposition of annual average labour productivity growth, 2001 to 2007



Source: Office for National Statistics

growth between 2001 and 2007 presented in Figure 2. The main difference between labour productivity growth in the whole economy and the market sector is the contribution from MFP, which again is smaller for the whole economy due to the inclusion of the non-market sector. The difference between the whole economy and market sector measures is also greater when comparing labour productivity as opposed to output growth. This is because the contribution of hours worked to output growth is greater for the whole economy than the market sector, possibly due to non-market services being particularly labour intensive.

Table 2 shows yearly growth in labour composition, by sector, over the period 1998 to 2007. For the whole economy, labour composition grew on average by just under 0.5 per cent a year, with the highest growth occurring in manufacturing, financial intermediation and business services, and public and other services. However, few conclusions can be drawn on the change in labour composition due to the short time period studied. The labour measure is based on hours worked, which is a far more cyclical measure than workers or jobs, with firms responding to changing demand conditions by increasing or reducing hours in the short term rather than hiring or dismissing workers. Therefore, if such changes affect particular worker types differently, there will be a change in labour composition. In general, it would be expected that labour composition would rise during a slump, when the less skilled and experienced workers are the first to be laid off, and fall during a boom, when less productive workers are drawn back into the labour market due to increased demand. Thus, the seemingly slow growth in labour composition between 1998 and 2007 may reflect the strength of the UK economy over this period. This question can begin to be addressed in the next MFP publication, which will include output data for 2008 expected to be much weaker than any of the years covered in this article.

Revisions since previous release

Revisions to MFP results since Goodridge (2008) are caused by revisions to numerous component series, which can be divided into:

- revisions to capital services estimates
- revisions to QALI estimates, and
- revisions to National Accounts data in *Blue Book 2008*

The revisions to labour and capital input have a clear impact on MFP, which is calculated as the residual of GVA growth not explained by the contributions from labour and capital. Revisions to capital services estimates, described in detail in Wallis and Turvey (2009), are primarily driven by the adoption of new methodologies for deflating investment in purchased software and plant and machinery (excluding computers). An important source of revisions to QALI estimates is the regrossing of LFS microdata to 2007 population estimates (Goodridge 2009).

Revisions to National Accounts data in *Blue Book 2008* affect MFP results in many ways. GVA has been revised throughout

Table 2
Annual growth in labour composition

Percentages

	ABCE	D	F	GHI	JK	LMNOPQ	Whole economy	Market sector
1998	–1.37	0.64	–0.31	0.16	0.83	1.64	0.86	..
1999	–0.02	1.33	–1.34	–0.15	1.05	0.72	0.37	..
2000	–1.64	1.56	–0.52	0.84	0.26	1.16	0.79	..
2001	1.76	0.44	0.09	1.06	0.48	–0.41	–0.13	0.69
2002	0.84	0.30	–0.11	–0.67	0.45	0.30	–0.10	0.20
2003	–0.02	1.01	–1.04	0.15	1.36	0.80	0.48	0.24
2004	2.21	0.77	0.23	–0.68	2.18	0.40	0.33	0.79
2005	–4.86	1.46	–0.54	0.16	–0.91	1.38	0.30	–0.58
2006	1.22	1.39	–0.61	1.83	0.64	0.85	1.13	0.80
2007	–2.44	0.70	–0.38	0.67	1.35	0.39	0.56	0.44
Average	–0.43	0.96	–0.45	0.34	0.77	0.72	0.46	0.37

Source: Office for National Statistics

the period studied, largely due to the reallocation of financial intermediation services indirectly measured from intermediate consumption to final output and across industries, but also due to the use of a new dataset for the financial services industry, which resulted in a downward revision to growth in that sector. *Blue Book 2008* incorporated substantial revisions to CoE and GOS data, which affected not only the weights applied to labour and capital in the MFP calculation, but also the capital services and QALI estimates themselves. In addition, the constant price investment series on which capital services estimates are based were revised in the last edition of the *Blue Book*.

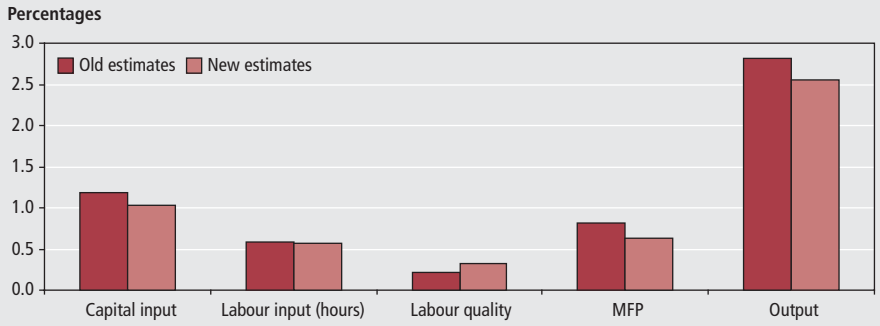
Figure 5 provides an indication of what has been driving revisions to output growth in aggregate, by showing new estimates of contributions from capital, labour and MFP to whole economy output growth against estimates based on previously published data. The period covered in Figure 5 (1998 to 2006) reflects the years for which comparable series are available. Compared with past data, average output growth has been lower than previously estimated, caused by downward revisions to MFP and the contribution from capital, which is in accordance with the downward revision to whole economy capital services in Wallis and Turvey (2009). Interestingly, the contribution of labour composition has been revised upwards, suggesting the importance of skilled labour in driving output growth had previously been understated.

Conclusion

This article has presented growth accounting results for 1998 to 2007, based on experimental quality-adjusted measures of labour and capital input, for the whole economy, broad industry groups and, over a shorter time period, for the market sector. Between 1998 and 2007, the contribution of MFP to whole economy output growth was approximately one-quarter, with the greatest contribution coming from strong growth in capital services, largely as a result of large investments in ICT. The results presented here incorporate revisions from many sources, which have resulted in reduced contributions from capital services and MFP, and an increased contribution from labour composition, compared with the data produced for last year's publication.

The short time period studied, particularly for the market sector, constrains the depth of growth accounting analysis possible, especially given the volatility of MFP growth in the short run. Consequently, estimates will improve as the series is lengthened, though it is not currently possible to extend the series further back due to breaks in the qualification variable on which QALI is partially based.

Figure 5
Contributions to whole economy output growth: new and previous estimates, 1998 to 2006



Source: Office for National Statistics

Notes

1 Further detail on EU KLEMS methodology, and research data produced on a KLEMS growth accounting basis, can be found at www.euklems.com

2 Further information can be found at www.statistics.gov.uk/ukcemga

CONTACT

elmr@ons.gsi.gov.uk

REFERENCES

Galindo-Rueda F (2007) 'Developing an R&D satellite account for the UK: a preliminary analysis', *Economic & Labour Market Review* 1(12) pp 18–29 and at www.statistics.gov.uk/cci/article.asp?id=1903

Giorgio Marrano M, Haskel J and Wallis G (2007) 'What Happened to the Knowledge Economy? ICT, Intangible Investment and Britain's Productivity Record Revisited', Queen Mary College Working Paper 603.

Goodridge P (2008) 'Multi-factor productivity: estimates for 1997 to 2006', *Economic & Labour Market Review* 2(1) pp 42–8 and at www.statistics.gov.uk/cci/article.asp?id=1918

Goodridge P (2009) 'Quality-adjusted labour input: estimates for 1997 to 2007', *Economic & Labour Market Review* 3(1) pp 62–6 and at www.statistics.gov.uk/cci/article.asp?id=2102

Office for National Statistics (2007) *The ONS Productivity Handbook: A Statistical Overview and Guide* at www.statistics.gov.uk/about/data/guides/productivity/default.asp

Solow R (1957) 'Technical change and the Aggregate Production Function', *Review of Economics and Statistics* vol 39, pp 312–20.

Van Ark B, O'Mahony M, Ypma G, Groningen Growth and Development Centre, University of Groningen, University of Birmingham (2007) 'The EU KLEMS Productivity Report' at www.euklems.com/data/eu_klems_productivity_report.pdf

Wallis G and Turvey A (2009) 'Volume of capital services: estimates for 1950 to 2007', *Economic & Labour Market Review* 3(1) pp 53–61 and at www.statistics.gov.uk/cci/article.asp?id=2105

FEATURE

Revisions to workforce jobs: December 2008

Nick Barford
Office for National Statistics

SUMMARY

Workforce jobs (WFJ) is a quarterly measure of the number of jobs in the UK and the preferred measure of the change in jobs by industry. This article explains the processes and other causes of revisions on the WFJ, showing their impact on the series in terms of the revisions to levels and annual growth. The revisions are mainly due to benchmarking the short-term series to the latest estimates from the Annual Business Inquiry for 2006 and 2007, and taking on reweighted Labour Force Survey inputs to WFJ.

The Office for National Statistics (ONS) released revisions to the workforce jobs (WFJ) series on 17 December 2008 in the Labour Market Statistics First Release (see ONS 2008a). WFJ is a quarterly measure of the number of jobs in the UK and is the preferred measure of the change in jobs by industry. It is the sum of employee jobs measured primarily by employer surveys, self-employment jobs from the Labour Force Survey (LFS), and government-supported trainees and HM Forces from administrative sources.

The revisions policy for WFJ is to open the series for revisions in December each year. The main causes of revisions this year are:

- benchmarking the short-term employee jobs series for Great Britain (GB) to the latest estimates from the Annual Business Inquiry (ABI1) for 2006 and 2007
- reweighted Labour Force Survey (LFS) inputs to WFJ from 1995Q1
- revisions to other sources, such as public sector employment and Northern Ireland jobs estimates.

Table 1 and **Table 2** show the revisions to UK WFJ back to 1996. In total, the level of WFJ has been revised downwards by 18,000 (0.06 per cent) in June 2008 to 31,661,000. Employee jobs have been revised up by 18,000 (0.07 per cent), mainly due to benchmarking. This is offset by a downward revision of 36,000 (0.87 per cent) in self-employment jobs due to LFS reweighting.

GB employee jobs

Benchmarking to the Annual Business Inquiry

Each year, the GB short-term employee jobs series are aligned to successive benchmarks from ABI1 estimates, also released in December (see ONS 2008b). The revised benchmark for September 2006 and the provisional benchmark for September 2007 have revised WFJ back to the start of 2006 (for 2005 and earlier, ABI1 estimates refer to December). The benchmarking process has caused an upward revision to the level of employee jobs in September 2007 of around 40,000 (offset by other revisions to the employee jobs series described below).

Table 3 and **Table 4** show the revisions to WFJ by industry. Benchmarking has caused upward revisions to some industries and downward revisions to others. The short-term estimator tends to underestimate the change in employment, so growing industries tend to be revised upwards, for example, finance, real estate, renting and business services (sections J and K), has been revised up by 52,000 in September 2007. The opposite is the case for declining industries, such as manufacturing.

In highly seasonal industries, such as retail, there is an additional impact from benchmarking. The short-term employer surveys (STES) and ABI1 ask for employment on the same date (mid-September) but, in practice, businesses tend to use a later date for STES than ABI1. This is because STES is dispatched after ABI1 and also because STES collects turnover information (used for the short-term output indicators), and so businesses

Table 1
Workforce jobs:[1,2] revisions to levels

United Kingdom — Thousands, seasonally adjusted

	Workforce jobs	Employee jobs	Self-employment jobs	Government-supported trainees
Mar 96	–4	0	–4	0
Jun 96	–2	0	–1	0
Sep 96	0	1	–1	0
Dec 96	–3	–2	–1	0
Mar 97	–2	1	–3	0
Jun 97	–8	0	–8	0
Sep 97	–6	2	–8	0
Dec 97	–13	–5	–8	0
Mar 98	–16	–8	–8	0
Jun 98	–11	–3	–8	0
Sep 98	–12	–4	–8	0
Dec 98	–27	–18	–9	0
Mar 99	–22	–16	–6	0
Jun 99	–38	–34	–4	0
Sep 99	–28	–23	–4	0
Dec 99	–25	–20	–5	0
Mar 00	–49	–45	–4	0
Jun 00	–50	–46	–4	0
Sep 00	–47	–42	–6	0
Dec 00	–44	–40	–4	0
Mar 01	–27	–25	–2	0
Jun 01	–33	–29	–3	0
Sep 01	–17	–12	–5	0
Dec 01	–21	–13	–8	0
Mar 02	–21	–15	–6	0
Jun 02	–14	–12	–2	0
Sep 02	–18	–14	–5	0
Dec 02	–19	–11	–9	0
Mar 03	–27	–19	–9	0
Jun 03	–25	–13	–12	0
Sep 03	–24	–11	–13	0
Dec 03	–7	3	–10	0
Mar 04	–9	4	–13	0
Jun 04	–12	–2	–10	0
Sep 04	–24	–7	–17	0
Dec 04	–29	–8	–21	0
Mar 05	–31	–7	–24	0
Jun 05	–27	–8	–19	0
Sep 05	–24	6	–30	0
Dec 05	–32	–2	–30	0
Mar 06	–29	–3	–26	0
Jun 06	–36	–19	–17	0
Sep 06	–15	8	–24	1
Dec 06	–18	13	–31	1
Mar 07	–41	–3	–38	0
Jun 07	–66	–17	–47	–2
Sep 07	–10	27	–37	0
Dec 07	–9	32	–41	1
Mar 08	–9	29	–39	1
Jun 08	–18	18	–36	1

Notes: *Source: Office for National Statistics*

1 Workforce jobs figures are a measure of jobs rather than people. For example, if a person holds two jobs, each job will be counted in the workforce jobs total. For this reason, self-employment jobs (which come from the LFS) will not equal the figures for self-employed persons from the LFS. Workforce jobs figures come from a variety of sources and, where possible, from the employer rather than the individual. Employee jobs (which is much the largest component of Workforce Jobs) come from quarterly surveys of employers carried out by ONS, and administrative sources. Self-employment jobs are provided by the LFS. Government-supported trainees are provided from administrative sources.
2 There are no revisions to HM Forces data over the period shown.

Table 2
Workforce jobs:[1,2] revisions to annual changes

United Kingdom — Thousands, seasonally adjusted

	Workforce jobs	Employee jobs	Self-employment jobs	Government-supported trainees
Jun 97	–6	1	–7	0
Jun 98	–3	–3	0	0
Jun 99	–27	–31	4	0
Jun 00	–12	–12	0	0
Jun 01	18	17	1	0
Jun 02	18	17	1	0
Jun 03	–10	–1	–9	0
Jun 04	13	11	2	0
Jun 05	–15	–6	–9	0
Jun 06	–9	–12	3	0
Jun 07	–29	3	–30	–2
Jun 08	48	35	11	3

Notes: *Source: Office for National Statistics*

1 See note 1 to Table 1.
2 There are no revisions to HM Forces data over the period shown.

tend to wait until the turnover information is available before completing the employment section.

Therefore, STES estimates tend to be higher than ABI1, which causes downward revisions when the STES estimates are subsequently benchmarked to ABI1. The downward revision of around 60,000 in distribution, hotels and catering (sections G and H, which contains the retail sector) is partly caused by this effect.

Agriculture

The LFS provides WFJ with the GB short-term employee jobs series for agriculture, because this sector is not covered by STES. In May 2008, ONS revised LFS estimates due to reweighting the microdata (see Palmer and Hughes 2008), and again in October 2008 due to interim reweighting (reweighting the aggregate series to 2007 mid-year population estimates). These revisions have now been applied to WFJ back to 1998Q1, that is, as far back as the first ABI1 benchmark in 1998.

The series is currently only benchmarked up to 2001 because of quality issues with the ABI1 estimates after this period. The 2000 and 2001 benchmarks have now been updated in line with published estimates for ABI1, but benchmarks thereafter will not be applied until the ABI1 team have completed quality assurance of their estimates.

These changes have caused predominantly upward revisions from 2002 onwards and downwards revisions before then, particularly in 2000.

Construction

The LFS also provides WFJ with the GB short-term employee jobs series for construction, again because this sector is not covered by STES. ONS has recently taken over responsibility for the construction employer surveys from the Department for Business, Enterprise & Regulatory Reform (BERR), and is aiming to use this as the source for short-term employee jobs in construction in place of the LFS, once the surveys have been fully transferred and redeveloped. Therefore, the LFS reweighting revisions have only been taken on back to 2006Q1, that is, as far back as the revisions caused by benchmarking.

Public sector employment

For those industries which have a significant proportion of jobs in the public sector, WFJ uses ONS's public sector employment (PSE) estimates for GB (see ONS 2008c), that is, for public administration and defence, education, health and social work (sections L, M and N), post and telecommunications (division 64) and recreation, cultural and sporting activities (division 92). These inputs are not benchmarked as they are the definitive measure of PSE. However, PSE estimates are also revised in December, and so these revisions are applied to WFJ inputs. These revisions go back to 1998Q4 and, for recent periods, total approximately –20,000, and are predominantly in sections L, M and N.

GB self-employed jobs

The LFS is used as the measure of self-employment jobs. Again, LFS reweighting revisions have been applied to these series. This has caused downward revisions of up to 47,000 in June 2007, tapering back to 1995Q1.

Government-supported trainees

The Department for Innovation, Universities and Skills and the devolved administrations provide the information for these series; small revisions have been taken on.

Northern Ireland jobs

WFJ estimates for Northern Ireland are provided by the Department of Enterprise, Trade and Investment in Northern Ireland, which has revised its series back to 1995Q1, mainly due to LFS reweighting.

Seasonal adjustment

Seasonal adjustment is performed at various levels of aggregation. Revising the non-seasonally adjusted series causes revisions to the seasonal factors.

The comparison of WFJ and LFS estimates of jobs, shown in Annex 1 of the Labour Market Overview (see ONS 2008d) that accompanies the First Release, has been updated to reflect revisions to both measures.

CONTACT

elmr@ons.gsi.gov.uk

REFERENCES

Office for National Statistics (2008b) 'Annual Business Inquiry (ABI/1) employee jobs estimates' at www.nomisweb.co.uk

Office for National Statistics (2008d) 'Comparison of LFS and WFJ statistics on jobs' at www.statistics.gov.uk/statbase/product.asp?vlnk=1944

Office for National Statistics (2008a) 'Labour Market Statistics First Release – December 2008' at www.statistics.gov.uk/statbase/product.asp?vlnk=1944

Office for National Statistics (2008c) 'Public Sector Employment First Release – Q3 2008' at www.statistics.gov.uk/statbase/product.asp?vlnk=13615

Palmer N and Hughes M (2008) 'Labour Force Survey: reweighting and seasonal adjustment review 2008', *Economic & Labour Market Review* 2(6), pp 33–42 and at www.statistics.gov.uk/cci/article.asp?id=2011

Table 3
Workforce jobs:[1] by industry, revisions to levels

United Kingdom — Thousands, seasonally adjusted

SIC 2003 sections	All jobs A–O	Agriculture and fishing A,B	Production C–E	Construction F	Distribution, hotels and Catering G,H	Transport and communications I	Finance, real estate, renting and business activities J,K	Public administration, education and health[2] L–N	Other services O
Mar 96	–4	1	–2	–3	4	1	1	–2	–3
Jun 96	–2	2	1	3	–1	–1	–6	–1	1
Sep 96	0	–1	0	0	–2	–2	1	2	0
Dec 96	–3	–5	0	–4	–2	0	3	2	3
Mar 97	–2	4	–1	2	0	–11	–13	15	2
Jun 97	–8	3	1	–9	–11	–4	3	5	5
Sep 97	–6	2	–7	–14	0	8	–1	0	7
Dec 97	–13	–5	0	–8	5	0	–17	1	12
Mar 98	–16	–10	–4	–10	–4	2	2	6	3
Jun 98	–11	0	–4	–29	3	4	8	–6	13
Sep 98	–12	–5	11	–13	–9	–4	–4	8	4
Dec 98	–27	–3	–4	–15	1	–9	–1	–11	15
Mar 99	–22	–7	8	–24	–11	4	–4	–10	22
Jun 99	–38	–9	2	–6	–4	–2	–3	–8	–8
Sep 99	–28	–13	–2	–14	15	–8	0	–11	4
Dec 99	–25	–9	–5	–11	–1	–4	–6	–9	19
Mar 00	–49	–31	0	–6	–10	–4	15	–3	–9
Jun 00	–50	–32	3	–10	2	–4	–10	–15	15
Sep 00	–47	–36	–3	–10	–9	–8	11	–8	15
Dec 00	–44	–19	–1	–20	–15	1	–7	6	11
Mar 01	–27	–14	–2	–19	11	–3	4	–14	10
Jun 01	–33	–18	4	–16	5	–7	–10	–2	12
Sep 01	–17	2	–3	–8	1	–1	–1	–8	–1
Dec 01	–21	–7	3	–17	14	–8	–2	–19	15
Mar 02	–21	0	5	–17	–7	1	–6	–3	4
Jun 02	–14	9	–4	–23	–4	–3	19	–15	5
Sep 02	–18	9	–4	–20	–2	–6	12	–27	20
Dec 02	–19	–1	3	–6	1	–4	–10	–9	8
Mar 03	–27	3	–1	–17	7	5	–5	–18	0
Jun 03	–25	3	2	–4	–12	0	8	–14	–8
Sep 03	–24	–1	–5	–21	1	–3	15	–12	1
Dec 03	–7	15	9	–25	8	–12	–8	–8	14
Mar 04	–9	19	0	–13	–16	–5	6	–6	6
Jun 04	–12	9	0	–21	1	0	–5	–13	17
Sep 04	–24	3	7	–11	–6	2	–13	–15	10
Dec 04	–29	2	–1	–2	–10	–2	5	–18	–3
Mar 05	–31	10	–1	–4	–5	1	–13	–19	0
Jun 05	–27	11	–2	0	–5	–2	–17	–11	–1
Sep 05	–24	7	–5	–5	2	–4	–5	–15	0
Dec 05	–32	9	–1	–1	–12	–4	0	–22	0
Mar 06	–29	16	0	0	–8	3	–14	–24	–2
Jun 06	–36	11	0	4	–11	4	–16	–26	–3
Sep 06	–15	11	3	–6	0	8	0	–30	0
Dec 06	–18	13	6	6	–32	9	11	–24	–6
Mar 07	–41	19	2	4	–44	16	11	–30	–17
Jun 07	–66	8	–6	14	–61	14	15	–26	–25
Sep 07	–10	12	3	19	–59	16	52	–22	–30
Dec 07	–9	13	–2	27	–67	19	53	–26	–26
Mar 08	–9	17	0	30	–64	17	40	–19	–29
Jun 08	–18	16	–7	38	–69	13	35	–14	–30

Notes:

1 See note 1 to Table 1.
2 Includes both public and private sectors.

Source: Office for National Statistics

Table 4

Workforce jobs:[1] by industry, revisions to annual changes

United Kingdom — Thousands, seasonally adjusted

SIC 2003 sections	All jobs A–O	Agriculture and fishing A,B	Production C–E	Construction F	Distribution, hotels and Catering G,H	Transport and communications I	Finance, real estate, renting and business activities J,K	Public administration, education and health[2] L–N	Other services O
Jun 97	–6	1	0	–13	–10	–4	9	6	5
Jun 98	–3	–3	–5	–19	14	9	5	–11	8
Jun 99	–27	–9	6	22	–7	–7	–10	–1	–21
Jun 00	–12	–22	1	–3	6	–2	–7	–8	23
Jun 01	18	13	1	–6	3	–3	0	13	–3
Jun 02	18	28	–8	–7	–9	5	29	–13	–6
Jun 03	–10	–6	6	19	–8	2	–11	1	–13
Jun 04	13	6	–2	–16	12	0	–13	1	25
Jun 05	–15	2	–2	21	–5	–3	–11	2	–18
Jun 06	–9	0	2	4	–6	6	1	–15	–2
Jun 07	–29	–3	–6	10	–50	11	31	0	–21
Jun 08	48	8	–1	24	–8	–2	20	12	–5

Notes:

Source: Office for National Statistics

1 See note 1 to Table 1.
2 Includes both public and private sectors.

FEATURE

Richard Jones and Andrew Rowlinson
Office for National Statistics

Incorporating equality considerations into measures of public service output

SUMMARY

The UK Centre for Measurement of Government Activity was launched in 2005 to improve measures of public service output. This article discusses how distributional weights may be used to incorporate equality considerations into these measures. It also presents the arguments for and against making this type of adjustment.

For decades, economists have debated the use of distributional weights in cost-benefit analysis. This article will broaden the debate to include measures of public service output. But first, what is meant by equality? There is no universally agreed definition but, loosely, equality is the idea of people getting the same, or being treated the same, in some respect. Writers have tried to clarify this concept by posing two questions:

- Equality between whom?
- Equality of what?

Equality between whom?

'Fairness and opportunity of all' is the subject of government policy, illustrated by Public Service Agreements (PSA) 8 to 17. PSA 15 aims to 'Address the disadvantage that households experience because of their gender, race, disability, age, sexual orientation, religion or belief.' This is horizontal equity – the equal treatment of groups identified by a common characteristic. Government policy is less explicit on vertical equity – the relative treatment of rich and poor.

Equality of what?

The Cabinet Office's Equalities Review (Cabinet Office 2007) highlighted several types of equality:

- Equality of process: ensuring that people are treated in the same manner in any given situation. This idea underpins the right to a fair trial or the right of children to an education, for example
- Equality of worth: according each individual equal respect – a concept that lies behind giving every citizen the right to vote
- Equality of outcome: sometimes interpreted as aiming for everyone to have, for instance, equal amounts of income or wealth, or the same educational opportunities
- Equality of opportunity: a term that is understood in different ways. Some interpret it to mean that outcomes should depend only on an individual's talents and the efforts they make. Others argue that equality of opportunity is about ensuring that those circumstances beyond an individual's control should not undermine the opportunity an individual has to thrive. For example, being born into a family with a low income should not affect the opportunities available to an individual

This article concentrates on equality of outcome as, in principle, this is the easiest to measure.

Weighting output

One way of incorporating equality considerations into measures of public service output is to attach weight to the output according to who benefits from it, so that the same unit of output is worth more, in some sense, if it benefits poor rather than

rich individuals, so reducing inequality. There is a precedent for making this type of adjustment. HM Treasury's Green Book (HM Treasury 2003), which provides guidance on the economic assessment of spending and investment, states:

> In principle, each monetary cost and benefit should be weighted according to the relative prosperity of those receiving the benefit or bearing the cost… If appraisers decide not to use distributional weights to make an explicit adjustment, this decision must be fully justified.

Deriving the weights

Welfare economics provides a framework for deriving these weights. Assuming that society's welfare (W) depends upon the income of the households that make up that society (Y_h), then society's welfare is given by $W = W(Y_1, Y_2, \ldots, Y_H)$. Defining W_0 as the original welfare of society and W_1 as society's welfare with an additional unit of public service output, then the change in society's welfare is:

$$\Delta W = W_1 - W_0 = \sum_h \omega_h \Delta Y_h$$

where ΔY_h is the change in the income of household h due to the change in public service output and ω_h is the weight attached to the change in the income of household h. These weights provide a method for formally incorporating concepts of fairness into economic analysis. In economic terms, the weights reflect how much society values a marginal change in the income of an individual household. In this article, the concepts are illustrated in terms of income but they could also have been illustrated in terms of other outcomes, such as consumption.

So, adjusting measures of public service output for equality considerations involves:

- establishing the impact of the public service output on the income of individual households,[1] that is, obtain ΔY_h, and
- aggregating the impacts into a measure of overall welfare, that is, derive ω_h

Obtaining public service output and household income

The impact of the public service output on the income of individual households can be estimated using benefit incidence analysis. This technique involves allocating per unit public subsidies (for example, expenditure per student for the education sector) according to utilisation rates of public services.

This approach has several weaknesses. One is the difficulty in calculating unit costs. While visits to the doctor or attendances at school can be defined on a unit of service basis, services such as the physical infrastructure (overhead-type services) are more difficult to break down. A second weakness is the use of 'average' participation rates to infer the distributional impact of changes in public spending. The inferences drawn could be wrong if programme participation is non-homogenous or where the composition of participants varies with the size of the programme. This approach relies on data for utilisation of public services being sufficiently disaggregated.

Benefit incidence analysis focuses on changes in income rather than welfare or utility. How these changes in income translate into changes in wellbeing depends on several factors. For example, a household that contains children is likely to need more resources to achieve the same standard of living as a household where there are no children, other things being equal. The change in wellbeing can be partially captured using an 'equivalence scale' that adjusts household income to account for variations in household size and composition. The choice of scale on which it is used can lead to slightly differing results and has implications for the analysis.

How resources are shared within households is also a factor that affects analysis. For example, suppose a household has two individuals, one who has paid employment and is relatively well-paid, while the other does not have paid employment. Looking at the distribution of income across individuals would show the earner near the top of the income distribution, while the non-earner would be near the bottom. In contrast, the distribution of household incomes would show this household around the middle. The most common approach is to assume pooling or equal sharing of income.

Obtaining welfare weights

Distributional weights can be derived using the concept of a social welfare function (Samuelson 1947). This function describes how well off society is, given different allocations of resources to its members. In this framework, the weight attached to the change in income of household ω_h has three components:

- The size of the household
- How equivalised income leads to changes in nominal income Y_h, and
- The social marginal utility or welfare weight; this component models society's aversion to inequality

Inequality aversion

The use of welfare weights can be illustrated using a form of the social welfare function proposed by Atkinson (1970) that has been used frequently in the literature:

$$W\left(u_1(.), u_2(.), \ldots, u_n(.)\right) = \sum_{h=1}^{n} w(u_h)$$

$$= \sum_{h=1}^{n} \frac{u_h^{1-\gamma}}{(1-\gamma)} \text{ for } \gamma \neq 1 \text{ and } \log\left(u_h\right) \text{ for } \gamma = 1$$

The parameter γ describes how much a household's welfare weight decreases as its income increases. The higher γ is, the faster the rate of proportional decline in welfare weight to proportional decline in welfare. Thus, γ describes the strength of society's desire for equality of incomes compared with uniformly higher incomes for all. For example:

- $\gamma = 0$ gives the utilitarian social welfare function where social welfare is the sum of household utilities, with the utility of each household given equal weighting
- $\gamma = \infty$ results in the Rawlsian social welfare function which assumes that society's welfare is the utility of the least well-off household (Rawls 1972)
- $0 \leq \gamma \leq \infty$ describes the situation where society is prepared to redistribute resources from rich to poor even if some of the resources are lost in the process

Cowell and Gardiner (1999) described three justifications for the use of welfare weights.

The individual welfare approach

This is based on the idea that individuals have diminishing marginal utility of income (or consumption). This means that the effect on the subjective wellbeing of a change in income becomes progressively smaller the higher the initial level of income. If this assumption is correct, then providing an additional £1 of income to a poor household will have a greater positive impact on the household's wellbeing than providing £1 of income to a rich household, other things being equal.

Based on Pearce and Ulph (1995), Cowell and Gardiner (1999) and OXERA (2002), the Green Book states that the available evidence suggests the elasticity of the marginal utility of income is around one.

This implies that an increment to income occurring when income is, say, £50,000 is half as valuable as if it occurs when income is £25,000. This estimate is supported by other studies, for example, Evans (2005) and Layard *et al* (2007).

The externalities approach

This approach suggests that the wellbeing of households is likely to depend on the income of other households as well as their own. In technical terms, an externality occurs when the production or consumption decisions of one agent have an impact on the objective function of another agent in an unintended way, and when no payment is made by the generator of the impact to the affected party. For example, vaccinating one person means that that individual is less likely to get the illness they have been vaccinated against (the private benefit) and other people also gain because they are now less likely to contract the illness (the external benefit).

A 'caring' externality occurs when households receive benefit from knowing that other people are receiving medical treatment. Knowing that someone is in pain because they cannot afford medical treatment makes other people in society feel bad – it causes 'negative utility'. This has led several authors to suggest that some public services, notably healthcare, have different ethical considerations than other goods and services and should be distributed according to non-market principles. An aversion to inequality aversion in this case is determined by the marginal utility of the externality.

Incomplete information

The final approach suggests that households have incomplete information about their future circumstances and may be willing to pool some of their future income to reduce the risks they face. In this approach, households 'care' about inequality because there is a risk of them being in the lower part of the distribution. How much they care depends on how risk averse they are (Dahlby 1987).

Empirical evidence on inequality aversion

As inequality aversion cannot be directly measured, earlier work has mainly utilised a questionnaire approach for quantifying the level of inequality aversion. Perhaps the most well-known way of contrasting efficiency and equity is the 'leaky bucket' idea due to Okun (1975). An amount of money is transferred from the rich to the poor, but a certain fraction of it is lost when doing so, for instance, because of administrative costs. The extent of the loss, or leakage, society can accept determines the level of inequality aversion. The higher the tolerable leakage is, the more society is averse to inequality. Following this method, Amiel *et al* (1999) conducted experiments for groups of students from two different countries. They found that inequality aversion could be measured in a reasonably precise way. They estimated that median inequality aversion was between 0.1 and 0.2, much lower than values typically used by economists in simulations.

An alternative way of formalising the efficiency-equity trade-off is to present a hypothetical situation in which respondents have a choice between different income distributions. In one of the societies, the mean income is low and the income dispersion small; in the other, the mean income is higher but the income distribution is more dispersed. Using this approach in an experiment with Swedish students, Carlsson, Daruvala and Johansson-Stenman (2005) found that the median inequality aversion lies between 1 and 2. Their estimate was ten times larger than the estimate deduced by Amiel *et al* (1999).

Most of the evidence in this area is obtained from experiments involving university students. It is unclear how well this evidence can be generalised for wider populations. Even within experimental studies, it has been shown that the composition of the participants (for example, economics students compared with students from other disciplines) can have large effects on the estimates of inequality aversion (Engelman and Strobel 2004, Fehr *et al* 2006). The experiments also rely on hypothetical situations, where the sums of money are unrelated to any real-world situation in which the respondents are familiar.

Applying discount factors

The full benefit of a public service may not materialise until months or even years after the provision of the service. For example, the increased earnings arising from additional years of schooling would be realised throughout an individual's lifetime. Similarly, some public services have important intergenerational impacts. This can be incorporated into this analysis by applying a discount factor to the output, which varies according to when the benefit of the public service is realised. This discount factor captures several ideas.

First, individuals prefer to have things such as income now rather than in the future (pure time preference).

Second, there is a risk that there will be some event so devastating that all returns from policies, programmes or projects are eliminated, or at least radically and unpredictably altered. Examples are technological advancements that lead to premature obsolescence, natural disasters or major wars. The scale of this risk is, by its nature, hard to quantify.

Third, because income and consumption tend to grow over time, additional income in the future will have less value. This is a reflection of the diminishing marginal utility of income idea presented above. HM Treasury's Green Book uses the empirical evidence on these factors to calculate a discount rate of 3.5 per cent. However, it also recommends that, where a project has long-term costs or benefits (beyond 30 years), a lower discount rate should be used to reflect the uncertainty about the future.

Is the adjustment appropriate?

Having set out how an adjustment to measures of public service output might be made, it is useful to consider some of the issues about whether making this adjustment is appropriate.

The Atkinson Review (Atkinson 2005) noted that:

> [Governments] are concerned with distribution as well as with totals. They are concerned with rights and procedural justice, as well as with outcomes. Equity and fairness have value for governments, but are not captured in the National Accounts. For these reasons alone, there is no reason to expect government policy to be directed solely at maximising national output; nor, conversely, should the output measure be determined solely by the policy objectives.

Thus, the main argument for making this type of adjustment is that equality is valued by governments and society and so the UK Centre for Measurement of Government Activity (UKCeMGA) should incorporate this into measurements of public service output.

One of the main arguments against making this type adjustment is that it is inconsistent with National Accounts methodology, where transactions are valued independently of who engages in them. Principle A from the Atkinson Review is that, 'the measurement of government non-market output should, as far as possible,

follow a procedure parallel to that adopted in the National Accounts for market output.'

As implicitly illustrated above, the implementation of an equality adjustment requires a number of judgements about the functional form of individual and societal welfare functions. The counter argument is that the use of equal weights for everybody, implicit in current methods, is itself a value judgement.

Making this type of adjustment relies on having sufficiently disaggregated data which enables us to distinguish between individuals or households of particular types. As HM Treasury's Green Book acknowledges:

> '…this information is unlikely to be available at acceptable cost for many applications. The decision on whether an explicit adjustment is warranted should be informed by the: scale of the impact associated with a particular project or proposal; likely robustness of any calculation of distributional impacts; and the type of project being assessed.'

Conclusions

This article has suggested that because public bodies and private companies fulfilling public functions are required to promote equality, this should be taken into account when measuring their output. The inconsistency with National Accounts means that an appropriate way ahead is to try to introduce the adjustment in measures of output that do not feed into National Accounts but are used in UKCeMGA productivity articles or satellite accounts.

To implement the methods outlined in this article, UKCeMGA needs to decide on what perspective of equality the adjustment will reflect. Will an adjustment be made for horizontal equity (the treatment of groups identified by race, disability or gender, or vertical equity – the relative treatment of rich and poor)? The latter would be easier to implement, as estimates of many of the relevant parameters identified in this article have already been made. In contrast, if the adjustment is made to reflect horizontal equity, there is a need to produce new parameter estimates, for example, on society's aversion to inequality across groups.

The next question is whether to apply the adjustment to costs or to valuations. To apply the weights to costs, UKCeMGA needs to identify how the cost of producing the marginal output is distributed across the equality dimension chosen and then weight it. For example, if the health service performed more operations, the cost of an operation would be adjusted depending on who receives it.

Alternatively, to move to an output measure, UKCeMGA needs to identify how the benefit of the marginal unit of public service output is distributed across the equality dimension chosen and over time. For example, assuming, for simplicity, that the output of the public education system is to raise productivity and earnings and that the increase in earnings is received for several years into the future, then UKCeMGA would need to calculate the increase in earnings for each category of the equality dimension considered and then discount the earnings. To consider a wider range of outputs would require the development of methods of measuring these outputs, using a common scale. For example, if 'staying safe' at school is considered an output of the public education system, UKCeMGA would need to estimate the monetary value of this so that it could be adjusted in the same way as the increase in earnings.

As with any adjustment that has a subjective dimension, sensitivity analysis should be used to investigate how measures of output and productivity change are affected by using different functional forms and parameters.

Notes

1 For simplicity, this article discusses concepts in terms of households but the arguments also apply, for example, to individuals, groups and regions.

CONTACT

elmr@ons.gsi.gov.uk

REFERENCES

Amiel Y, Creedy J and Hurn S (1999) 'Measuring attitudes towards inequality', *Scandinavian Journal of Economics* 101, pp 83–96.

Atkinson A B (1970) 'On the measurement of inequality', *Journal of Economic Theory*, 2, pp 244–63.

Atkinson A B (2005) 'Atkinson Review: Final Report. Measurement of Government Output and Productivity for the National Accounts', Palgrave Macmillan.

Cabinet Office (2007) *Fairness and Freedom: The Final Report of the Equalities Review.*

Carlsson F, Daruvala D and Johansson-Stenman O (2005) 'Are people inequality-averse or just risk averse?', *Economica*, 72, pp 375–96.

Cowell F A and Gardiner K A (1999) 'Welfare Weights', OFT Economic Research Paper no. 202, Office of Fair Trading: London.

Dahlby B (1987) 'Interpreting inequality measures in a Harsanyi framework', *Theory and Decision*, 22, pp 187–202.

Engelman D and Strobel M (2004) 'Inequality aversion, efficiency, and Maximin preferences in simple distribution experiments', *American Economic Review*, 94, pp 857–69.

Evans D (2005) 'The elasticity of marginal utility of consumption, estimates for twenty OECD countries', *Fiscal Studies*, 26, pp 197–224.

Fehr E, Naef M and Schmidt K (2006) 'Inequality aversion, efficiency, and Maximin preferences in simple distribution experiments: Comment', *American Economic Review* 96, pp 1912–17.

Layard R, Mayraz G and Nickell S (2007) 'The marginal utility of income', Working paper, London School of Economics.

HM Treasury (2003) *Green Book, Appraisal and Evaluation in Central Government*.

Okun A (1975) *Equality and efficiency: The big trade-off*, Brookings Institution: Washington D.C.

OXERA (2002) 'A Social Time Preference Rate for Use in Long-Term Discounting', A report for ODPM, DfT and Defra.

Pearce D and Ulph D (1995) 'A Social Discount Rate For The United Kingdom', CSERGE Working Paper no. 95-01, School of Environmental Studies, University of East Anglia, Norwich.

Rawls J (1972) *A Theory of Justice*, Clarendon Press, Oxford.

Samuelson P A (1947) *Foundations of Economic Analysis*, Harvard University Press.

Methods explained

Methods explained is a quarterly series of short articles explaining statistical issues and methodologies relevant to ONS and other data. As well as defining the topic areas, the notes explain why and how these methodologies are used. Where relevant, the reader is also pointed to further sources of information.

Core inflation

Graeme Chamberlin
Office for National Statistics

SUMMARY

Core inflation attempts to capture the underlying inflationary pressures in the economy by excluding or down-weighting the more erratic and transitory components of consumer prices indices. Recent volatility in food and energy prices, along with the monetary policy regime of inflation targeting, has increased interest in these measures. However, the Office for National Statistics does not produce estimates of core inflation and neither does the Bank of England target them. This article outlines several ways in which core inflation can be calculated and discusses the issues and judgements involved.

The Office for National Statistics (ONS) produces two measures of consumer price inflation in the UK. Both the Retail Prices Index (RPI) and the Consumer Prices Index (CPI) are published each month and are based on the cost of a basket of goods and services for a representative household. Weights attached to each individual item generally reflect the share in total expenditure. Roe and Fenwick (2004) provides a good overview of the history, coverage and methodology of each index.

Core inflation, on the other hand, is a construct invented by economists to try and assess the more underlying inflationary pressures in the economy. It recognises that, in the short run, headline inflation rates may be driven by temporary supply shocks or seasonal effects that do not have a lasting impact and, as such, there is less imperative for policy makers to respond to these. Instead, as Blinder (1997) states, (monetary) policy should concentrate on the permanent or durable part of actual inflation that is likely to persist once the transitory or fleeting influences on price movements have worked through or been reversed.

ONS does not produce a specific measure of core inflation and the Bank of England does not explicitly target one. It is important to recognise at the outset that there are many ways of constructing such a measure and separating inflation into core and non-core parts in real time requires a strong element of judgement. Almost all methods are based on excluding or down-weighting the more erratic components of consumer prices indices based on the assumption that these provide little information about inflation in the medium term.

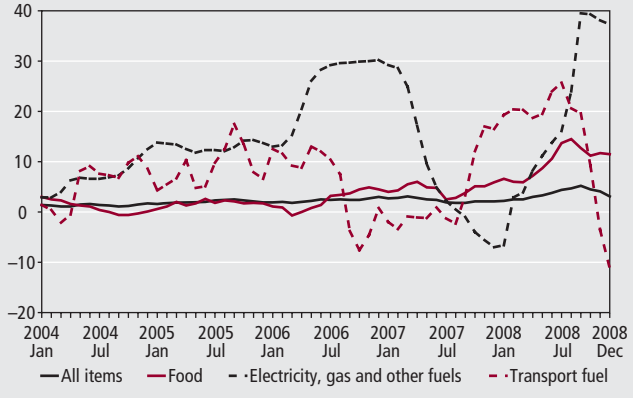
However, it may be the case that these are the exact components that are likely to pick up new inflationary developments. For example, the Bank of England, as evidenced in the minutes of the Monetary Policy Committee (MPC), has been very concerned about possible second-round effects that can originate from one-off transitory shocks which become engrained in expectations and thus longer-term inflation rates. Core inflation measures are also contentious. By excluding or down-weighting items that matter to people in the 'real' world, they may be disregarded as unrepresentative by the public. So even though core inflation may be a useful indicator for policy makers, consideration should always be given to how it was produced and the judgements involved.

Recent interest in core inflation has been marked due to a combination of volatility in primary goods prices (food, energy and minerals) and the UK's monetary policy regime which puts a strong emphasis on the inflation outlook. This article, recognising the current context, sets out and discusses various methods for constructing core inflation and applies them to UK CPI inflation.

Recent volatility in UK CPI inflation

Interest in core inflation is particularly strong during times of volatile price movements, as has been the case in the UK and the rest of the world during the last two years. During 2008, CPI inflation in the UK, on an annual basis, peaked at 5.2 per cent in September before falling back to 3.1 per cent by the end of the year. As **Figure 1** shows, these trends have been largely driven by a few subaggregates of the overall price index.

Figure 1
CPI inflation
Percentage change, month on same month a year earlier



Source: Office for National Statistics

During 2008, the annual rate of food price inflation peaked at 14.8 per cent in August. Electricity and gas prices have risen substantially, by 31 and 51 per cent, respectively, during the course of the year. Transport fuel (petrol and diesel) has also exhibited large swings in prices connected with movements in global oil prices. In July, transport fuel prices were 25.7 per cent higher than in the same month a year earlier, but corresponding figures for December reported an 11.2 per cent fall.

Core inflation and UK monetary policy

The Bank of England Act (1998) established a new framework for the operation of monetary policy in the UK. Control of interest rates was passed from HM Treasury to the independent MPC at the Bank of England, whose remit was to maintain price stability in terms of an inflation target set by the Chancellor.

Initially, the target was RPI excluding mortgage interest payments (RPI-X) inflation of 2.5 per cent. However, in December 2003, the remit was changed to target CPI inflation at 2 per cent. The change was motivated by the wide belief that CPI was more methodologically sound and a better indicator of the UK inflationary pressures of concern to monetary policy makers. Roe and Fenwick (2004) provide the statistical perspective on the move to the new target.

Inflation targeting, by making the association between inflation outlook and the level of interest rates faced by households and firms more transparent, has heightened public awareness in price statistics. The Bank of England publishes the minutes of MPC meetings, a quarterly Inflation Report and MPC members themselves make speeches around the country and appear before the House of Commons Treasury Select Committee.

Although the Bank of England does not target core inflation, it is easy to understand why monetary policy makers might wish to consider these measures. It is widely accepted that interest rate changes take up to two years to fully feed through to output. Consequently, monetary policy is forward-looking, having to be set pre-emptively to maintain an inflation target in the medium term. As core inflation is the part of actual inflation that is expected to persist beyond the short run, it is potentially a useful indicator of the medium term and more persistent inflationary pressures in the economy that monetary policy should address.

While excluding or down-weighting the more erratic items can give an altogether cleaner measure, it runs the risk of discarding new information on emerging inflationary developments. The current UK policy regime reflects this by targeting headline inflation but allowing some short-term flexibility. If inflation departs from target by more than 1 percentage point in either direction, it triggers an open letter from the Governor of the Bank of England to the Chancellor explaining the reason for the deviation and how the target rate will be restored over the forecast horizon (approximately two years). This facility frees monetary policy from having to react to short-term influences on actual inflation as long as the target is on course to be met in the medium term. So, even though the Bank of England does not explicitly target a core inflation measure, it is clear that the underlying principles have been figured into the monetary policy regime.

Measuring core inflation

There are a plethora of different techniques for constructing measures of core inflation. These differ in part depending on how core inflation is actually defined but in essence most are built on the same underlying principles.

If core inflation is viewed as actual inflation once extreme or erratic prices are removed from the index, then the standard approach taken is to extract the general noise to leave a cleaner measure of current price changes. Here, statistical approaches such as excluding the most volatile subcomponents or reweighting the index based on the respective variances of the subcomponents are often adopted.

Alternatively, if the aim is to capture the true underlying price pressures in the economy, then the methods used might give higher weights to the components that exhibit greater persistency or are better predictors of future inflation. However, it is unlikely an item which exhibits erratic price movements will also show strong persistency or be a good predictor of future inflation. Hence, these techniques would be expected to produce similar answers to those based on variance weights.

Finally, economists have developed a fairly strong sense of the long-run determinants of inflation and this laid the foundation of model-based estimates of core inflation. These are slightly different from the more statistical methods, but again it is not too difficult to reconcile the views and approaches of economists and statisticians.

A number of desirable properties of core inflation measures have been suggested (see Wynne 1999).

- Timeliness: the measure should be computable in real time and available alongside the headline figures
- Unbiased: as core inflation measures seek only to remove transitory and/or reversible components from the price index, the long-run average of core measures should be similar to the actual or headline rate
- Once constructed, core measures should not then be revised unless there are revisions to the underlying data
- Verifiable: techniques should easily be understood by the general public and, if necessary, reproducible with limited resources
- Forward-looking: a key element of core inflation measures is their success in predicting future inflation trends
- Economic basis: a theoretical rationale may be beneficial given the use of any measure is likely to be in economic policy making or analysis

This article now seeks to demonstrate several of these methods applied to UK CPI inflation since the new inflation target was introduced in December 2003.

Exclusion methods

These are the simplest and the most widely applied measures of core inflation. Certain parts of an aggregate price index are considered very prone to short-term supply-side shocks or strong seasonal movements which have little effect on the long-term outlook

for inflation and can therefore be excluded altogether. The most common suspects appear to be food and energy items.

ONS publishes a number of consumer price indices where certain special aggregates are excluded, although they are not referred to as core inflation measures. These are typically known as CPI-X, where the X refers to the item or items omitted, and can be found in the monthly Focus on Consumer Price Indices release.[1] As an illustration, **Table 1** presents the different CPI-X measures for September 2008 when the aggregate CPI inflation rate peaked at 5.2 per cent.

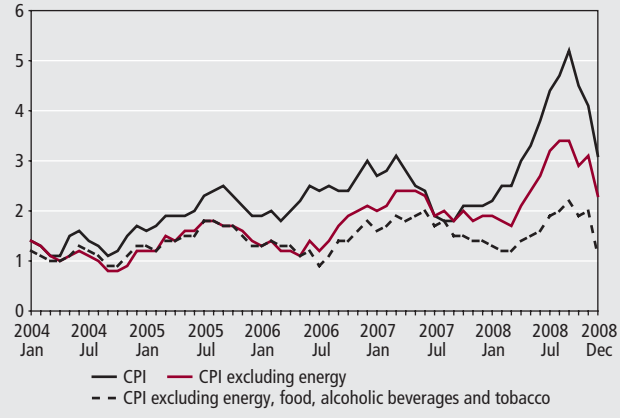
Figure 2 plots UK CPI inflation along with a measure that excludes energy and one that excludes energy as well as food, beverages and tobacco. Looking at the three time series gives a very different perspective on UK consumer price inflation during 2008. All three measures peaked during September but, while overall CPI inflation was 5.2 per cent, the exclusion of energy saw it peak at a lesser 3.4 per cent and the further exclusion of food, alcoholic beverages and tobacco saw a peak of only 2.2 per cent. So, while headline inflation rates increased significantly, rates based on the exclusion of energy and food-related items suggested inflationary pressures were much closer to target.

Table 1
Exclusion of special aggregates and inflation, September 2008

Special aggregate (X)	CPI-X weight (per 1000)	CPI-X inflation rate (per cent)
CPI	1,000	*5.2*
Energy	927	*3.4*
Energy, food, alcoholic beverages and tobacco	776	*2.2*
Energy and unprocessed food	877	*2.8*
Seasonal food	971	*5.1*
Energy and seasonal food	898	*3.2*
Tobacco	976	*5.2*
Alcoholic beverages and tobacco	958	*5.3*
Liquid fuels, vehicles fuels and lubricants	960	*4.6*
Housing, water, electricity, gas and other fuels	885	*3.9*
Education, health and social protection	947	*5.2*

Source: Office for National Statistics

Figure 2
CPI and the exclusion of special aggregates
Percentage change, month on same month a year earlier



Source: Office for National Statistics

Another class of exclusion-based measures concerns one-off and known shocks. In UK economic policy making, RPI-X has been the measure of choice for many years and this is a form of core inflation by excluding mortgage interest payments from the overall index. It was not considered particularly helpful that an increase in interest rates designed to curb inflationary pressures might actually transmit into higher RPI inflation through mortgage interest payments, so a better underlying impression of true inflationary pressures would result from its omission. RPI-Y is another exclusion-based measure, not only stripping out mortgage interest payments but also indirect taxes from the index.

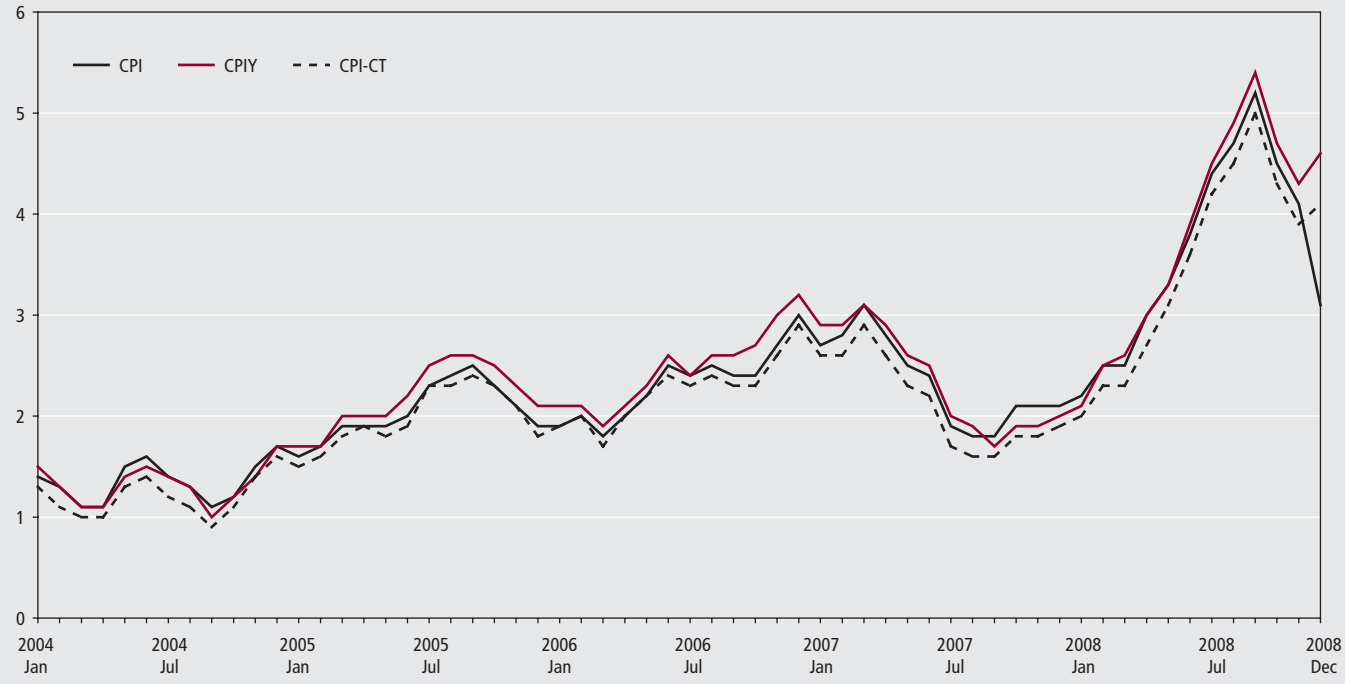
Mortgage interest payments along with a number of other housing-related items such as depreciation do not form part of the CPI. However, indirect tax changes can still have an important impact on measured price inflation even though they are not part of the underlying demand and supply pressures in the economy. ONS produces two estimates of CPI inflation that exclude the effects of indirect taxation (**Figure 3**). CPI-Y excludes VAT, duties, insurance premium tax, stamp duty on share transactions and air passenger duty. CPI-CT is simply the consumer price index at constant tax rates. Differences between the series predominately reflect weightings due to taxes being excluded in one measure, but included at constant rates in the other.

Looking at the history of CPI inflation, for the most part, indirect tax changes have had a small impact. In general, indirect tax rates have increased in recent years. Excise duties normally go up rather than down, especially fuel duties which, for a period of time, were driven by the fuel price escalator. There have also been notable increases in vehicle excise duty and air passenger taxes. Despite these trends, the latest impact of indirect tax changes on CPI inflation rates has been downwards.

In the 2008 Pre-Budget Report, the Chancellor announced a temporary 2.5 percentage point reduction in the rate of VAT, although the impact on alcohol, fuel and tobacco was to be offset by excise tax increases. These measures, implemented in December of that year, have had a big impact on CPI inflation. Headline rates for December reported a 3.1 per cent increase in prices relative to the same month a year earlier. However, the CPI-Y and CPI-CT rates were much higher, at 4.6 and 4.1 per cent, respectively. Hence, much of the reduction in UK inflation in that month was due to policy changes rather than a marked shift in inflation trends.

Core inflation measures based on the exclusion method are popular and tick many of the desirable boxes listed before. **Table 2** presents some cross-country comparisons of core inflation measures and all are based on this approach. Certainly they are easy to compute and the public has a good understanding of what they portray. But they have attracted criticism on two grounds. First, a once and for all judgement about what is in and what is out is required. Second, the blanket approach to exclusion may not always be considered helpful. For example, excluding all food items from the index implies that all food price movements are simply transitory whereas there may be useful underlying information inherent in certain subparts of the food category.

Figure 3
CPI inflation excluding the effects of indirect taxes
Percentage change, month on same month a year earlier



Source: Office for National Statistics

Table 2
Cross-country comparisons of core inflation measures

Country	Core inflation measure
Canada	CPI excluding food, energy and indirect taxes
Australia	Treasury underlying CPI
New Zealand	CPI excluding interest charges
Japan	CPI excluding fresh food
US	CPI excluding food and energy
Germany	CPI excluding indirect taxes
Spain	CPI excluding energy and unprocessed food
Netherlands	CPI minus fruits, vegetables, and energy
Ireland	CPI less mortgage interest payments (MIPs); CPI excluding MIPs, food and energy
Portugal	CPI less unprocessed food and energy

Source: Office for National Statistics

Weighted variance methods

Exclusion methods omit an entire class of items from the price index based on a prior judgement that their impact on inflation rates is erratic and non-lasting. A refinement of this approach would be to simply recalculate the price index based on a measure of volatility. Therefore, non-volatile items within a class of otherwise excluded items can still be allowed to influence the measurement of core inflation. And erratic components in other non-excluded item classes can have their influence diminished. Naturally, a downside is the less simplistic and clear-cut approach, although the computations involved are hardly complex.

Weighting individual components according to past volatility can be done in a number of ways, but a generally accepted approach proposed by Dow (1994) is to allocate weights inversely related to the standard deviation of individual prices. Therefore, for each of the 85 item categories making up the CPI, the respective weight is given by:

$$w_i = \frac{\left(1/\sigma_i\right)}{\sum_{i}^{85}\left(1/\sigma_i\right)}$$

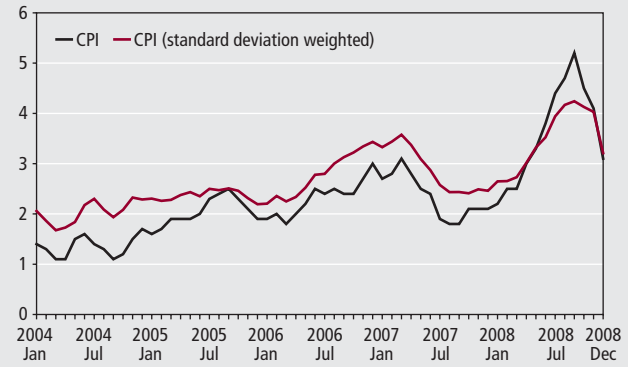
where σ_i is the standard deviation of monthly inflation rates for each item over the past five years.

Figure 4 plots the core inflation rate calculated where the weights are updated each year using this methodology, alongside the headline rate. It is evident that, over the sample January 2004 to December 2008, the volatility of the core rate is lower. In particular, the inflation peak in the summer of 2008 is reduced, but also the core measure exceeds the low CPI measures at the beginning of the sample period.

A comparison of the standard deviation-based weights and the CPI expenditure-based weights at a more aggregated 12-item classification and pertaining to 2008 are presented in **Figure 5**. Note that the weights applied during 2008 were formulated over the previous five-year period (2003 to 2007), so the significant volatility in food and home-energy prices during that year would yet to be fully reflected. However, it is evident that previous volatility in transport fuel prices had an impact, meaning its lower weight in the core inflation measure fed through to a lower peak rate in September 2008. Higher core rates at the beginning of the sample might reflect the lower weights attached to clothing and footwear items where prices have generally fallen over the last decade. These items tend to exhibit seasonal volatility so it is no surprise that past inflation rates, month on month, report a relatively high standard deviation.

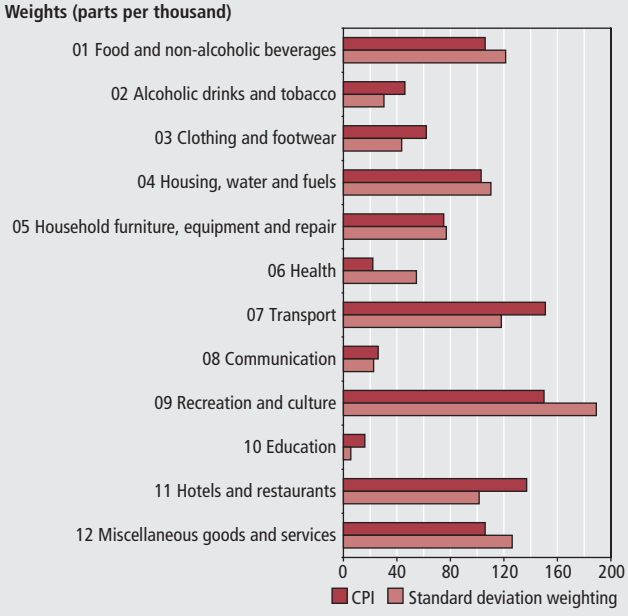
Some understanding of how the volatility of certain item prices might be changing over the sample period can be taken from

Figure 4
Core inflation based on weights inversely related to the past standard deviation of price movements



Source: Office for National Statistics

Figure 5
Standard deviation-based weights and CPI weights, 2008



Source: Office for National Statistics

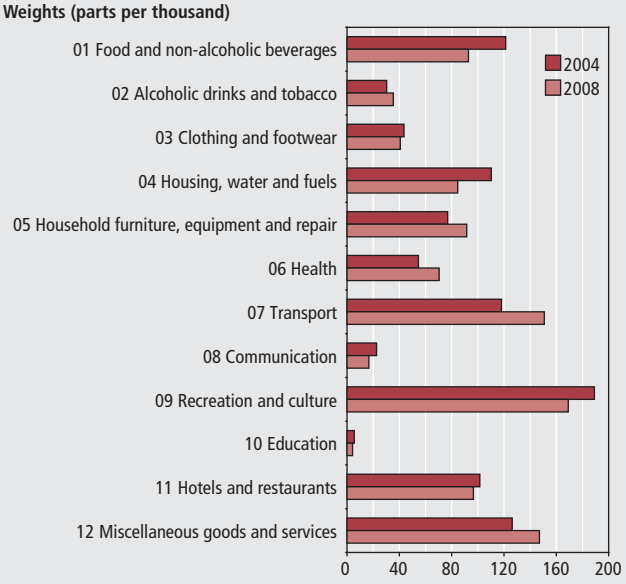
Figure 6 which shows a comparison of standard deviation-based weights for 2004 and 2008. Clearly, the weights of food and home-energy items are beginning to fall.

This reflects one of the disadvantages of the method, that the weights are backward looking, so the calculation can be sensitive to regime changes in price movements. Using a shorter rolling sample would make the weights more responsive to recent inflation volatility but, obviously, assumes the risks of using a smaller sample of observations. Hence a judgement has to be made: should the weights reflect longer-term trends in volatility or be more able to respond quickly to sudden changes?

Persistence-weighted methods

If an important feature of core inflation is the accurate prediction of future headline rates, then the persistency of individual price movements may be informative. This approach was investigated

Figure 6
Standard deviation-based weights



Source: Office for National Statistics

by Cutler (2001) in an MPC working paper. Her suggestion was to reweight price movements in monthly inflation rates using the coefficients from a simple first-order autoregressive model.

For each of the 85 items making up the CPI, the following simple regression was estimated:

$$\pi_{it} = a_i * \pi_{it-1} + e_{it}$$

where π_{it} is the individual inflation rate of a particular item at time t, a_i the autoregressive coefficient and e_{it} an error term.

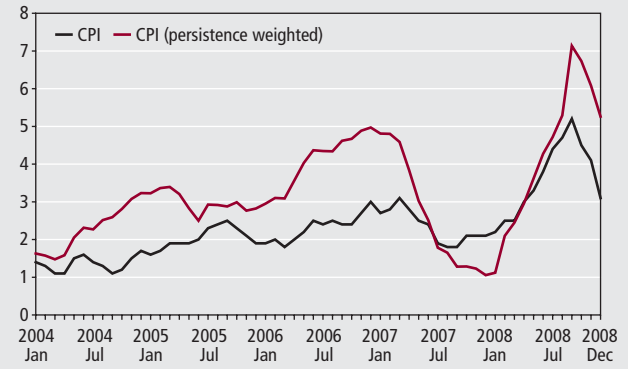
The reasoning behind this approach is fairly intuitive. If the coefficient a_i is negative, then it suggests that previous price movements are quickly reversed and the item is given a zero weight. This is likely to correspond to items where seasonal factors are important. The larger the coefficient a_i, the stronger the effect of previous price movements on current inflation. Hence, a persistency-weighted index can be constructed where each item is given the weight:

$$w_i = \frac{a_i}{\sum_{i=1}^{85} a_i}$$

In **Figure 7**, this method is applied to produce a UK CPI core inflation measure between 2004 and 2008. Weights are updated annually and the regression is run over a five-year rolling sample with the monthly inflation rate as the dependent variable. The surprising result is that the core inflation rate calculated using this method is actually more volatile than the headline rate.

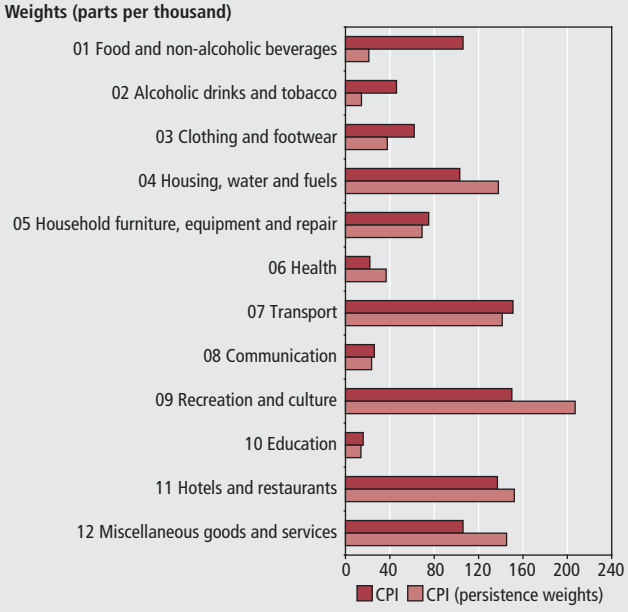
A comparison of persistence and general CPI weights in 2004, at the 12-item level of aggregation, is presented in **Figure 8**. These results are plausible, especially the low persistence weights attached to the food, drink and tobacco segments where monthly price movements are driven by strong seasonal factors and are quickly reversed.

Figure 7
Core inflation based on persistence weights
Percentage change, month on same month a year earlier



Source: Office for National Statistics

Figure 8
Persistence-based weights and CPI weights, 2004
Weights (parts per thousand)

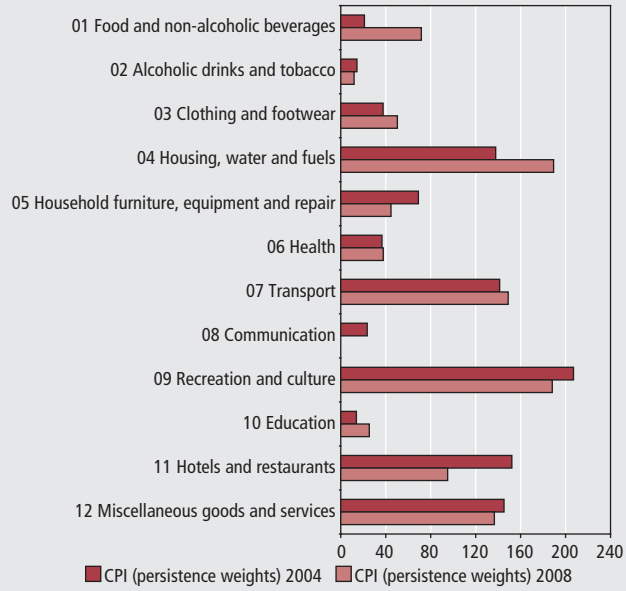


Source: Office for National Statistics

Comparing the 2004 and 2008 weights shows how the persistence weights have changed over time (**Figure 9**). Note that the food and household energy weights have increased markedly during this time reflecting the recent sustained increases in these prices. Once again, these results will not capture the strong volatility in 2008, as the weights applied to price movements in that year were taken from regressions run over the five-year period January 2003 to December 2007.

Applying this methodology produces a core inflation measure that actually amplifies the movements in the headline rates. This must be because the items that are exhibiting high inflation have also been exhibiting sustained movements in inflation. While this approach is probably quite good at giving low or zero weights to very seasonal price movements, it is generally poor at dealing with jumps or large movements in time series. In this case, the coefficient in the autoregressive model will be quite sensitive, as is evident in the shifting weight patterns for the food and the housing, water and fuels categories in Figure 9.

Figure 9
Persistence-based weights
Weights (parts per thousand)



Source: Office for National Statistics

However, this example does underline an important principle. It is not implausible for core inflation measures to show stronger movements than the headline index for short periods, even though conventional wisdom is that the former are generally just smoothed versions of the latter. This is particularly likely when the extreme price movements in the distribution of all individual prices are sustained for several periods. This effect is further strengthened by the backward-looking nature of the calculation which assumes that sustained price movements in the past will continue.

Trimmed-mean methods

Both the CPI and RPI are based on a weighted basket, where the weights reflect the typical expenditure share of each item for a representative consumer. RPI inflation is calculated as the arithmetic mean of price relatives, but this is only the best estimator if the distribution of price changes follows a normal distribution.

In reality, most price distributions are considered to be non-normal in two ways. First, the distribution of price movements tends to be asymmetric in exhibiting positive skewness. This means that large positive price movements tend to be more common than negative price movements of the same magnitude. Second, the distribution of price movements is leptokurtic with fat tails (that is, having a higher probability of extreme values), implying that very large price movements are actually far more common than the normal distribution would imply. If a distribution were skewed, then the arithmetic mean would be a biased estimator of central tendency. And if the distribution were leptokurtic, it would be an inefficient estimator in that a better indicator of the central tendency could be achieved by giving less weight to the large price changes at the extremes of the distribution (see Roger 2000 for a useful account of the importance of the distribution of price changes).

These problems are slightly mitigated in the calculation of CPI inflation rates, which are based on the geometric mean of price

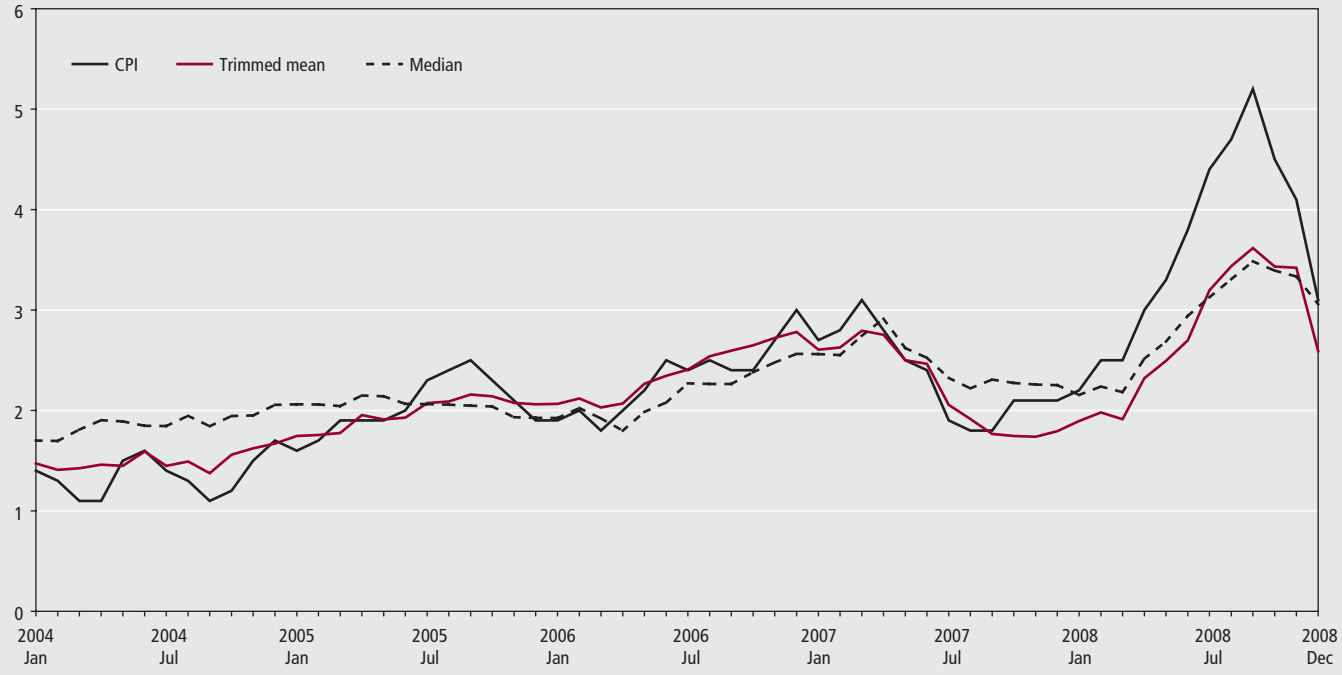
movements. A geometric mean is essentially the arithmetic mean of a log-normal distribution, and the effect of a log-transformation is to generally reduce the impact of the more extreme observations.

If the distribution of price changes is leptokurtic, then trimmed means, where a certain percentage of the largest and smallest price changes are excluded, are regarded as a more efficient estimator. Judgement, though, is required concerning the proportion of the distribution that should be trimmed. Bakhshi and Yates (1999) suggest a 15 per cent symmetric trim for the UK RPI-X. According to their analysis, this approach produces a core inflation measure with similar properties to a 37-month moving average of the actual RPI-X inflation rate. Judgement is also required on whether the applied trim should be symmetric or focused on tackling any skewness in the distribution of individual price changes.

Figure 10 presents a trimmed-mean core inflation estimate for the UK CPI. This has been calculated by removing for each month the 15 per cent largest and smallest monthly price changes over the period 2004 to 2008. Also presented in Figure 10 is the median rate of CPI inflation. A median is basically the same as a 50 per cent symmetric trim and exhibits the useful property of being a much more robust indicator of central tendency than the mean. **Table 3** reports the top 15 and bottom 15 most excluded items in the 60 monthly periods.

The most often trimmed items are passenger transport by air

Figure 10
Trimmed mean and median estimates of core inflation
Percentage change, month on same month a year earlier



Source: Office for National Statistics

Table 3
Top 15 most and least often trimmed items

Top 15 trimmed items			Bottom 15 trimmed items		
Item		Percentage of months trimmed	Item		Percentage of months trimmed
07.3.3	Passenger transport by air	*98.3*	07.1.1A	New cars	*0.0*
07.3.4	Passenger transport by sea and inland waterway	*91.7*	09.2.1	Major durables for recreation	*1.7*
04.5.3	Liquid fuels	*90.0*	11.1.1	Restaurants and cafes	*1.7*
05.1.1	Furniture and furnishings	*86.7*	12.1.1	Hairdressing and personal grooming establishments	*1.7*
09.1.2	Photographic, cinematic and optimal equipment	*86.7*	04.3.2	Services for maintenance and repair	*6.7*
09.1.3	Data processing equipment	*83.3*	09.1.5	Repair of audiovisual equipment	*6.7*
01.1.6	Fruit	*81.7*	04.4.1	Water supply	*8.3*
07.2.2	Fuels and lubricants	*80.0*	04.4.3	Sewage collection	*8.3*
09.1.1	Reception and reproduction of sound and pictures	*75.0*	05.3.3	Repair of household appliances	*8.3*
09.5.1	Books	*75.0*	05.6.2	Domestic and household services	*8.3*
05.1.2	Carpets and floor coverings	*70.0*	06.1.2	Other medical equipment	*8.3*
05.2	Household textiles	*70.0*	09.4.1	Recreational and sporting activities	*8.3*
09.1.4	Recording media	*68.3*	09.5.2	Newspapers and periodicals	*8.3*
01.2.1	Coffee, tea and cocoa	*65.0*	11.1.2	Canteens	*8.3*
09.3.1	Games, toys and hobbies	*65.0*	12.4	Social protection	*8.3*

Source: Office for National Statistics

and water, where seasonal factors play a key role in driving price movements. Other items typically excluded are a general class of electrical goods (audiovisual, computers and photography), household furniture and carpets. Again, these are items that may follow fairly regular discount periods, such as biannual sales. It is little surprise that liquid fuels, fruit, and coffee, tea and cocoa are also regularly trimmed given the sensitivity of prices to supply shocks.

In terms of the least often trimmed, the goods and services which report relatively stable monthly price movements, new cars were never excluded. Repair and maintenance expenditure; cafes, restaurants and canteens; recreational, domestic, household and personal services; and water and sewage utilities also showed evidence of relative price stability.

The basic justification for trimming is that prices at the extreme of the distribution carry less information about the currently prevailing inflationary pressures in the economy. However, Zeldes (1994) argues that, in certain situations, it is the large price movements at the ends of the distribution that actually contain the true news on general price pressures. For example, there is a great deal of anecdotal evidence that prices are sticky so, for a firm that faces costs in changing prices, it is possible for a wedge to open up between its actual and desired price. If, following a demand shock, this wedge reaches a critical level for some companies and not others, the firms that actually change price will be those that are responding to the underlying price information. A trimming procedure though may well delete these items from the core inflation estimate even though they contain new information about future price movements.

Common component methods

When observing price movements in real time, the difficulty is identifying the relative importance of the permanent and transitory parts. In this sense, measuring core inflation is a signal extraction problem, in that true or underlying price movements are embedded in the noisier observed data.

Signal extraction problems are commonplace in economic and statistical analysis. For example, the permanent income hypothesis argues that households base their consumption decisions not on actual income but on a longer-term view or permanent income. Therefore, transitory changes in income would have little impact on spending. Another example concerns the rate of unemployment, where inflationary pressures are likely to be neutral, known as the Non-Accelerating Inflation Rate of Unemployment or NAIRU. In both cases, it is not the observed data that matter, whether household income or unemployment, but the signal within that data referring to the permanent innovations in the data.

Deducing the underlying variable of interest (core inflation) from the measured data (headline inflation) can be achieved by writing the signal extraction problem in state space form and applying the Kalman Filter. State space form consists of two sets of equations.

The measurement equations define the relationship between the observed data, the state variable(s) and an idiosyncratic component. Using a broader 12-item disaggregation of CPI inflation, the measurement equations can be written as follows:

$$\begin{aligned} \pi_{1t} &= S_t + e_{1t} \quad & Var(e_{1t}) &= \sigma_1^2 \\ \pi_{2t} &= S_t + e_{2t} \quad & Var(e_{2t}) &= \sigma_2^2 \\ &\vdots & &\vdots \\ \pi_{12t} &= S_t + e_{12t} \quad & Var(e_{12t}) &= \sigma_{12}^2 \end{aligned}$$

Hence, the recorded inflation rate of each item (π_{it}) consists of a common component (core inflation) represented by the state variable (S_t) and an individual idiosyncratic factor (e_{it}) that is allowed to take its own variance (σ_i^2).

The second set of equations, known as the state equations, define a law of motion for the state variable(s). This could feasibly be any type of linear model although, for simplicity, this example uses a basic first-order autoregressive model.

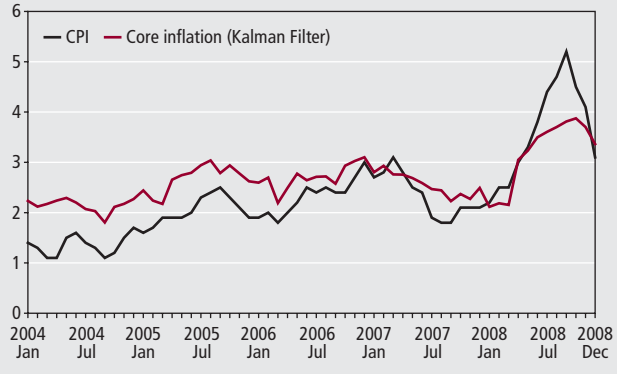
$$S_t = \rho S_{t-1} + v_t \quad Var(v_t) = 1$$

Having expressed the signal extraction problem in state space form, an estimate of core inflation can be found using the Kalman Filter (see Harvey 1991 for a good exposition). This is a recursive algorithm which at each point in time, based on the history of the data, determines how much of an innovation in measured inflation is accounted for by the core element and the non-core or idiosyncratic element. For example, if the past data are particularly volatile, then the algorithm would be expected to allocate a larger proportion of current and future inflation innovations in that item to the idiosyncratic rather than the common component. The results from this procedure are shown in **Figure 11**.

The Kalman Filter is often used in trend analysis and, here, core inflation is estimated as the general underlying trend in a cross-section of individual inflation rates. A key element of the procedure is the signal-to-noise ratio. If the variance of the error term in the state equation is normalised to unity, then this will be given by the inverse of the variance of the idiosyncratic terms in each of the measurement equations ($1/\sigma_i^2$).

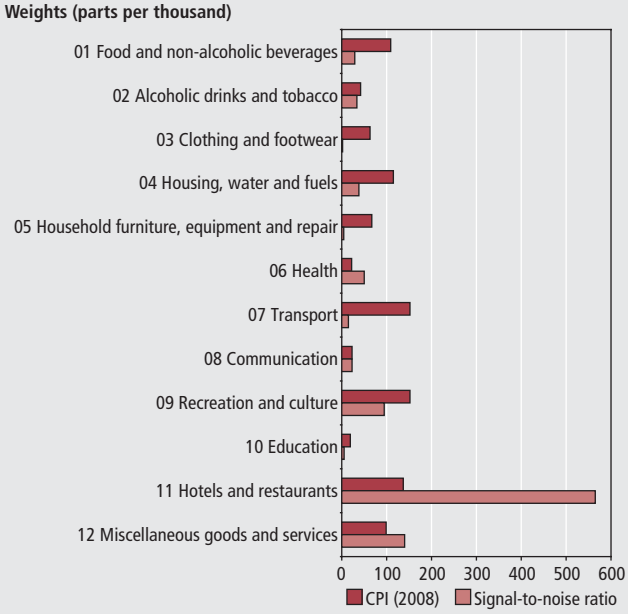
The lower the signal-to-noise ratio, the greater the contribution of

Figure 11
A Kalman Filter approach to core inflation
Percentage change, month on same month a year earlier



Source: Office for National Statistics

Figure 12
A comparison of CPI expenditure weights and signal-to-noise ratios



Source: Office for National Statistics

specific rather than common factors in accounting for inflation. As the signal-to-noise ratio increases, core inflation plays a larger role in accounting for the measured inflation of that item. Therefore, this method is closely related to the variance-weighted approach. By normalising the calculated signal-to-noise ratios so that they sum to 1000, they can be compared with the actual CPI expenditure weights (**Figure 12**).

The signal-to-noise ratios were estimated over the period 1996 to 2008 so, being based on a much longer sample, may not exactly compare with weights calculated through other methods. The most significant result is the large weight attached to hotels and restaurants, implying that inflation in this category has been strongly representative of underlying inflationary pressures in the whole economy over this longer time period. This corresponds with the evidence in Table 3 where this category was infrequently excluded when calculating a trimmed mean of price changes. Lower weights attached to food, housing fuels and transport prices are indicative of the frequent supply shocks that affect these items. Also, the clothing and footwear, household furniture, and recreation and culture (which includes computers and audiovisual goods) categories would have a lower signal-to-noise ratio due to frequent periods of discounting, adding volatility to the time series.

The example used here is close in spirit to the dynamic factor model outlined in Bryan and Cecchetti (1993). Another approach, based on similar principles, is the use of generalised dynamic factor analysis in Cristadoro *et al* (2001) which has the advantage of being able to deal with a much larger cross-section of data. While methods based on extracting common components from the data are fairly intuitive, and flexible in that almost any type of linear model can be represented in state space form, they are generally more complex than other approaches. This might be expected to hinder public understanding and acceptance of such measures.

A further problem connected with filters is that past estimates will tend to be revised, even if the underlying data remain the same, once the time series rolls forwards. Data at the end of the sample are the most prone, an issue known as the end-point problem. Unfortunately, the recent data also tend to be of most interest, so revisions to core inflation measures may undermine people's trust in them.

Economic model-based methods

According to economic thought, there are two sources of price changes in an economy. The first are relative price changes resulting from shifting demand and supply. For example, a sharp rise in oil prices would, if everything else were held constant, lead to a fall in real incomes and subsequently falling demand and prices elsewhere in the economy. Although relative prices have changed, the overall price index would remain unchanged. Movements in relative prices may well be far from painless and have differential impacts on certain groups of people but, in aggregate, they are neutral and thus require no monetary policy response under a regime of inflation targeting. Even if relative price changes did have a non-neutral impact, it would be expected to be a one-off effect on the price level rather than the rate of inflation (the growth rate of the price level).

When economists talk about inflation, they are really referring to a fall in the purchasing power of money caused by a mismatch between the money supply and the level of output. When the growth of the money supply exceeds the growth of output, the relative increase in money causes prices to be bid upwards, hence each unit of money has less power to be exchanged for goods and services. The general creep in prices that this causes is identified as the long-term root cause of inflation. Relative price changes only have permanent effects to the extent they are accommodated by the money supply. For this reason, Milton Freidman famously stated inflation as being everywhere a monetary phenomenon.

In real time, it is immensely difficult to separate out the relative price and monetary mismatch effects in measured inflation. For this reason, the approaches used by statisticians can serve as a good proxy. Relative price movements are assumed to have a more erratic and shorter-term impact on aggregate price movements so, if removed or down-weighted, a measure based on more persistent inflationary trends results.

If core inflation is defined as the long-run consequence of excessive monetary growth, then it provides a basis for economists to model core inflation. Despite this, the literature has remained fairly sparse and it has been hard to find much empirical correlation between growth in the money supply and the trend in inflation as theory predicts. Quah and Vahey (1995) is the most cited work to date, and they identify core inflation as the component of measured inflation with no medium- to long-run effect on output and produce an estimate for UK RPI-X.

Final remarks

Core inflation measures seek to provide an estimate of the underlying and persistent component of inflation, recognising that price indices can be affected by erratic and transitory components in the short run. As an explicit measure, it can guide in the setting of monetary policy and in helping the public to establish inflation expectations.

This article has discussed a number of approaches to measuring core inflation. The most commonly applied is the exclusion approach, favoured for its simplicity and for the ease with which it can be verified by the public. Food (seasonal) and energy prices are the most commonly omitted as these items are particularly prone to supply shocks that have temporary effects on the rate of inflation.

However, it has been questioned whether central banks should just concentrate on core inflation, as households care about the prices of all the items they buy. By living in a world where people do not eat or drive, monetary policy makers might be accused of being out of touch so, for the benefit of public accountability, it is sensible to target headline inflation as well.

A dual approach takes into account the possible interactions that exist between headline and core inflation. Changes in core inflation are less likely to be reversed, and by providing a cleaner measure of the underlying inflationary pressures in the economy, is a useful indicator for the future path of headline inflation. Correspondingly, sharp movements in relative prices can also feed through into core inflation, especially if the initial bout of inflation they cause becomes engrained in inflationary expectations. The potential for these second-round effects has been an important consideration to the Bank of England, as recorded in the MPC minutes.

Notes

1 See www.statistics.gov.uk/statbase/product.asp?vlnk=867

CONTACT

elmr@ons.gsi.gov.uk

REFERENCES

Bakhshi H and Yates T (1999) 'To trim or not to trim?', Bank of England working paper no. 97.

Blinder A (1997) 'Measuring short run inflation for central bankers', Federal Reserve Bank of St. Louis, May 1997.

Bryan M and Cecchetti S (1993) 'Measuring core inflation', National Bureau of Economic Research working paper W4303.

Cristadoro R, Forni M, Reichlin L and Veronese G (2001) 'A core inflation index for the Euro area', Centre for Economic Policy Research discussion paper 3097.

Cutler J (2001) 'A new measure of core inflation in the UK', MPC unit discussion paper no. 3.

Dow J (1994) 'Measuring inflation using multiple price indexes', Department of Economics, University of California-Riverside mimeo.

Harvey A (1991) 'Forecasting structural time series and the Kalman Filter', Cambridge University Press.

Quah D and Vahey S (1995) 'Measuring core inflation' *Economic Journal* vol 105, no. 432.

Roe D and Fenwick D (2004) 'The new inflation target: the statistical perspective', *Economic Trends* 602, pp 24–46 and at www.statistics.gov.uk/cci/article.asp?id=688

Roger S (2000) 'Relative prices, inflation and core inflation', International Monetary Fund working papers 00/58.

Wynne M (1999) 'Core inflation – a review of some conceptual issues', Federal Reserve Bank of Dallas, working paper 99-03.

Zeldes S (1994) 'Comment on Bryan and Cecchetti (1993)'.

Key time series

1 National accounts aggregates

Last updated: 25/02/09

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
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
2008						111.9	112.0		
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	361,324	322,629	126.8	127.1	114.5	112.7	112.7	112.5	112.8
2008 Q2	362,719	323,514	127.3	127.5	113.5	112.7	112.7	113.0	113.1
2008 Q3	362,008	325,542	127.0	128.3	112.7	111.9	111.9	113.5	114.6
2008 Q4	359,053	324,662	126.0	127.9		110.2	110.3	114.4	116.0

Percentage change, quarter on corresponding quarter of previous year

	IHYO	ABML[4]	IHYO	ABML[4]	YBGO4	IHYR	ABMM[4]	IHYU	ABML/ABMM[4]
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	*5.4*	*5.9*	*5.5*	*5.9*	*5.4*	*2.6*	*2.6*	*2.7*	*3.2*
2008 Q2	*4.1*	*4.3*	*4.1*	*4.3*	*3.4*	*1.7*	*1.8*	*2.3*	*2.5*
2008 Q3	*2.4*	*3.3*	*2.4*	*3.3*	*1.9*	*0.2*	*0.2*	*2.1*	*3.1*
2008 Q4	*0.5*	*1.8*	*0.5*	*1.8*		*–1.9*	*–1.7*	*2.4*	*3.6*

Notes:

Source: Office for National Statistics

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

2 Gross domestic product: by category of expenditure

Last updated: 25/02/09

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

	Domestic expenditure on goods and services at market prices											
	Final consumption expenditure			Gross capital formation								
	Households	Non-profit institutions[1]	General government	Gross fixed capital formation	Changes in inventories[2]	Acquisitions less disposals of valuables	Total	Exports of goods and services	Gross final expenditure	*less* imports of goods and services	Statistical discrepancy (expenditure)	Gross domestic at product market prices
	ABJR	HAYO	NMRY	NPQT	CAFU	NPJR	YBIM	IKBK	ABMG	IKBL	GIXS	ABMI
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
2008	802,079	30,714	261,652	217,544	1,812	1,242	1,315,043	350,079	1,665,122	388,771	–1,177	1,275,175
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	201,453	7,509	64,966	56,240	1,136	207	331,510	89,227	420,737	99,351	–203	321,183
2008 Q2	200,958	7,634	65,008	55,525	1,835	415	331,375	88,272	419,646	98,230	–284	321,132
2008 Q3	200,537	7,804	65,353	53,506	1,440	348	328,988	88,722	417,710	98,501	–335	318,874
2008 Q4	199,131	7,767	66,325	52,273	–2,599	272	323,170	83,858	407,029	92,689	–355	313,986

Percentage change, quarter on corresponding quarter of previous year

										IHYR
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	*3.6*	*3.3*	*3.4*	*–0.2*		*2.8*	*3.6*	*3.0*	*3.8*	*2.6*
2008 Q2	*2.3*	*4.6*	*2.9*	*–0.9*		*2.3*	*1.7*	*2.2*	*3.1*	*1.7*
2008 Q3	*0.7*	*5.9*	*3.2*	*–6.3*		*0.0*	*–0.1*	*0.0*	*–1.4*	*0.2*
2008 Q4	*–0.2*	*3.4*	*4.4*	*–9.7*		*–2.3*	*–5.3*	*–3.0*	*–7.1*	*–1.9*

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: 11/02/09

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
Oct–Dec 2006	48,418	30,782	29,085	1,698	17,636	*63.6*	*60.1*	*5.5*	*36.4*
Oct–Dec 2007	48,814	31,000	29,398	1,602	17,814	*63.5*	*60.2*	*5.2*	*36.5*
Jan–Mar 2008	48,911	31,123	29,499	1,624	17,788	*63.6*	*60.3*	*5.2*	*36.4*
Apr–Jun 2008	49,007	31,190	29,505	1,685	17,816	*63.6*	*60.2*	*5.4*	*36.4*
Jul–Sep 2008	49,107	31,232	29,407	1,825	17,876	*63.6*	*59.9*	*5.8*	*36.4*
Oct–Dec 2008	49,210	31,333	29,361	1,971	17,877	*63.7*	*59.7*	*6.3*	*36.3*
Male	MGSM	MGSG	MGSA	MGSD	MGSJ	MGWH	MGSS	MGSY	YBTD
Oct–Dec 2006	23,524	16,690	15,715	974	6,835	*70.9*	*66.8*	*5.8*	*29.1*
Oct–Dec 2007	23,752	16,804	15,891	913	6,947	*70.8*	*66.9*	*5.4*	*29.2*
Jan–Mar 2008	23,807	16,890	15,948	942	6,917	*70.9*	*67.0*	*5.6*	*29.1*
Apr–Jun 2008	23,862	16,928	15,938	990	6,934	*70.9*	*66.8*	*5.8*	*29.1*
Jul–Sep 2008	23,919	16,937	15,862	1,075	6,982	*70.8*	*66.3*	*6.3*	*29.2*
Oct–Dec 2008	23,976	17,010	15,829	1,181	6,966	*70.9*	*66.0*	*6.9*	*29.1*
Female	MGSN	MGSH	MGSB	MGSE	MGSK	MGWI	MGST	MGSZ	YBTE
Oct–Dec 2006	24,894	14,093	13,369	724	10,801	*56.6*	*53.7*	*5.1*	*43.4*
Oct–Dec 2007	25,063	14,196	13,507	689	10,867	*56.6*	*53.9*	*4.9*	*43.4*
Jan–Mar 2008	25,104	14,233	13,552	681	10,870	*56.7*	*54.0*	*4.8*	*43.3*
Apr–Jun 2008	25,144	14,262	13,568	695	10,882	*56.7*	*54.0*	*4.9*	*43.3*
Jul–Sep 2008	25,188	14,295	13,545	750	10,894	*56.8*	*53.8*	*5.2*	*43.2*
Oct–Dec 2008	25,234	14,322	13,532	790	10,911	*56.8*	*53.6*	*5.5*	*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
Oct–Dec 2006	37,447	29,562	27,886	1,675	7,885	*78.9*	*74.5*	*5.7*	*21.1*
Oct–Dec 2007	37,631	29,725	28,141	1,584	7,906	*79.0*	*74.8*	*5.3*	*21.0*
Jan–Mar 2008	37,674	29,802	28,199	1,604	7,871	*79.1*	*74.8*	*5.4*	*20.9*
Apr–Jun 2008	37,716	29,844	28,182	1,662	7,872	*79.1*	*74.7*	*5.6*	*20.9*
Jul–Sep 2008	37,765	29,878	28,082	1,796	7,887	*79.1*	*74.4*	*6.0*	*20.9*
Oct–Dec 2008	37,816	29,958	28,018	1,940	7,858	*79.2*	*74.1*	*6.5*	*20.8*
Male	YBTG	YBSL	YBSF	YBSI	YBSO	MGSP	MGSV	YBTJ	YBTM
Oct–Dec 2006	19,446	16,284	15,317	967	3,162	*83.7*	*78.8*	*5.9*	*16.3*
Oct–Dec 2007	19,604	16,387	15,480	907	3,216	*83.6*	*79.0*	*5.5*	*16.4*
Jan–Mar 2008	19,638	16,441	15,508	933	3,197	*83.7*	*79.0*	*5.7*	*16.3*
Apr–Jun 2008	19,672	16,472	15,492	980	3,200	*83.7*	*78.8*	*5.9*	*16.3*
Jul–Sep 2008	19,705	16,484	15,424	1,060	3,221	*83.7*	*78.3*	*6.4*	*16.3*
Oct–Dec 2008	19,737	16,550	15,382	1,168	3,187	*83.9*	*77.9*	*7.1*	*16.1*
Female	YBTH	YBSM	YBSG	YBSJ	YBSP	MGSQ	MGSW	YBTK	YBTN
Oct–Dec 2006	18,001	13,278	12,569	709	4,724	*73.8*	*69.8*	*5.3*	*26.2*
Oct–Dec 2007	18,027	13,338	12,661	677	4,689	*74.0*	*70.2*	*5.1*	*26.0*
Jan–Mar 2008	18,036	13,362	12,690	671	4,674	*74.1*	*70.4*	*5.0*	*25.9*
Apr–Jun 2008	18,044	13,372	12,690	683	4,672	*74.1*	*70.3*	*5.1*	*25.9*
Jul–Sep 2008	18,060	13,394	12,658	736	4,665	*74.2*	*70.1*	*5.5*	*25.8*
Oct–Dec 2008	18,079	13,408	12,636	772	4,671	*74.2*	*69.9*	*5.8*	*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: 17/02/09

Percentage change over 12 months

Not seasonally adjusted

	Consumer prices						Producer prices			
	Consumer prices index (CPI)			Retail prices index (RPI)			Output prices		Input prices	
	All items	CPI excluding indirect taxes (CPIY)[1]	CPI at constant tax rates (CPI-CT)	All items	All items excluding mortgage interest payments (RPIX)	All items excluding mortgage interest payments and indirect taxes (RPIY)[2]	All manufactured products	Excluding food, beverages, tobacco and petroleum products	Materials and fuels purchased by manufacturing industry	Excluding food, beverages, tobacco and petroleum products
	D7G7	EL2S	EAD6	CZBH	CDKQ	CBZX	PLLU[3]	PLLV[3,4]	RNNK[3,4]	RNNQ[3,4]
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	29.0	20.8
2008 Sep	5.2	5.4	5.0	5.0	5.5	5.6	8.5	5.6	24.1	19.5
2008 Oct	4.5	4.7	4.3	4.2	4.7	4.9	6.7	5.0	16.2	17.0
2008 Nov	4.1	4.3	3.9	3.0	3.9	3.9	5.1	5.0	8.2	14.1
2008 Dec	3.1	4.6	4.1	0.9	2.8	3.9	4.6	5.0	3.5	12.6
2009 Jan	3.0	4.5	4.1	0.1	2.4	3.4	3.5	4.1	2.3	10.8

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/03_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/03_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/03_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

February 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

January 2009

www.statistics.gov.uk/StatBase/Product.asp?vlnk=867

Monthly review of external trade statistics (MM24)

December 2008

www.statistics.gov.uk/StatBase/Product.asp?vlnk=613

Producer Price Indices (MM22)

January 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

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 Mulheirn

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

JANUARY 2009

National Statistician's article: measuring regional economic performance
Karen Dunnell

The redistribution of household income 1977 to 2006/07
Francis Jones, Daniel Annan and Saef Shah

Measuring defence
Mavis Anagboso and Alison Spence

Volume of capital services: estimates for 1950 to 2007
Gavin Wallis and Alex Turvey

Quality-adjusted labour input: estimates for 1997 to 2007
Peter Goodridge

Characteristics of those paid below the National Minimum Wage
Stephen Hicks, Sarah Conn and Jenny Johnson

Services producer price index (experimental) – third quarter 2008
Ian Richardson

FEBRUARY 2009

The labour market and the economy
Gareth Clancy

Labour demand: The need for workers
Gareth Clancy

Employment, Changes over 30 years
Katherine Kent

Unemployment, Trends since the 1970s
Debra Leaker

Economic inactivity
Debra Leaker

Labour costs
Sarah Conn

Regional economic indicators, A focus on enterprise – driving regional productivity
Birgit Wosnitza, Keith Tyrrell and Jonathan Knight

Future articles

List is provisional and subject to change.

APRIL 2009

Employment characteristics of the older generation
Characteristics of the younger generation
Identifying labour shortages in skilled occupations
Revisions to quarterly GDP growth and its components
CPI and RPI: the 2009 basket of goods and services
Labour as an input to production
Estimating capital stock at the firm level