

Economic & Labour Market Review

March 2007 | Volume 1 | Number 3

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The Director of ONS is also the National Statistician and the Registrar General for England and Wales.

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A fuller list of contact points can be found on
page 66.

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In brief

ONS Independence

While the Statistics and Registration Services Bill continues its passage through Parliament, the focus at ONS is on practical implementation and delivery of the Independence agenda.

The Bill will create a new independent Statistics Board, outside ministerial control, which will be constituted by a majority of external, non-executive, members. The Board will have a statutory responsibility to promote and safeguard the quality and comprehensiveness of all official statistics. The Board's responsibilities will extend across the UK.

Other main features of the Bill include the creation of a new assessment and designation function, and clauses to enable increased data sharing for statistical purposes. In addition, the Financial Secretary to the Treasury, John Healey, announced the Government's commitment in principle to the creation of a central publication hub through which all national statistics will be published. He also proposed to cut pre-release access to non-market-sensitive data from five days to 40½ hours to align with market-sensitive data.

Now that the main policy issues have been resolved and set out in the Bill, attention is fixed on ensuring a smooth transition from present to future arrangements. Implementation divides into two broad workstreams: professional matters, led by the National Statistician in consultation with the Government Statistical Service (GSS); and other matters, which will ultimately be for the new Chair but at this stage are led by a Treasury-based Steering Committee supported appropriately by working groups, including the GSS.

The work toward Independence at ONS is being coordinated by an ONS Programme Board, chaired by Dennis Roberts. Further arrangements to secure and extend the relevant input from external bodies are under discussion and will be announced shortly.

Another of the Programme Board's priorities is to prepare a range of options for consideration by the incoming Chair of the Statistics Board. The point at which the new arrangements come into force will depend on the Parliamentary process and timetable. However, the working assumption remains for the new system to be up and running by April 2008. Meanwhile, it is anticipated that a Chair will be appointed in advance of this date.

More information

www.hm-treasury.gov.uk/consultations_and_legislation/statistics_bill/statistics_bill_index.cfm

www.publications.parliament.uk/pa/cm200607/cmhansrd/cm070108/debindx/70108-x.htm

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Measuring low pay

The UK uses two major surveys as sources of earnings information. The Annual Survey of Hours and Earnings (ASHE) provides the official measure of low pay; the Labour Force Survey (LFS) supplements this with breakdowns by personal characteristics. The methods for producing these figures are well established. The differences that exist between the surveys in the total number of low paid (those earnings below the National Minimum Wage or NMW) are accepted as a consequence of the different survey methods and purposes.

ONS has carried out three related investigations into these explanations over the past year, bringing together several new results which examine both surveys in much greater detail than before.

The first shows how the timing of measurement is crucial and suggests evidence of non-compliance. Looking at the changes in responses throughout the year shows some evidence of non-compliance and different patterns of implementing the NMW according to firm size.

The second sheds new light on the perceived inaccuracy of responses in household surveys. Household surveys include proxy responses and may not use documentation, so earnings are often approximated at 'round' values. This investigation identifies a tendency to round certain information. An important implication, that LFS low pay estimates will be affected by the proximity of the NMW to round numbers, has been demonstrated by comparing low pay estimates across years.

The third concentrates on the methodology and effect of precision of the estimates. This investigation shows that the measure of hourly rate used can explain much of the difference between

the ASHE and LFS estimates of low pay. The investigation also demonstrates how precision affects the estimates due to the yes/no nature of low pay.

All three investigations support the current methods for generating low pay estimates but suggest that 'the number of low paid' can be a misleading construct without an awareness of these background issues.

More information

www.statistics.gov.uk/cc/article.asp?id=1730
www.statistics.gov.uk/cc/article.asp?id=1731
www.statistics.gov.uk/cc/article.asp?id=1732

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Family spending

ONS published the 2006 edition of *Family Spending* on 18 January 2007. The report, presenting the latest information from the Expenditure and Food Survey (EFS) for the financial year April 2005 to March 2006, includes an overview chapter outlining key findings, and two detailed chapters focusing on housing expenditure and the impact of equivalising income when calculating results. Also included is a fourth chapter looking at trends in household expenditure over time.

Based on the COICOP (Classification of Individual Consumption by Purpose) categories of expenditure, average weekly expenditure in the UK in 2005/06 was £443.40. As in previous years, spending was highest on transport, at £61.70 a week, with the next highest expenditure on recreation and culture, at £57.50 a week, followed by food and non-alcoholic drinks at £45.30. Average weekly expenditure on housing, fuel and power was £44.20 a week.

Average weekly household expenditure was highest, £744 a week, among households with children and three or more adults and lowest, £135 a week, among one-person retired households who were mainly dependent on state pensions. Households with two adults and two children spent an average of £642 a week.

Averaged over three years, households in the UK spent £432 a week, though expenditure varied from £500 a week in London, 16 per cent more than the UK average, to £352 a week in the North East,

19 per cent less than the UK average. London, the South East, the South West and the East of England were the only regions in which average expenditure was higher than the UK average.

The 2005/06 results mark five years of the EFS on a consistent classification of expenditure. Measured in 2005/06 prices, there has been little change in overall household expenditure over the period 2001/02 to 2005/06.

One of the main purposes of the EFS (formerly the Family Expenditure Survey) is to define the 'basket of goods' for the retail prices index (RPI) and the consumer prices index (CPI). Information from the EFS is also a major source for estimates of household expenditure in the UK National Accounts.

More information

www.statistics.gov.uk/StatBase/Product.asp?vlnk=361

Contact

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Labour Force Survey User Group, January 2007

The large-scale government surveys, such as the General Household Survey (GHS) and the Labour Force Survey (LFS), are key data resources for social science researchers. The work of Economic and Social Data Service (ESDS) Government, led by the Cathie Marsh Centre for Census and Survey Research (CCSR) at the University of Manchester includes:

- raising awareness of the research potential of the government data sets
- providing user support through a dedicated helpline, user groups and FAQs
- exchanging information between users and producers
- running training courses on key topics of interest, on specific statistical packages and on methods of statistical analysis

- providing topic-related online course materials and a range of teaching data sets
- creating a number of value-added products which provide easy routes through the complex documentation of the government surveys
- working closely with ONS and other data producers to ensure that the complementarity of interest between producers, commissioning government departments and academic users is maximised

As part of the programme, the EDS run an annual LFS User Group meeting. These meetings are open to all and are provided free of charge, although prior registration is required to secure a place. The User Group meeting provides a forum for the exchange of information and views between both users and producers of the LFS. The subject matter now includes the Annual Population Survey (APS) as well as the LFS.

The latest annual meeting of the LFS User Group was held on 18 January 2007 at the Royal Statistical Society premises in London. The presentations from ONS staff covered ONS plans for developments on both the data collection side and for outputs. The presentations from LFS and APS users included 'Poles Apart? EU Enlargement and the Labour Market Outcomes of Immigrants in the UK', 'Language and labour market outcomes of Londoners', 'What e-social science can offer LFS/APS analysis', and 'ESDS resources and Survey Link Scheme'. All of these presentations can be accessed from the ESDS website below.

Forthcoming ESDS events include a GHS user meeting and an Integrated Household Survey meeting both to be held on 29 March 2007 at the Royal Statistical Society, London. Registration details are available on the ESDS website.

More information

www.ccsr.ac.uk/esds/events/

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UPDATES

Updates to statistics on www.statistics.gov.uk

7 February

Index of production

Manufacturing: unchanged in Q4 2006
www.statistics.gov.uk/cci/nugget.asp?id=198

9 February

UK trade

Deficit widened to £4.9 billion in December 2006
www.statistics.gov.uk/cci/nugget.asp?id=199

12 February

Producer prices

Factory gate inflation falls to 2.1% in January
www.statistics.gov.uk/cci/nugget.asp?id=248

13 February

Inflation

January: CPI down to 2.7%; RPI at 4.2%
www.statistics.gov.uk/cci/nugget.asp?id=19

14 February

Average earnings

Pay growth steady in year to December 2006
www.statistics.gov.uk/cci/nugget.asp?id=10

Unemployment

Rate falls to 5.5% in three months to December 2006
www.statistics.gov.uk/cci/nugget.asp?id=12

15 February

Retail sales

Underlying growth slows in January
www.statistics.gov.uk/cci/nugget.asp?id=256

20 February

Public sector

January: £14.1 billion budget surplus
www.statistics.gov.uk/cci/nugget.asp?id=206

21 February

International comparisons of productivity

Revised ICP estimates for 1990 to 2005
www.statistics.gov.uk/cci/nugget.asp?id=160

22 February

Business investment

3.3% rise in Q4 2006
www.statistics.gov.uk/cci/nugget.asp?id=258

23 February

Index of services

Experimental: 1.0% three-monthly rise into December 2006
www.statistics.gov.uk/cci/nugget.asp?id=558

Motor vehicles

Total production rises in the three months to January
www.statistics.gov.uk/cci/nugget.asp?id=376

GDP growth

UK economy up by 0.8% in Q4 2006
www.statistics.gov.uk/cci/nugget.asp?id=192

28 February

Service prices

SPPI inflation at 3.0% in Q4 2006
www.statistics.gov.uk/cci/nugget.asp?id=253

FORTHCOMING RELEASES

Future statistical release on www.statistics.gov.uk

9 March

Index of production – January 2007

12 March

Producer prices – February 2007

13 March

UK trade – January 2007

14 March

Labour market statistics – March 2007

15 March

Focus on the digital age
Public and private sector breakdown of labour disputes

19 March

Consumer prices index and retail prices index: 2007 basket of goods and services

20 March

Consumer price indices – February 2007

MM22: Producer prices – February 2007
Public sector finances – February 2007

21 March

International trade in services: 2005

22 March

Retail sales – February 2007

23 March

Gross domestic expenditure on research and development (GERD) – 2005
Public sector finances: supplementary (quarterly) data

26 March

Focus on consumer price indices – February 2007
International comparisons of labour disputes – 2005

27 March

Business investment revised results – Q4 2006
Investment by insurance companies, pension funds and trusts – Q4 2006
Monthly Digest of Statistics – March 2007

28 March

Balance of payments – Q4 2006
Consumer trends – Q4 2006
Quarterly national accounts – Q4 2006

29 March

Productivity – Q4 2006

30 March

Distributive and service trades – January 2007
Government deficit and debt under the Maastricht Treaty

Economic review

March 2007

Anis Chowdhury

Office for National Statistics

SUMMARY

GDP continued to grow robustly in 2006 quarter four, driven mainly by the services sector, with little contribution from manufacturing output. On the expenditure side in 2006 quarter four, robust business investment continues to drive growth, supported by a pick in household spending. As a reflection of the UK's dynamic domestic demand profile and unfavourable exchange rate position the trade deficit widened in 2006 quarter four. The Labour Market exhibited signs of improvement in quarter four, but average earnings remain subdued. The public sector finances improved in January 2007. Consumer and producer output price inflation fell in January 2007.

GROSS DOMESTIC PRODUCT

Fourth quarter growth of 0.8 per cent

GDP growth for the fourth quarter of 2006 is estimated to have grown fairly strongly, by 0.8 per cent, up from 0.7 per cent in the previous quarter. The annual rate of growth rose by 3.0 per cent, up from 2.9 in the previous quarter. The latest release contains more information than that contained in the preliminary one. It gives first estimates for the main expenditure categories and more complete

information on the output side. It is still, however, based on as yet incomplete information (Figure 1).

The growth rate in the UK economy in 2006 quarter four continues to be led by strong growth in services sector output. Total industrial production growth in contrast remains subdued, recording virtually flat growth and continuing the trend from the previous quarter. Muted industrial production was led by flat manufacturing output and weakening energy supply output. This was offset by a bounce back in mining & quarrying output,

although the sector's contribution to growth remained negative. Construction output accelerated in quarter four, continuing to grow strongly. On the expenditure side, growth was led by a strong pick up household consumption expenditure and by a continued robustness in business investment growth.

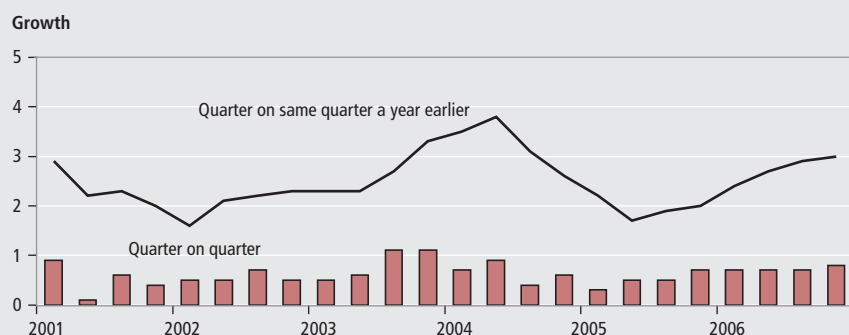
OTHER MAJOR ECONOMIES

Global growth picks up in 2006 quarter four

Preliminary estimates for 2006 quarter four GDP growth for the other major OECD countries are available and these show a strengthening picture of the global economy. US GDP data for the fourth quarter showed an acceleration. Growth was 0.9 per cent compared to 0.5 per cent in the previous quarter. The higher rate of growth was mainly led by strong household consumption expenditure, which was underpinned by a fairly buoyant labour market together with a fall in energy prices. Government spending growth also made a positive contribution to GDP growth as did net exports which rose faster whilst imports fell. Investment growth in contrast, fell markedly on the quarter. Japan's GDP growth showed a marked improvement in 2006 quarter four. Growth was 1.2 per cent, a sharp increase from almost zero percent in quarter three. Growth was primarily led by household consumption expenditure which grew strongly in quarter four, reversing the contraction in quarter three. Growth was also underpinned by an acceleration in private non-residential investment and a bounce back in residential investment. Government spending also made a positive contribution to growth. This was offset by a deceleration in exports which made a muted contribution to GDP growth.

Growth in the three biggest mainland EU economies – Germany, France and Italy – exhibited a strengthening picture. Euro-area growth overall was 0.9 per cent, up from 0.5 per cent in the previous quarter. German GDP growth according to the preliminary estimate was a strong 0.9 per cent in 2006 quarter four, continuing the trend of 0.8 per cent growth in quarter three. German GDP growth was led by a strong net trade position with an acceleration in exports. Investment growth remained buoyant. This was offset

Figure 1
Gross Domestic Product



by a slowdown in household consumption growth. French GDP growth showed a rebound in 2006 quarter four. The initial estimate of growth was 0.6 per cent, compared to flat growth in the previous quarter. French growth was led by an acceleration in business investment and to a lesser extent, by a pick up in household consumption expenditure. Net exports also made a positive contribution to growth. The Italian economy according to the preliminary estimate also showed resurgence. Growth was a strong 1.1 per cent, the highest since 1999 and up considerably from 0.3 per cent growth in the previous quarter. The breakdown of growth was not available at the time of writing this article but early indication suggests growth was evident in all sectors of the economy, including services, industrial output and agriculture. Household consumption, investment and exports could have also boosted growth.

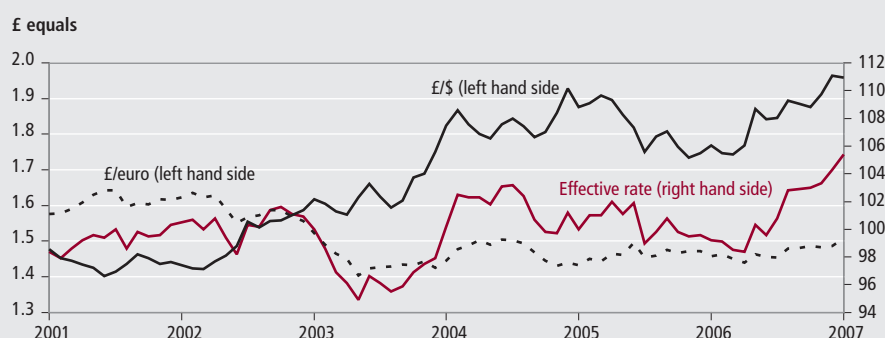
FINANCIAL MARKETS

Share prices fall and pound appreciates in 2006 quarter four

Equity performance has been fairly volatile in 2006. The FTSE All-Share index fell by 2 per cent in 2006 quarter four after increasing by around 9 per cent in 2006 quarter three. In January 2007, the index increased by around 1.0 per cent. This could be due to a more pessimistic outlook of the global economy, particularly in regards to the euro-zone and the US economies, on the part of investors. Also, this has coincided with increases in actual interest rates in some world economies in order to dampen inflationary pressures, therefore making interest bearing assets more attractive than shares.

As for currency markets, 2006 quarter four saw sterling's average value appreciating broadly grow in line with quarter three. The pound appreciated against the dollar by around 2.0 per cent, following appreciation of around 2.4 per cent in the previous quarter. In January 2007, growth against the dollar was fairly flat. Against the euro, sterling's value appreciated by around 1.0 per cent in 2006 quarter four following appreciation of 1.2 per cent in the previous quarter. It appreciated by a further 1.5 per cent in January 2007. Overall, the quarterly effective exchange rate appreciated by 1.4 per cent in quarter four following growth of 2.7 per cent in the previous quarter (**Figure 2**). In January 2007, the effective exchange rate appreciated by around 1.0 per cent.

Figure 2
Exchange rates



The recent movements in the exchange rate might be linked to a number of factors. Firstly, exchange rate movements can be related to the perceptions of the relative strengths of the US, the Euro and UK economy. The appreciation of the pound against the both the dollar and euro in 2006 quarter four may be partly linked to perceptions of stronger UK economic growth, leading to greater inflationary pressures and therefore the prospects of higher interest rates in the UK. In recent months, there have been particular concerns regarding the impact of the US housing slowdown and weaker US GDP growth. Furthermore, inflationary pressures have been relatively subdued in the US. This may have lessened the likelihood of further interest rate rises in the US. US interest rates currently stand at 5.25 per cent. The euro area shows signs of lower inflationary pressures and this may have lessened the likelihood of future interest rate rises, although interest rates were raised in the euro-area by a further 0.25 percentage points in December, following the 0.25 percentage points rise in October 2006 to leave rates currently standing at 3.50 per cent. In the UK, interest rates were raised by a further 0.25 percentage points in January 2007 following on from the 0.25 percentage point increase in November 2006 to leave interest rates currently standing at 5.25 per cent.

Secondly, another factor for the US depreciation relative to the pound may be due to the current account deficit which is generally seen as a weakness for the US economy. The dollar may have fallen recently in response to a readjustment process, with the intended consequence of making exports cheaper and imports dearer – thus in theory leading to switch in expenditure to home produced goods and ultimately leading to a narrowing in the deficit.

Thirdly, another factor may be due to a lack of international appetite for dollar

denominated assets, particularly from central banks, whom are choosing to mix up their currency assets on their balance sheets (for portfolio and risk management purposes) thereby further undermining the value of the dollar.

OUTPUT

Services sector drives economic growth

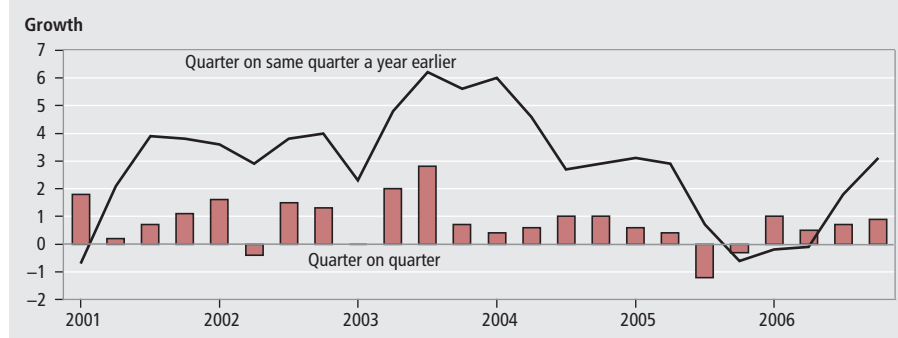
GDP growth in 2006 quarter four was estimated at 0.8 per cent, an acceleration from growth of 0.6 per cent growth in the previous quarter. On an annual basis it was 3.0 per cent, up from 2.9 per cent in 2006 quarter three.

Construction activity is estimated to have grown strongly in the fourth quarter of 2006. Construction output grew by 0.9 per cent in quarter four, up from 0.7 per cent in the previous quarter. Comparing the quarter on the quarter a year ago, construction output rose by 3.0 per cent following growth of 1.9 per cent in the previous quarter (**Figure 3**).

As for external surveys of construction, the CIPS survey signalled strengthening activity in 2006 quarter four, with the average headline index at 56.8 up from 53.8 in the previous quarter. Stronger activity was driven by sharp growth across all sectors, with commercial activity recording the fastest growth. In January 2007, the headline index edged up to 57.9. The RICS in its 2006 quarter four construction survey report that construction workloads showed the largest rise in over two years, led by rapid expansion in commercial and private housing activity. The workload balance was 26 per cent, up from 21 per cent in quarter three.

Total output from the production industries fell by 0.2 per cent in 2006 quarter four following growth of just 0.2 per cent in the previous quarter. On an annual basis it grew by 0.8 per cent compared to

Figure 3
Construction output



0.5 per cent in the previous quarter. The main contribution to the decline came from flat manufacturing output after fairly robust growth of 0.7 per cent in the previous quarter. On an annual basis, manufacturing output continues to grow strongly at 2.6 per cent (**Figure 4**). Another contribution to the fall came from a weakening in the output of the electricity, gas and water supply industries which decelerated further, by 1.7 per cent in 2006 quarter four following a decrease of 0.2 per cent in quarter three. The decrease in output can be mainly attributed to milder weather in quarter four. Mining and quarrying output (including oil & gas production), fell by 0.6 per cent in quarter four; although negative it is still an improvement on the 3.6 per cent decrease in quarter three. Higher oil production was offset by a decline in gas extraction. This suggests that the temporary maintenance shutdowns of oil rigs in the third quarter may no longer be a factor. Production growth has generally been weak in the last three quarters of 2006. Mining and quarrying output has also been weak for much of 2006, although as mentioned, there are signs of a pick up in the latest quarter. The output of the agriculture, forestry and fishing industries fell by 0.3 per cent following virtually flat growth in the previous quarter.

External surveys of manufacturing for 2006 quarter four show a mixed picture (**Figure 5**). It is not unusual for the path of business indicators and official data to diverge over the short term. These differences happen partly because the series are not measuring exactly the same thing. External surveys measure the direction rather than the magnitude of a change in output and often inquire into expectations rather than actual activity.

The CIPS average headline index for manufacturing output indicated a

slowdown in 2006 quarter four. The headline index was 52.7, down from 53.8 in quarter three, but still indicative of fairly robust growth. The output index fell sharply to 53.8 from 56.2 in the previous quarter. In January 2007, the headline index was 52.8. The CBI in its quarter four Industrial Trends survey reports an improvement in its total order books balance, although the balance was negative at minus 9. The latest CBI monthly Industrial Trends survey show a pick up in manufacturing activity – with the total orders balance at a 12 year high at plus 4 from minus 9 in January. The BCC survey in contrast reports an overall

positive picture in 2006 quarter four. The net balance for home sales rose sharply to plus 31 from plus 18 in the previous quarter. The net balance for home orders rose by nine points to plus 27, both recording the highest growth since 2004 quarter two.

Overall, the service sector, by far the largest part of the UK economy and the main driver of UK growth recently, continued to grow strongly in 2006 quarter four. Growth was 1.0 per cent, up from 0.8 per cent growth in the previous quarter (**Figure 6**). The main contribution to the growth rate came from distribution, hotels and catering, where output accelerated sharply in 2006 to 1.4 per cent from 0.2 per cent in the previous quarter. Transport, storage and communication output also grew strongly, by 1.1 per cent in quarter four, a jump from 0.3 per cent in the previous quarter. This was offset by slower growth in output of business services & finance at 1.0 per cent, still a robust rate of growth but down from 1.4 per cent in the previous quarter. Government and other services output continues to grow moderately, with growth of 0.5 per cent in 2006 quarter four.

The external surveys on services showed a strengthening picture in 2006 quarter four

Figure 4
Manufacturing output

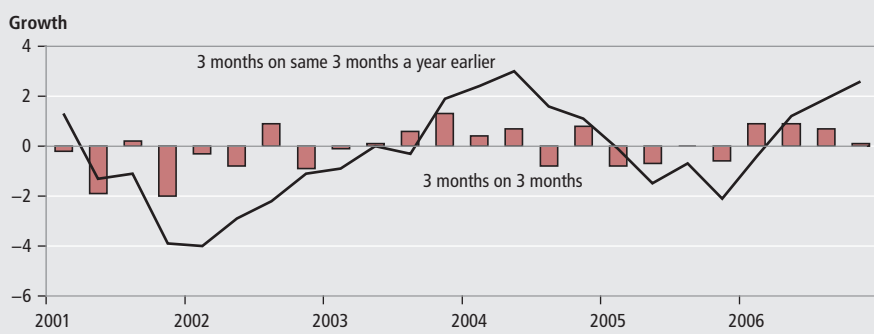


Figure 5
External manufacturing indicators

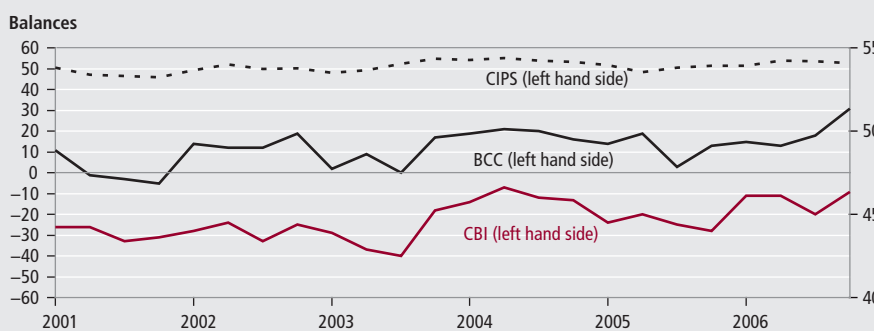
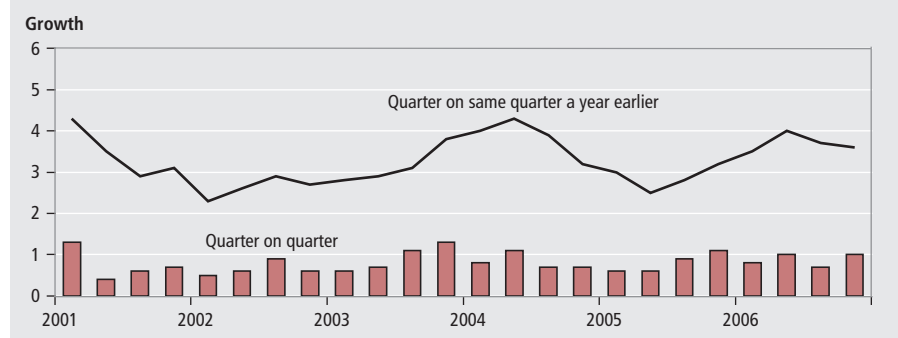


Figure 6
Services output



in line with the official picture. The CIPS survey signalled strong growth in 2006 quarter four. The headline index was 59.9 in quarter four, up from 57.2 in the previous quarter, led by new orders. In January 2007, the headline index fell marginally to 59.2. It should be noted that the CIPS survey has a narrow coverage of the distribution and government sectors.

The CBI and BCC also report a strengthening of service sector output (**Figure 7**). The CBI in its latest services sector survey in November reported strong growth in business volumes. The CBI report that consumer services business volumes grew at their fastest rate since February 2005 with the balance at plus 30, reversing minus 35 in the previous survey. Business and professional services volumes also grew strongly with the balance at plus 33, up from plus 15 in the previous survey. The BCC in its 2006 quarter four survey reported a strengthening picture. The service sector's domestic balance rose 10 points to plus 34, the highest since 2004 quarter two. The net balance for home orders rose 9 points in 2006 quarter four, the highest since 2000 quarter four.

EXPENDITURE

Consumers' spending strengthens in quarter four

Household consumption expenditure showed a marked acceleration in 2006 quarter four after fairly modest growth in the previous quarter. Growth achieved a strong 1.0 per cent compared to 0.4 per cent in the previous quarter. Growth compared with the same quarter a year also accelerated, to 2.6 per cent, up from 2.2 per cent in the previous quarter, but still below the above 3 per cent growth rates achieved in 2003 and 2004 (**Figure 8**). In terms of expenditure breakdown, the increase in

household consumption growth was broad based with durable and semi-durable goods registering strong growth and to a lesser extent non-durable goods.

Household consumption expenditure in 2006 quarter four could have strengthened for a number of economic reasons. On the face of it, the two 0.25 percentage point increases in interest rates in August and November; the negative consumer expenditure indicators such from the GfK and MORI; the rise in utility bills and taxes, doesn't seem to have had much of a discernible impact on consumer spending in quarter four.

One key indicator of household expenditure however is retail sales. Retail

sales appear to have picked up strongly in quarter four, with sales increasing by 1.4 per cent compared to 0.8 per cent in quarter three. This may suggest a certain degree of postponement in expenditure on the part of consumers. Much of the pick up in consumer expenditure can be explained by shop prices (that is, the prices deflator which on average grew by just 0.2 per cent in 2006 quarter four).

It should be noted that household consumption accounts for a much broader range of spending than just retail sales. For instance, household purchases of services, motor vehicles and housing (imputed rents) are not included in retail sales. Since the beginning of 2005, retail sales have grown faster than household consumption as a whole, but seem to have showed signs of narrowing in 2006 quarter three and four.

Retail sales figures are published on a monthly basis and the latest available figures for January showed a slowdown but still a fairly robust rate of growth. This follows a strong December picture (**Figure 9**). According to the latest figures, the volume of retail sales in the three months to January 2007 was 0.9 per cent higher than the previous three months. This followed growth of 1.4 per cent in the three months to December. On an annual basis, retail sales grew by 3.5 per cent in the three months to January 2007, down

Figure 7
External services

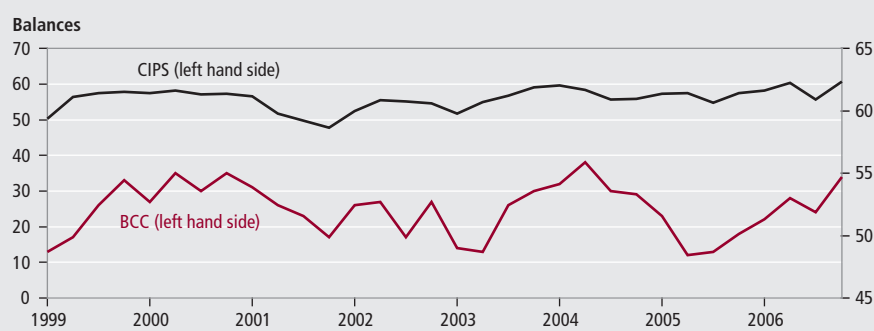


Figure 8
Household demand

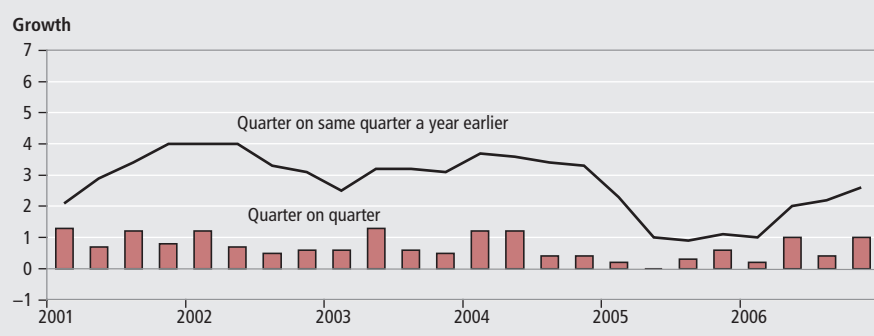
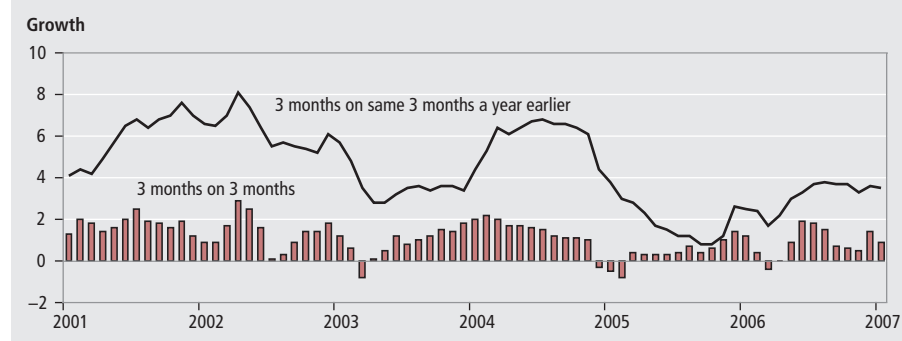


Figure 9
Retail sales



from 3.8 per cent compared to the previous month's annual growth rate.

At a disaggregated level, retail sales growth during the three months to the end of January was driven by the 'Predominantly non-food' sector which grew by 0.9 per cent. Within this sector, growth was led by the 'Non-store retailing and repair' sector (which includes mail order and internet sales) which grew by 4.7 per cent. This was followed by growth in 'Household goods stores' at 2.8 per cent. Growth in the 'Predominantly food-stores' was 0.9 per cent.

The slowdown in sales in January occurred, despite the fall in shop prices (that is, the shop price deflator), which fell by 0.4 per cent. The slowdown in sales can be partially explained as mentioned earlier, to a strong retail sales picture in December, particularly in the context of the Christmas period.

External surveys for retail show a robust picture. The CBI in its monthly Distributive Trades survey report that retail sales volumes grew strongly into January 2007 – the highest reading since 2004. The balance was plus 30, up from plus 25 in December. The BRC report that retail sales increased by 3.1 per cent on a like-for-like basis in January, up from 2.5 per cent in the previous month. Both attribute the increase to the effects of discounting (Figure 10).

Another factor for the increase in household spending in quarter four may be attributed to the continued strength in household borrowing. Household consumption has risen faster than disposable income in recent years as the household sector has become a considerable net borrower and therefore accumulated high debt levels. There are two channels of borrowing available to households; i) secured borrowing; usually on homes. In recent years, a source of consumption expenditure has come via equity release; ii) unsecured borrowing, that is, on credit cards. In recent years, secured borrowing has been particularly strong compared to weaker unsecured credit growth. The growth of secured lending may reflect households just choosing to incorporate some of their unsecured debts into their secured borrowing to lower the cost of re-financing. This may have released expenditure for spending on household and durable goods.

Another boost to expenditure may have been provided by the rise in house prices which according to the Nationwide and Halifax, grew at annual rate of around 10 per cent in December 2006. The rise in house prices may have further increased the level of equity and therefore led to higher borrowing amounts; and this may have outweighed any concerns about increase in mortgage and equity release borrowing costs.

Bank of England figures show lending continuing to grow at a healthy rate in December 2006. Figures show total net lending to individuals increased by £11.6 billion in December 2006, up from £11.2 billion in November and up from £10.3 billion at the end of quarter three. Within the total, net lending secured on dwellings grew by £10.6 billion, up from £10.0 billion in November. However, there was a weakening in unsecured credit growth, at £1.0 billion in December compared to £1.1 billion in November.

According to provisional estimates, the measure of broad money supply (M4) rose by £13.6 billion in December, up from £7.4 billion in November and this may have further underpinned expenditure.

Other possible upsides to consumer expenditure in 2006 quarter four may have been due to the recent fall in oil prices which averaged \$60 a barrel compared to \$70 a barrel in quarter three; this may have led to expenditure switching to non-petrol goods. Finally, the labour market appears healthy and could have provided an underlying boost to confidence and therefore spending.

BUSINESS DEMAND

Business investment maintains strong momentum in quarter four

Total investment grew relatively strongly in 2006 quarter four. Growth was 2.5 per cent compared to 1.9 per cent in the previous quarter. On an annual basis it grew by 7.2 per cent compared to 5.1 per cent in the previous quarter. Growth on an annual basis was primarily driven by business investment.

Business investment for the fourth quarter of 2006 showed a fairly robust growth of 3.3 per cent, similar to the rate in the previous quarter. On an annual basis it grew by 11.1 per cent, up from 8.3 per cent in the previous quarter (Figure 11). Profitability is one factor determining investment, and this has shown some positive signs in recent quarters. The expectations of future higher profits may also provide an explanation for the increased investment in quarter four. Another factor could be due the existence of low real interest rates. The recent strengthening of the stock market maybe another source of business investment growth. Finally, business investment may have also been encouraged by a positive

Figure 10
External retailing indicators

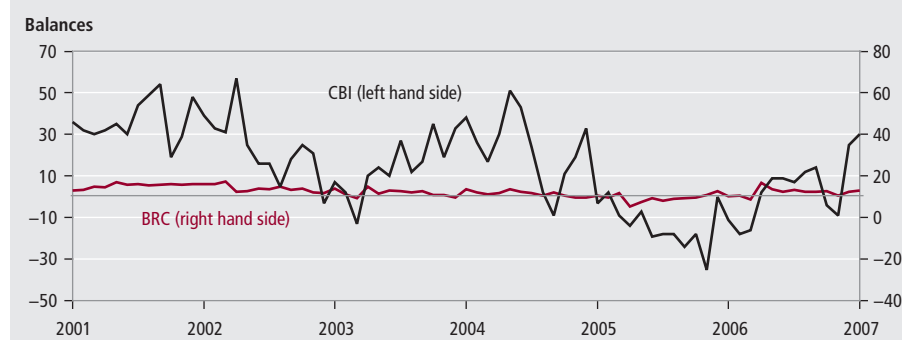
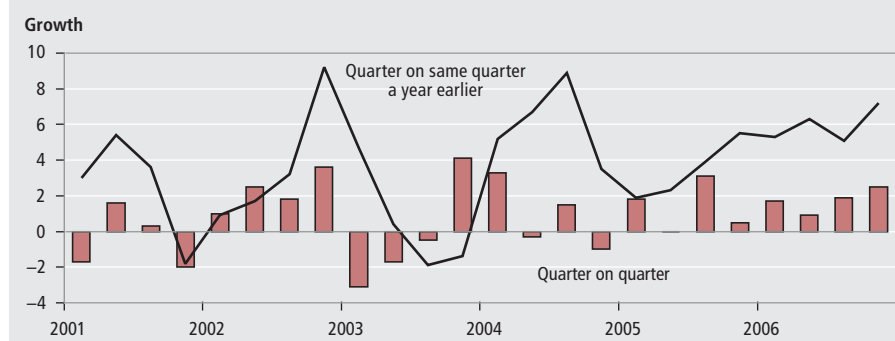


Figure 11
Total fixed investment



outlook of the global economy aided by improved export prospects.

Evidence on investment intentions from the latest BCC and CBI surveys showed a somewhat mixed but slightly improving picture in quarter four. According to the quarterly BCC survey, the balance of manufacturing and services firms' investment in plant and machinery rose by one point to plus 23. The CBI in its 2006 quarter four Industrial Survey reports an improvement in investment although the balance is still negative at minus 8.

GOVERNMENT DEMAND

Budget deficit; net borrowing improves in January

Government final consumption expenditure decelerated in 2006 quarter four to 0.4 per cent, down from 0.6 per cent in the previous quarter. Growth quarter on quarter a year ago was 1.5 per cent, down from 1.7 per cent in the previous quarter (**Figure 12**).

The latest figures on the public sector finances report in the current financial year to January 2007 illustrated a positive picture. Overall, it showed the government continue to operate a financial deficit, with government expenditure continuing to exceed revenues. Over the financial year April to January 2006/07, the current budget was in deficit by £8.1 billion, a lower deficit compared to £14.5 billion for financial year April to January 2005/06. Net borrowing (which includes capital investment) also fell, to £27.6 billion in the financial year April to January 2006/07 from £31.3 billion in the financial year April to January 2005/06. The positive picture mainly reflects a surge in income tax receipts, coinciding with the return of self-assessment tax forms; offset by a fall in

corporation tax receipts. This has led to a lower current budget deficit in the current financial year. However, this continues to be exceeded by central government net borrowing, albeit at a lower rate in the current financial period, partly to fund capital spending.

Since net borrowing became positive in 2002, following the current budget moving from surplus into deficit, net debt as a proportion of annual GDP has risen steadily. Public sector net debt by the end of January 2007 was 36.2 per cent of GDP, down from 38.0 per cent of GDP in December 2006 and down from 36.5 per cent of GDP over the financial year 2005/06.

TRADE AND THE BALANCE OF PAYMENTS

Current account deficit widens; goods deficit widens in quarter four

The publication of the latest quarterly Balance of Payments shows that the current account deficit widened in 2006 quarter three to £9.4 billion from a deficit of £8.2 billion in the previous quarter (**Figure 13**). As a proportion of GDP, the deficit rose to 2.9 per cent of GDP from 2.6 per cent in 2006 quarter two.

The run of current account deficits since 1998 reflects the sustained deterioration in the trade balance. The UK has traditionally run a surplus on the trade in services, complemented by a surplus in investment income, but this has been more than offset by the growing deficit in trade in goods partly due to the UK's appetite for cheaper imports. The deficit on goods and services in 2006 as a whole is provisionally estimated at £55.8 billion. This compares with £44.6 billion deficit in 2005.

Data for 2006 quarter four showed the UK continuing to have a large trade deficit in goods with levels of imports rising faster than exports. This has provided a negative

Figure 12
Government spending

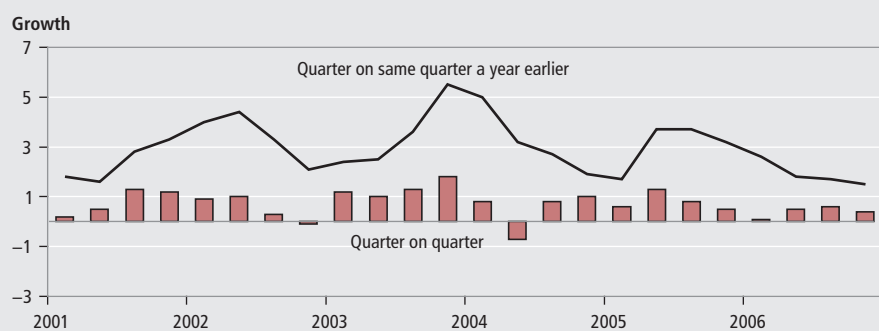
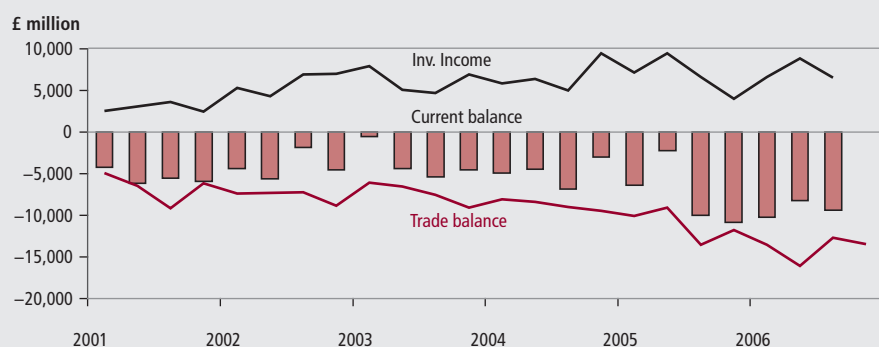


Figure 13
Balance of payments



contribution towards GDP growth in the fourth quarter. In 2006 quarter four, the deficit in net exports widened to £10.6 billion from £10.0 billion in the previous quarter. In terms of growth, exports of goods fell by 1.8 per cent in quarter four whilst imports of goods were flat. The appreciation of the pound recently may have been a factor for the relatively high trade deficit, as a higher pound makes imports cheaper and exports more expensive.

However, these figures are distorted by volatility in VAT Missing Trader Intra-Community (MTIC) Fraud. Therefore, trade in goods figures need to be treated with caution, because more than half of the growth reflects distributions by changes to the pattern of trading associated with VAT MTIC fraud. This makes it difficult to analyse trade figures as increases inflate both imports and exports, though with no impact on net trade. In terms of level, estimated MTIC VAT fraud fell to £0.6 billion in 2006 quarter four, down from £2.2 billion in quarter three. These falls and changes between areas are related to significant falls in trading associated with MTIC fraud; but again these figures need to be treated with caution.

External surveys on exports show a generally weak picture. The BCC reported that the export sales net balance fell markedly in quarter four, by 14 points to plus 20. The CBI in its 2006 quarter four Industrial Trends Survey reports that the export order book was minus 3. According to the latest monthly Industrial Trends survey in January 2007, that remained unchanged.

LABOUR MARKET

Labour market activity strengthens in quarter four

The Labour market showed evidence of further tightening in the latest reference period, continuing the trend of the recent previous months. This follows the looser conditions prevalent in earlier quarters. As the labour market operates on a time lag, this could perhaps be due to the pick up in demand conditions in 2005 quarter four beginning to feed through into a strengthening labour market picture.

The latest figures from the Labour Force Survey (LFS) pertain to the three-month period up to December 2006 and show a mostly positive picture. The number of

people in employment rose. The number of unemployed people, the unemployment rate and the claimant count fell. Job vacancies increased. On the downside, the employment rate remained unchanged. Average earnings fell from the previous month and remain subdued with weak real wage growth. The concurrent rise and fall in the employment and unemployment levels may be partially attributed to higher workforce participation levels.

Looking at a detailed level, the increase in employment levels appears to be mainly generated by an increase in part-time and self-employment jobs. This somewhat continues the trend from the previous quarter but reverses the picture of the earlier quarters where there was a concurrent increase in the employment and unemployment levels; explained partly by the fall in the inactivity rate.

The current working age employment rate was 74.5 per cent, in the three months to December 2006, unchanged from the three months to September 2006, but up 0.1 percentage point from a year earlier. The number of people in employment increased by 51,000 over the quarter and by 278,000 over the year, to leave the employment level standing at 29.04 million in the three months to December. The unemployment rate was 5.5 per cent, in the three months to December, down 0.1 percentage point from the three months to September 2006 but up 0.4 percentage points from a year earlier (Figure 14). The number of unemployed people fell by 23,000, from the three months to September, but increased by 133,000 from a year earlier, leaving the unemployment level standing at 1.69 million.

According to the LFS, in the period October to December 2006, the number of people in employment increased by 51,000. The bulk of the increase was accounted

for by an increase in self-employees of 35,000. Employees increased by 13,000. From another perspective, the number of full-time employees fell by 30,000, whilst those in part-time jobs increased by 81,000, continuing the trend from the previous quarter.

Workforce jobs rises

According to employer surveys, there was an increase of 54,000 jobs in the three months to September 2006. The largest contribution came from an increase in finance & business services jobs at 29,000 followed by 'other services' at 23,000. Three sectors recorded a fall in jobs (Distribution, hotels & restaurants, manufacturing and agriculture and fishing). Over the year, education, health and public administration saw the largest increase in jobs at 133,000 followed by 'other services' at 80,000. Distribution, hotels & catering in contrast lost jobs of 42,000 over the year, followed by manufacturing at 39,000.

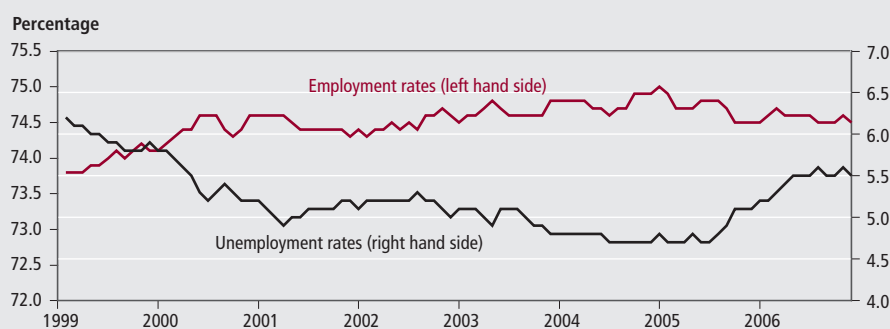
Claimant count falls

The claimant count measures the number of people claiming the job-seekers allowance. The latest figures for January showed the claimant count level at 925,800, down 13,500 on the month but up 20,700 on a year earlier. The claimant count rate in January 2007 was 2.9 per cent, virtually unchanged from the previous month but up 0.1 percentage points from a year earlier.

Vacancies rise

There were 607,900 job vacancies on average in the three months to January 2007, up 7,300 from the previous three months and up 6,200 from the same period a year earlier.

Figure 14
Employment and unemployment



Inactivity level rises

The working age inactivity rate was 21.0 per cent in the three months to December 2006, unchanged from the three months to September 2006 but down 0.4 percentage points from a year earlier. The number of economically inactive people of working age was up 19,000 over the quarter to leave the level standing at 7.85 million in the three months to December 2006. The largest increase in the inactivity rate occurred amongst those categorised as 'retired' which increased by 25,000, roughly similar to the previous month, followed by the 'student' category at 23,000 and the 'long-term sick' category at 19,000. This was partially offset by a fall in those categorised as 'looking after family/home' at 59,000. On an annual basis, inactivity fell by 94,000, with the largest fall being amongst those categorised as 'looking after family/home' at 61,000, followed by the 'long-term sick' at 42,000 and the 'student' category at 38,000.

Average earnings fell

Average earnings growth, including and excluding bonuses, fell in the latest reference period. Average earnings growth, excluding bonuses, was 3.7 per cent in December, down 0.1 percentage point from November. Average earnings growth, including bonuses, grew by a rate of 4.0 per cent, again, down 0.1 percentage point from the previous month.

In terms of the public and private sector split, the gap in earnings growth, excluding bonuses, was the same as in the previous month. Private sector wage growth was 3.9 per cent while public sector wage growth was 3.1 per cent in the three months to December.

Overall, the numbers point to a slightly strengthening labour market, although it is still loose compared to previous years, with employment increasing due mainly to higher activity rates, which is consistent with robust GDP growth. Average earnings show stable but fairly modest growth, consistent with increase supply in the labour force.

PRICES

Producer and consumer prices fall in January 2007

Industrial input and output prices, an indication of inflationary pressures in the economy, showed further signs of easing marginally, at the beginning of 2007 quarter one compared to December 2006.

However, the divergence between input and output price inflation which narrowed in 2006 quarter four, seems to have widened in January 2007.

Input prices fell by 1.6 per cent in the year to January 2007, the largest fall since February 2004. This follows growth of 2.4 per cent in the year to December 2006. The fall in January also contrasts with 2006 quarter four where prices on average increased by 3.5 per cent, a marked easing compared to growth in average prices of 8.0 per cent in quarter three. The main contribution to the fall in January came from a decrease in crude oil prices which fell by around 11 per cent. In the year to January 2007, crude oil prices fell by around 20.0 per cent. This is partly as a result of warmer weather and partly due to higher US crude inventories. Gas prices also made a contribution to the fall in input prices; gas prices fell by around 9.0 per cent in January and over the year fell by around 29.0 per cent. The core input price index, excluding food, beverages, tobacco and petroleum rose by 2.0 per cent in the year to January, significantly down from 3.2 per cent growth in the year to December. It is also a marked easing on 2006 quarter four and three where prices on average increased by 4.8 per cent and 8.0 per cent respectively. The slower growth in input prices was to some extent helped by the appreciation of the pound relative to the dollar and euro, which had the effect of making exports dearer but imports cheaper. The fall in input prices seems to have marginally fed through to producer out prices.

The output price index rose by 2.1 per cent in the year to January 2007, slightly down from a rise of 2.2 per cent in December but a slight pick up from average growth of 1.9 per cent in 2006 quarter four. This may suggest a continuing attempt by firms to re-build their profit margins, but still finding an element of difficulty in passing on costs to customers. The underlying picture mirrors that of the

headline picture; both in terms of suggesting reduced inflationary pressures and in the inability to pass on costs to customers. On the core measure which excludes food, beverages, tobacco and petroleum, producer prices rose by 2.2 per cent in January 2007, down from growth of 2.3 per cent in the year to December 2006. This is also down on 2006 quarter four, where average prices increased by 2.4 per cent.

Growth in the consumer price index (CPI) – the Government's target measure of inflation – was 2.7 per cent in January 2007; down from the record figure of 3.0 per cent in December 2006; but still continues to exceed the Government's 2.0 per cent inflation target. The Retail Price Index (RPI) a broader measure of inflation, also fell, to 4.2 per cent from 4.4 per cent in December. The Retail Price Index, excluding mortgage interest payments (RPIX) was 3.5 per cent in January, down from 3.8 per cent in December (Figure 15).

The largest downward effect on the CPI annual rate came from transport costs. Prices of fuels and lubricants fell this year, with the average price of petrol dropping by 0.8p per litre between December and January 2007, compared with an increase of 1.7p a year ago. There was an additional large downward effect from air travel, mainly due to changes in the cost of fares to European destinations. Another large downward contribution came from food and non-alcoholic beverages. Food prices fell by more than a year ago for fruit, bread, and cereals, meat, and milk, cheese and eggs. A further large downward effect came from communication costs, mainly due to increases in some landline charges last year, compared with little change this year. This was partially offset by small upward effects from alcohol and tobacco, due to increase in cigarette prices, compared with little change a year earlier and restaurants and hotels, where prices rose by more than a year ago.

Figure 15
Inflation

Growth, month on month a year ago



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	2005	2006	2006 Q2	2006 Q3	2006 Q4	2006 Nov	2006 Dec	2007 Jan
GDP growth - chained volume measures (CVM)									
Gross domestic product at market prices	ABMI	1.9	2.7	0.7	0.7	0.8	..	..	..
Output growth - chained volume measures (CVM)									
Gross value added (GVA) at basic prices	ABMM	2.0	2.7	0.8	0.6	0.8	..	..	..
Industrial production	CKYW	-1.9	-0.1	0.1	0.2	-0.1	0.3	-0.1	..
Manufacturing	CKYY	-1.1	1.4	0.9	0.7	0.1	0.2	0.2	..
Construction	GDQB	1.5	1.1	0.5	0.7	0.9	..	..	..
Services	GDQS	2.9	3.6	1.0	0.7	1.0	..	..	..
Oil and gas extraction	CKZO	-9.9	-10.2	-4.5	-3.2	-0.7	-0.4	-4.1	..
Electricity, gas and water supply	CKYZ	-0.3	-2.7	-2.9	-0.2	-1.7	2.8	0.3	..
Business services and finance	GDQN	4.3	5.4	1.6	1.4	1.0	..	..	..
Household demand									
Retail sales volume growth	EAPS	2.0	3.3	1.9	0.8	1.4	0.1	1.1	-1.8
Household final consumption expenditure growth (CVM)	ABJR	1.3	2.0	1.0	0.4	1.0	..	..	..
GB new registrations of cars (thousands) ¹	BCGT	2,444	2,340	570	662	446	157	136	..
Labour market^{2,3}									
Employment: 16 and over (thousands)	MGRZ	28,676	28,895	28,930	28,986	29,036	29,036	..	..
Employment rate: working age (%)	MGSU	74.7	74.6	74.6	74.5	74.5	74.5	..	..
Workforce jobs (thousands)	DYDC	30,810	31,064	31,064	31,118	..	..	..	..
Total actual weekly hours of work: all workers (millions)	YBUS	918.6	923.7	926.3	925.4	925.8	925.8	..	..
Unemployment: 16 and over (thousands)	MGSC	1,425	1,657	1,683	1,711	1,687	1,687	..	..
Unemployment rate: 16 and over (%)	MG SX	4.7	5.4	5.5	5.6	5.5	5.5	..	..
Claimant count (thousands)	BCJD	861.8	944.1	950.3	955.3	948.1	948.6	939.3	925.8
Economically active: 16 and over (thousands)	MGSF	30,101	30,552	30,613	30,696	30,723	30,723	..	..
Economic activity rate: working age (%)	MGSO	78.5	78.9	79.0	79.0	79.0	79.0	..	..
Economically inactive: working age (thousands)	YBSN	7,934	7,843	7,822	7,835	7,854	7,854	..	..
Economic inactivity rate: working age (%)	YBTL	21.5	21.1	21.0	21.0	21.0	21.0	..	..
Vacancies (thousands)	AP2Y	619.6	599.9	598.4	603.4	601.4	597.9	601.4	607.9
Redundancies (thousands)	BEAO	126	145	137	141	130	130	..	..
Productivity and earnings annual growth									
GB average earnings (including bonuses) ³	LN NC	..	..	4.3	3.9	4.0	4.1	4.0	..
GB average earnings (excluding bonuses) ³	JQDY	..	..	3.9	3.5	3.7	3.8	3.7	..
Whole economy productivity (output per worker)	A4YN	..	..	1.9	2.3	..	..	..	..
Manufacturing productivity (output per job)	LOUV	..	..	..	..	..	4.8	4.8	..
Unit wage costs: whole economy	LOJE	..	..	1.9	1.9	..	..	..	..
Unit wage costs: manufacturing	LOJF	..	..	..	..	..	0.3	-0.2	..
Business demand									
Business investment growth (CVM)	NPEL	17.2	-5.4	2.4	3.3	3.3	..	..	..
Government demand									
Government final consumption expenditure growth	NMRY	3.1	1.9	0.5	0.6	0.4	..	..	..
Prices (12-monthly percentage change – except oil prices)									
Consumer prices index ¹	D7G7	2.1	2.3	2.3	2.4	2.7	2.7	3.0	2.7
Retail prices index ¹	CZBH	2.8	3.2	3.0	3.5	4.0	3.9	4.4	4.2
Retail prices index (excluding mortgage interest payments)	CDKQ	2.3	2.9	2.8	3.2	3.5	3.4	3.8	3.5
Producer output prices (excluding FBTP) ⁴	EUAA	2.1	2.3	2.6	2.3	2.5	2.5	2.4	2.3
Producer input prices	EUAB	11.7	9.5	13.3	7.9	3.2	3.2	2.0	-1.7
Oil price: sterling (£ per barrel)	ETXR	30.358	35.929	38.569	37.748	31.637	31.239	31.817	27.944
Oil price: dollars (\$ per barrel)	ETXQ	55.046	66.107	70.454	70.675	60.633	59.654	62.458	54.714

	Source CDID	2005	2006	2006 Q2	2006 Q3	2006 Q4	2006 Nov	2006 Dec	2007 Jan
Financial markets									
Sterling ERI (January 2005=100)	BK67	100.5	101.0	99.4	102.2	103.5	103.3	104.3	105.4
Average exchange rate /US\$	AUSS	1.820	1.843	1.827	1.875	1.917	1.912	1.963	1.959
Average exchange rate /Euro	THAP	1.463	1.467	1.454	1.471	1.485	1.483	1.486	1.508
3-month inter-bank rate	HSAJ	4.57	5.26	4.71	5.02	5.26	5.20	5.26	5.54
Selected retail banks: base rate	ZCMG						5.00	5.00	5.25
3-month interest rate on US Treasury bills	LUST	3.92	4.89	4.88	4.77	4.89	4.90	4.89	5.00
Trade and the balance of payments									
UK balance on trade in goods (£m)	BOKI	-68,783	-84,323	-22,699	-19,854	-20,581	-6,871	-7,142	..
Exports of services (£m)	IKBB	114,255	124,327	30,972	30,988	31,063	10,094	9,929	..
Non-EU balance on trade in goods (£m)	LGDT	-31,953	-45,869	-10,522	-12,394	-12,703	-4,355	-4,308	..
Non-EU exports of goods (excl oil & erratics) ⁵	SHDJ	119.9	117.8	119.3	111.7	112.5	115.5	111.0	..
Non-EU imports of goods (excl oil & erratics) ⁵	SHED	116.8	124.5	123.4	123.2	128.1	130.0	128.4	..
Non-EU import and price index (excl oil) ⁵	LKWQ	101.2	103.8	104.1	103.2	103.1	103.5	101.9	..
Non-EU export and price index (excl oil) ⁵	LKVX	100.6	101.9	102.5	101.6	100.6	100.7	99.8	..
Monetary conditions/government finances									
M0 (year on year percentage growth)	VQMX	5.1	..	..	..	..	..	..	..
M4 (year on year percentage growth)	VQJW	11.4	13.3	13.6	14.3	12.8	13.1	12.8	..
Public sector net borrowing (£m)	-ANNX	41,724	35,298	16,888	6,842	14,138	9,706	6,450	-10,292
Net lending to consumers (£m)	RLMH	19,696	12,556	3,185	2,838	3,094	1,134	1,029	..

External indicators – non-ONS statistics

		2006 Jul	2006 Aug	2006 Sep	2006 Oct	2006 Nov	2006 Dec	2007 Jan	2007 Feb
Activity and expectations									
CBI output expectations balance	ETCU	14	11	14	9	5	11	12	28
CBI optimism balance	ETBV	-6			-10			-7	
CBI price expectations balance	ETDQ	10	14	12	11	23	8	10	16

Notes

1 Not seasonally adjusted.

2 Annual data are for April except for workforce jobs (June), claimant count (average of the twelve months) and vacancies (average of the four quarters).

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 Volumes, 2003 = 100.

For further explanatory notes, see Notes to tables on page 62.

Independent forecasts

February 2007

The tables below supplement the Economic review by providing a forward-looking view of the UK and world economy.

UK forecasts

The UK tables show the average and range of independent forecasts for 2006 and 2007 and are extracted from HM Treasury's *Forecasts for the UK Economy*.

2007

	Average	Lowest	Highest
GDP growth (per cent)	2.5	1.1	2.9
Inflation rate (Q4, per cent)			
CPI	2.0	1.4	3.0
RPI	3.0	2.3	3.9
Claimant unemployment (Q4, million)	0.98	0.86	1.15
Current account (£ billion)	-34.8	-56.9	-18.3
Public Sector Net Borrowing (2006-07, £ billion)	36.8	28.4	44.5

2008

	Average	Lowest	Highest
GDP growth (per cent)	2.3	-0.3	2.8
Inflation rate (Q4, per cent)			
CPI	2.0	1.7	2.4
RPI	2.6	1.9	3.3
Claimant unemployment (Q4, million)	1.01	0.82	1.30
Current account (£ billion)	-36.4	-62.3	-23.8
Public Sector Net Borrowing (2008-09, £ billion)	34.7	25.0	46.2

Notes

Forecasts for the UK economy gives more detailed forecasts, covering 27 variables, and is published monthly by HM Treasury. It is available on the Treasury's website at www.hm-treasury.gov.uk/economic_data_and_tools/data_index.cfm

Selected world forecasts

The world tables show forecasts for a range of economic indicators taken from *Economic Outlook (preliminary edition)*, published by OECD (Organisation for Economic Co-operation and Development).

2007

	US	Japan	Euro area	Total OECD
Real GDP growth (per cent)	2.4	2.0	2.2	2.5
Consumer price (percentage change from previous year)	2.6	0.2	2.0	2.2
Unemployment rate (per cent of the labour force)	4.8	3.9	7.4	5.8
Current account (as a percentage of GDP)	-6.5	4.5	-0.1	-1.9
Fiscal balance (as a percentage of GDP)	-2.8	-4.2	-1.1	-2.1

2008

	US	Japan	Euro area	Total OECD
Real GDP growth (per cent)	2.7	2.0	2.3	2.7
Consumer price (percentage change from previous year)	2.6	0.6	2.0	2.1
Unemployment rate (per cent of the labour force)	5.1	3.6	7.1	5.7
Current account (as a percentage of GDP)	-6.6	5.3	-0.1	-1.8
Fiscal balance (as a percentage of GDP)	-2.9	-4.1	-1.2	-2.2

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

Bryce Millard
Office for National Statistics

Regional analysis of public sector employment

SUMMARY

This article presents analysis of public sector employment by region, with time series since 1999, consistent with the official UK figures which are based on data supplied by public sector organisations. While figures are already available for Scotland and Northern Ireland on this basis, information from the Labour Force Survey is used to estimate the breakdown required for Wales and the English regions. This article includes commentary on the results as well as an explanation of the methodology and limitations of these estimates.

This article provides updated analysis of public sector employment (PSE) by region. The importance of regional PSE estimates for policy-related purposes was highlighted in the Allsopp Review of Statistics for Economic Policymaking, published in 2004. As part of the continuing programme for development of PSE statistics, the Office for National Statistics (ONS) produced regional PSE estimates by using information from the Labour Force Survey (LFS) which appeared for the first time in the article 'Public Sector Employment Trends 2005', published in October 2005.

The article is one of a series of articles providing analysis of PSE estimates. A previous article 'Public sector employment, 2006: seasonally adjusted series and recent trends' introduced the seasonally adjusted series and analysed trends in these series. It also reported on the progress of the development of PSE statistics. A further article planned for May 2007 will look at the characteristics of public sector employees.

The following are the main findings from the analysis:

- Between 1999 and 2006, all regions of the UK showed an increase in the level of public sector employment, although the trend has been flat in most regions over the past year or so
- Over the year to Q3 2006, the largest relative increase in the number of people working in the public sector was in the East Midlands region (5.5 per

cent), while the largest relative decrease was in the East region (3.7 per cent)

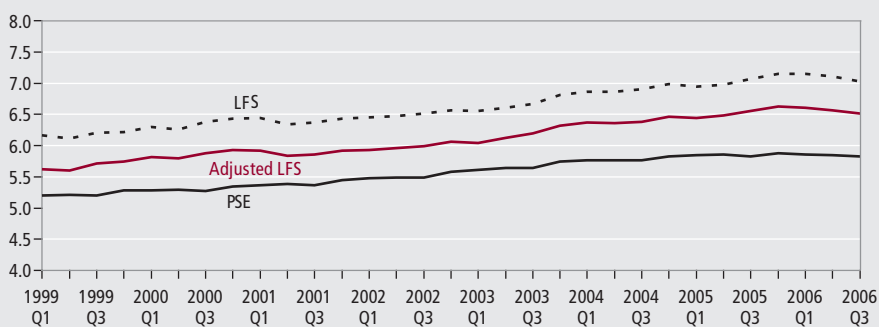
- Northern Ireland (29.1 per cent), the North East (23.8 per cent), Wales (23.7 per cent) and Scotland (23.6 per cent) had the highest proportion of their workforce working in the public sector, while the South East (17.2 per cent), East (17.9 per cent) and East Midlands (18.5 per cent) regions had the lowest over the 12 months to Q3 2006

Regional data based on information from public sector organisations

PSE estimates from administrative data supplied by public sector organisations are already available for Scotland and Northern Ireland (collected by the Scottish Executive (SE) and Department of Enterprise, Trade and Investment for Northern Ireland, respectively) as well as for the UK as a whole. SE began publishing quarterly PSE estimates in July 2005. The latest publication of the PSE series in Scotland now covers the period Q1 1999 to Q3 2006.

While PSE estimates for the English regions and Wales are not available from administrative sources, production of these estimates relies on information from the LFS for which the quality of public/private sector classification and region of workplace are deficient for reasons discussed below. A study to examine the feasibility of producing regional PSE estimates, using data from public sector organisations,

Figure 1

Comparison of PSE estimates from public sector organisations and LFSUnited Kingdom, not seasonally adjusted
Millions

Sources : Labour Force Survey, returns from public sector organisations (ONS, Scottish Executive and Department of Enterprise, Trade and Investment for Northern Ireland)

was carried out last year. ONS has been researching the individual sources of PSE to establish what is currently available and how far it goes towards meeting the needs of users. As a result of this, the aim is to introduce a new series of regional estimates by the end of 2007.

Use of LFS data for analysis of public sector employment

A number of important quality issues arise with regard to using LFS data to produce regional PSE estimates.

LFS public/private sector and industry classifications are made on the basis of survey respondents' views about the organisations for which they work. As a consequence, they are likely to suffer from reporting error as well as the figures not corresponding to the National Accounts definition used to produce PSE estimates from administrative sources. For example, according to the National Accounts definition, university staff and GPs should be classified into the private sector while at present they remain in the public sector according to the definition applied within the LFS.

LFS estimates of public sector employment are around 1 million higher than those from the PSE. Even when LFS estimates are adjusted to match more closely National Accounts definitions, LFS estimates are still higher, and the difference between estimates from the two sources has grown over the period 1995 to 2005. A comparison between PSE estimates based on returns from public sector organisations, those from the LFS, and LFS estimates adjusted to the National Accounts definition, are shown in **Figure 1**.

A large part of the divergence between the two series is within local government, especially within the areas of education and public administration. One possible reason for the increasing overestimation of public sector workers within the LFS may be because of increased contracting out of ancillary services within the public sector to private sector businesses, for example, cleaning, catering and transportation. Workers in contracted-out jobs may classify their activity according to the activity of the organisation on whose premises they work, rather than the organisation with whom they are employed, when responding to the survey. Another factor which may contribute to the divergence between the two sources is the under-coverage of schools devolved from local government, for example, foundation schools, within the

PSE. Further work is being carried out to provide robust enough methods to estimate for the missing schools on a quarterly basis.

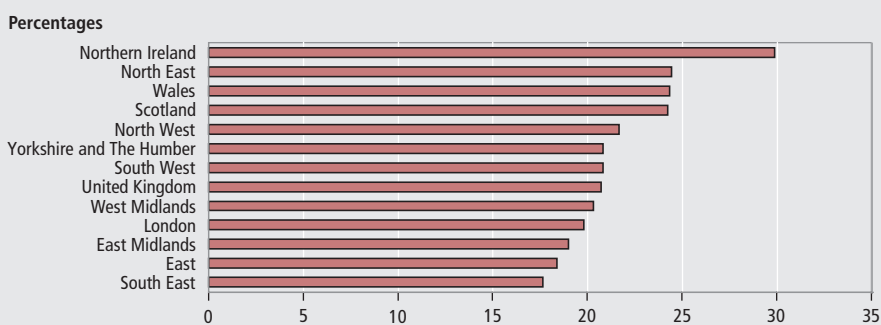
Until January 2006, the LFS used seasonal quarters as the main reporting period (spring, March–May; summer, June–August; autumn, September–November; winter, December–February). As of 2006, the LFS reporting period moved to calendar quarters as a consequence of EU regulation and the need to bring the survey in line with other ONS surveys. While key labour market variables were already available for calendar quarters from the quarterly figures published in the LMS First Release, the change from seasonal to calendar quarters introduced a break in the sequence of the LFS microdata used to estimate PSE. The issue arises as to whether PSE estimates based on calendar quarters can be used to extend existing series. Analysis suggests that extending existing series using calendar quarterly data does not introduce any important discontinuity when using four-quarterly rolling averages. Overall, the range of proportional differences between seasonal and calendar quarterly data is relatively small (generally within 1 per cent).

The method by which the LFS is used to produce regional PSE estimates is described in the Technical Note.

Public sector employment by region

Figure 2 shows that over the four quarters to Q3 2006, Northern Ireland (29.1 per cent), the North East (23.8 per cent), Wales (23.7 per cent) and Scotland (23.6 per cent) had the highest proportion of their

Figure 2

Public sector employment as a proportion of all in employment: by region and country of workplace, year to Q3 2006¹**Note:**

Public sector statistics for Northern Ireland relate to the number of public sector jobs rather than the number of people working in the public sector. The percentages for Northern Ireland as a proportion of all employment will tend to be around 2 percentage points higher than DETINI estimates expressed as a proportion of all jobs. HM Forces figures are not included in Northern Ireland estimates.

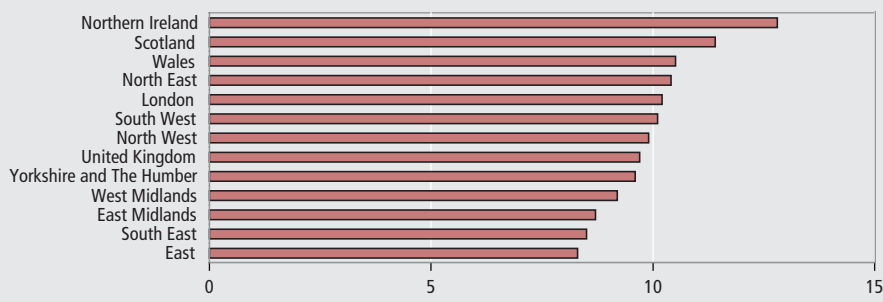
¹ Headcount, four-quarterly averages, based on estimates over the quarters December (Q4) 2005, March (Q1), June (Q2) and September (Q3) 2006.

Sources : Labour Force Survey, returns from public sector organisations (ONS, Scottish Executive and Department of Enterprise, Trade and Investment for Northern Ireland)

Figure 3

Public sector employment as a proportion of total resident population: by region and country, year to Q3 2006^{1,2}

Percentages

**Note:**

Public sector statistics for Northern Ireland relate to the number of public sector jobs rather than the number of people working in the public sector. HM Forces figures are not included in Northern Ireland estimates.

1 Public sector employment estimates are workplace-based estimates, that is, where people work rather than where they live. Mid-year population estimates measure resident population.

2 Headcount, four-quarterly averages, based on estimates over the quarters December (Q4) 2005, March (Q1), June (Q2) and September (Q3) 2006.

Sources : Labour Force Survey, returns from public sector organisations (ONS, Scottish Executive and Department of Enterprise, Trade and Investment for Northern Ireland) and ONS mid-year 2005 population estimates.

workforce working in the public sector. In contrast, the regions with the lowest proportion of the workforce in the public sector were the South East (17.2 per cent), East (17.9 per cent) and East Midlands (18.5 per cent).

Public sector employment estimates by region are expressed as the proportion of resident population in **Figure 3**. This approach takes into account the relationship between the size of the public sector and the customer base that it serves, although it cannot take account of the relative needs for public services in different areas. Variation between regions is smaller when based on resident population, for Q3 2006 ranging from 8.3 per cent in the East to 12.8 per cent in Northern Ireland.

All regions and countries showed an increase in the level of public sector employment between 1999 and 2006 (see **Table 1**). Over the period 1999 to 2006, the largest relative increase in the number of people working in the public sector was in the South West, which showed a 20.1 per cent increase. The East Midlands (17.0 per cent), North West (14.0 per cent) and West Midlands (14.0 per cent) regions showed the next largest proportional increases over the same period. The regions with the smallest relative increases over the same period were London (8.2 per cent) and Wales (8.2 per cent). Over the past two years, the trend has been close to flat in most regions.

Assessing the accuracy of ONS regional estimates of PSE

The method by which regional PSE estimates have been produced from the LFS can be evaluated by comparing them with PSE estimates for Scotland published by SE, based on administrative sources. Comparison of these estimates with LFS-based PSE estimates for Scotland produced in the same way as those for the English regions and Wales gives some measure of how accurate this method of producing estimates is. A comparison of these two sources of PSE estimates for Scotland is shown in **Table 2**.

This indicates that differences between the two sources of estimates are modest, no larger than may inevitably be expected due to LFS sampling variability and usual respondent errors. Over the period Q4 1999 (December) to Q3 2006 (July), LFS estimates were at most 3.5 per cent (Q4 2003) more and 1.5 per cent less (Q3 2006) than those published by SE.

Were figures available for the other regions of Great Britain based on returns from public sector organisations, it might be expected that similar differences would be found.

CONTACT

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Livesey D, Machin A, Millard B and Walling A 'Public sector employment 2006: Seasonally adjusted series and recent trends', *Labour Market Trends* 114(12), pp419–38 and at www.statistics.gov.uk/cpi/article.asp?ID=1686

TECHNICAL NOTE**Method of producing PSE regional estimates from LFS**

The regional estimates are presented on a seasonally adjusted basis for the sake of consistency with the main headline PSE figures. In practice though, this will make very little difference, as the figures are provided only in the form of four-quarter rolling averages, in order not to be significantly affected by the sampling variability of the LFS results.

In this article, the estimates for Scotland and Northern Ireland are taken directly from the quarterly PSE estimates published by the Scottish Executive and the Department of Enterprise, Trade and Investment for Northern Ireland. These are not seasonally adjusted, but the four-quarter rolling averages are comparable enough to the corresponding figures derived from the total UK PSE seasonally adjusted series. Corresponding totals for each four-quarter period back to 1999, for England and Wales combined, are thus derived by subtraction of the figures for Scotland and Northern Ireland from the corresponding UK totals. These estimates are then split, by English region and for Wales, on a pro rata basis according to the corresponding average LFS estimates of public sector employment, by region of workplace, using LFS microdata, after making the required adjustments to bring these estimates as close as possible to the National Accounts definition. These adjustments are to exclude employees of universities and grant-funded educational establishments, and temporary agency workers, who clearly belong to the private sector. Note that GPs and their practice staff who are allocated to the public sector in the LFS cannot be reclassified to the private sector as they cannot be distinguished from others, such as doctors and dentists working in hospitals that are part of the public sector.

Regional PSE employment rates are an expression of the levels of PSE as a proportion of total employment within each region. The regional total employment estimates by workplace are obtained by constraining the microdata estimates to the headline LFS figures for total employment (seasonally adjusted) on a pro rata basis for each region.

Table 1
Public sector employment:¹ by region and country of workplace

Thousands, seasonally adjusted

Average of four quarters to: ²	North East	North West	Yorkshire and The Humber	East Midlands	West Midlands	East	London	South East	South West	England	Wales	Scotland ³	Great Britain	Northern Ireland ⁴	United Kingdom
PSE level															
1999 Q4	238	594	441	321	435	414	711	630	427	4,210	287	529	5,026	197	5,223
2000 Q1	236	601	444	322	440	417	708	628	433	4,229	285	530	5,044	198	5,242
2000 Q2	231	615	454	320	438	418	696	630	440	4,243	289	531	5,063	199	5,262
2000 Q3	231	631	457	318	431	425	685	636	447	4,259	293	532	5,084	199	5,282
2000 Q4	230	642	461	316	429	428	675	639	451	4,271	297	532	5,100	199	5,299
2001 Q1	233	649	462	317	431	429	672	641	452	4,286	302	532	5,120	200	5,320
2001 Q2	238	654	454	317	435	431	687	643	452	4,310	299	533	5,143	201	5,344
2001 Q3	240	660	448	319	444	431	698	639	453	4,331	298	534	5,163	202	5,365
2001 Q4	244	664	440	320	449	431	707	644	457	4,355	296	536	5,187	202	5,389
2002 Q1	248	664	437	321	453	431	717	647	464	4,381	294	538	5,214	203	5,417
2002 Q2	252	662	441	327	457	430	720	647	467	4,403	297	540	5,240	204	5,443
2002 Q3	253	659	451	331	461	434	721	648	468	4,426	300	543	5,269	205	5,474
2002 Q4	252	661	460	330	467	440	725	644	473	4,453	304	545	5,302	206	5,508
2003 Q1	252	666	468	330	471	448	719	644	478	4,478	310	548	5,335	208	5,543
2003 Q2	253	674	478	331	472	453	715	649	482	4,507	314	551	5,373	209	5,582
2003 Q3	253	677	485	331	470	462	714	660	487	4,539	317	554	5,410	211	5,621
2003 Q4	252	681	497	340	468	469	712	671	486	4,576	316	558	5,449	212	5,661
2004 Q1	254	681	506	353	465	476	717	681	481	4,613	311	561	5,485	213	5,699
2004 Q2	255	677	508	362	466	484	723	688	478	4,642	307	565	5,514	214	5,728
2004 Q3	258	678	504	369	472	485	732	693	479	4,669	304	568	5,542	215	5,757
2004 Q4	263	676	496	368	477	487	740	697	483	4,688	303	571	5,563	216	5,779
2005 Q1	262	679	489	359	484	484	748	700	498	4,704	305	574	5,582	217	5,799
2005 Q2	261	688	484	354	493	481	748	705	510	4,723	305	576	5,604	219	5,823
2005 Q3	261	687	487	356	495	478	748	708	518	4,738	303	579	5,620	220	5,840
2005 Q4	261	684	493	361	496	470	752	707	522	4,746	305	580	5,632	220	5,852
2006 Q1 ⁵	263	682	495	370	496	465	755	702	519	4,746	306	583	5,635	221	5,855
2006 Q2 ⁵	265	675	495	375	495	462	765	699	514	4,744	306	583	5,633	221	5,853
2006 Q3 ⁵	266	677	486	376	496	460	769	696	513	4,738	310	583	5,631	221	5,852
Change on latest year	5	-10	-1	20	1	-18	21	-12	-5	0	6	4	11	1	12
Percentage change	1.9	-1.5	-0.1	5.5	0.3	-3.7	2.8	-1.8	-1.0	0.0	2.1	0.7	0.2	0.5	0.2

Notes:

1 Headcount, rolling four-quarter averages.

2 Rolling four-quarterly averages are based on estimates over the quarters March (Q1), June (Q2), September (Q3) and December (Q4). For example, the Q4 1999 estimate is an average taken for the quarters Q1 to Q4 1999.

3 Public sector employment estimates for Scotland are published by the Scottish Executive on a quarterly basis back to Q1 1999 from administrative records and surveys of public sector organisations in Scotland.

4 Public sector statistics for Northern Ireland relate to the number of public sector jobs rather than the number of people working in the public sector. The percentages for Northern Ireland as a proportion of all employment will tend to be around 2 percentage points higher than DETINI estimates expressed as a proportion of all jobs. HM Forces figures are not included in Northern Ireland estimates.

5 Estimates for these quarters have been produced using calendar quarterly LFS microdata to obtain regional splits (see section 'Use of LFS data for analysis of public sector employment').

Sources : Labour Force Survey, returns from public sector organisations (ONS, Scottish Executive & Department of Enterprise, Trade and Investment for Northern Ireland)

Table 1 - *continued***Public sector employment:¹ by region and country of workplace**

Thousands, seasonally adjusted															
Average of four quarters to: ²	North East	North West	Yorkshire and The Humber	East Midlands	West Midlands	East	London	South East	South West	England	Wales	Scotland ³	Great Britain	Northern Ireland ⁴	United Kingdom
PSE as a percentage of all in employment															
1999 Q4	23.4	19.6	19.9	17.0	17.9	17.1	18.6	16.5	18.2	18.3	23.9	23.1	19.0	28.7	19.2
2000 Q1	22.9	19.7	19.9	17.0	18.2	17.2	18.5	16.4	18.4	18.3	23.6	23.0	19.0	28.9	19.2
2000 Q2	22.2	20.1	20.2	16.8	18.2	17.1	18.3	16.3	18.5	18.3	23.8	22.8	19.0	29.0	19.2
2000 Q3	22.1	20.6	20.3	16.7	18.0	17.2	18.0	16.4	18.7	18.4	24.0	22.6	19.0	28.9	19.3
2000 Q4	22.0	20.9	20.4	16.6	17.9	17.1	17.8	16.5	18.8	18.4	24.4	22.5	19.0	28.9	19.3
2001 Q1	22.3	21.1	20.4	16.7	17.9	17.1	17.6	16.5	18.8	18.4	24.9	22.4	19.0	28.7	19.3
2001 Q2	22.8	21.3	20.1	16.8	17.9	17.2	17.8	16.5	18.8	18.5	24.8	22.4	19.1	28.6	19.3
2001 Q3	23.1	21.5	19.8	16.8	18.1	17.3	18.0	16.4	18.8	18.5	24.7	22.5	19.1	28.6	19.4
2001 Q4	23.5	21.6	19.4	16.8	18.3	17.2	18.2	16.5	18.8	18.6	24.6	22.6	19.2	29.0	19.4
2002 Q1	23.8	21.7	19.2	16.8	18.4	17.2	18.4	16.6	19.1	18.7	24.5	22.7	19.3	29.0	19.5
2002 Q2	24.1	21.6	19.3	17.0	18.5	17.1	18.5	16.7	19.2	18.7	24.7	22.8	19.3	29.1	19.6
2002 Q3	24.2	21.4	19.6	17.2	18.6	17.2	18.5	16.6	19.2	18.8	24.7	22.9	19.4	29.1	19.6
2002 Q4	24.1	21.4	19.9	17.1	18.8	17.4	18.7	16.5	19.4	18.9	24.7	22.9	19.5	28.6	19.7
2003 Q1	24.0	21.4	20.3	17.0	19.0	17.7	18.6	16.5	19.5	18.9	24.7	22.9	19.6	28.6	19.8
2003 Q2	24.0	21.5	20.6	17.0	19.1	17.9	18.5	16.6	19.6	19.0	24.7	22.9	19.6	28.7	19.9
2003 Q3	23.8	21.5	20.9	17.0	19.1	18.2	18.5	16.8	19.7	19.1	24.6	22.9	19.7	29.0	20.0
2003 Q4	23.5	21.6	21.3	17.5	19.0	18.3	18.4	17.1	19.7	19.2	24.4	23.0	19.8	29.3	20.1
2004 Q1	23.5	21.6	21.6	18.1	18.8	18.5	18.4	17.4	19.4	19.3	23.9	23.0	19.9	29.8	20.1
2004 Q2	23.5	21.4	21.6	18.6	18.8	18.7	18.5	17.6	19.3	19.4	23.7	23.1	20.0	30.0	20.2
2004 Q3	23.7	21.4	21.4	18.9	18.9	18.8	18.7	17.7	19.4	19.5	23.4	23.2	20.0	30.0	20.3
2004 Q4	24.0	21.3	21.0	18.9	19.0	18.9	18.9	17.7	19.5	19.5	23.3	23.2	20.0	30.0	20.3
2005 Q1	24.0	21.4	20.6	18.4	19.2	18.8	19.1	17.7	20.0	19.5	23.5	23.4	20.1	29.9	20.3
2005 Q2	23.8	21.6	20.4	18.0	19.5	18.7	19.0	17.7	20.5	19.6	23.4	23.4	20.1	29.8	20.3
2005 Q3	23.7	21.5	20.5	17.9	19.6	18.6	19.0	17.7	20.7	19.6	23.2	23.5	20.1	29.7	20.3
2005 Q4	23.7	21.5	20.7	17.9	19.8	18.3	19.1	17.6	20.8	19.6	23.3	23.5	20.1	29.5	20.4
2006 Q1 ⁵	23.7	21.3	20.7	18.3	19.8	18.2	19.1	17.4	20.7	19.6	23.3	23.6	20.1	29.4	20.3
2006 Q2 ⁵	23.8	21.1	20.7	18.5	19.8	18.1	19.3	17.3	20.4	19.5	23.3	23.6	20.0	29.2	20.3
2006 Q3 ⁵	23.8	21.1	20.3	18.5	19.8	17.9	19.3	17.2	20.3	19.4	23.7	23.6	20.0	29.1	20.2
Percentage point change on latest year	0.1	-0.4	-0.2	0.6	0.1	-0.7	0.3	-0.4	-0.4	-0.1	0.5	0.1	-0.1	-0.6	-0.1

Table 2
Comparison between Scottish Executive¹ and ONS PSE estimates

Scotland		
Average of four quarters to: ²	Difference: ONS minus SE estimates of PSE	
	PSE levels (thousands)	PSE levels (percentage difference)
1999 Q4	-2	-0.5
2000 Q1	2	0.3
2000 Q2	2	0.4
2000 Q3	3	0.6
2000 Q4	4	0.8
2001 Q1	4	0.7
2001 Q2	4	0.8
2001 Q3	7	1.3
2001 Q4	11	2.0
2002 Q1	14	2.6
2002 Q2	15	2.8
2002 Q3	14	2.7
2002 Q4	13	2.4
2003 Q1	15	2.7
2003 Q2	17	3.1
2003 Q3	19	3.4
2003 Q4	20	3.5
2004 Q1	16	2.8
2004 Q2	16	2.8
2004 Q3	15	2.6
2004 Q4	11	1.9
2005 Q1	10	1.8
2005 Q2	9	1.6
2005 Q3	7	1.1
2005 Q4	4	0.7
2006 Q1 ³	-1	-0.1
2006 Q2 ³	-6	-1.0
2006 Q3 ³	-9	-1.5

Notes:

1 Public sector employment estimates for Scotland are published by the Scottish Executive on a quarterly basis back to Q1 1999 from administrative records and surveys of individual public sector organisations in Scotland.

2 Rolling four-quarterly averages are based on estimates over the quarters March (Q1), June (Q2), September (Q3) and December (Q4). For example, the Q4 1999 estimate is an average taken for the quarters Q1 to Q4 1999.

3 Estimates for these quarters have been produced using calendar quarterly LFS microdata to obtain regional splits (see section 'Use of LFS data for analysis of public sector employment').

Sources: Labour Force Survey, returns from public sector organisations (ONS, Scottish Executive)

FEATURE

Catrin Ormerod and Felix Ritchie
Office for National Statistics

Linking ASHE and LFS: can the main earnings sources be reconciled?

SUMMARY

This article describes a project to link and study the Annual Survey of Hours and Earnings and Labour Force Survey. This investigation looked at the differences between the earnings and hours information collected on the surveys. The results show that some perceptions over the accuracy of the surveys are misplaced, and that researchers can have more confidence in using the data.

Understanding the behaviour of earnings is of key economic importance, both at the level of the macroeconomy and when understanding the actions of firms and individuals. The UK has two main sources of earnings data: the Labour Force Survey (LFS) and the Annual Survey of Hours and Earnings (ASHE), formerly known as the New Earnings Survey (NES).¹ These two data sets are the basis for most micro- and macro-level analysis of the UK labour market. However, they originate from quite different sources and as such do not provide a single, incontestable view of the labour market. Moreover, as the two surveys are designed for different purposes and collect different information, they answer different questions about the labour market.

The surveys are both based on individual data, and so a natural question to ask is whether they could be combined in such a way that:

- differences in the way they represent the structure of earnings could be analysed and clarified
- new analyses of the labour market could be addressed using a combined data set

However, the direct overlap between the two data sets is small. ASHE is a 1 per cent sample of the population; the LFS is a sample of about 60,000 people. Therefore only 600 people are expected to appear in both, throwing away 99 per cent of the observations. Moreover, the two do

not share a common direct identifier; therefore it is almost impossible to match individuals from the two surveys. Statistical matching techniques ('data fusion') have been considered, but because the validity of inference in these merged data sets depends on the joint statistical properties of the variables sets, which are rarely known in advance, this has only had little interest.

This article uses an alternative method for linking based on creating small cell groups from the two data sets. These are used to create a combined data set, containing properties of both data sources, which can be analysed relatively robustly. The grouped cell method of linking data sets involves creating records in the matched data set for each possible permutation, based on common variables across both sources.

The resulting data set has two aims:

- to test statistical properties of the combined variable set to draw inferences about the two surveys and their descriptions of the labour market, and
- to analyse the data set for its own purpose

This article focuses on the first of the two aims, using the data set to test the characteristics of the LFS and ASHE in direct comparison. In doing so, several of the 'stylised facts' about the characteristics of the two data sets are addressed, and some of these are found not to stand up to this combined scrutiny. As a result, the use of the two data sets can be reconsidered.

The next section describes the two data sets and the ways they are used. The statistical background of data linkage is then reviewed, and the method used is described. The subsequent section discusses the results of linking the data, including benchmarking and consistency checks. The final section considers what other inferences can be drawn from the combined data set and suggest some paths for future work. For a more detailed description of the creation of the data, and some preliminary analysis on the combined data sets, see Ormerod and Ritchie (2006a).

Data sources and collection methods

ASHE is an annual 1 per cent sample of employees which results in approximately 140,000 records per year; it was first carried out in 2004, replacing NES. Employers are asked to provide detailed information on the hours and earnings of their employees and on the workplace characteristics. This information is almost always derived from employers’ pay records.

The LFS is a quarterly sample survey of about 60,000 households living at private addresses in Great Britain. The survey seeks information on respondents’ personal circumstances and their labour market status during a specific reference period. Information is collected on the individuals’ personal characteristics as well as information about their hours and earnings in their main and second job (if they have one).

ASHE and LFS surveys collect similar information on earnings and hours worked, but the different methodologies and purposes of the surveys mean the detail and accuracy of the information collected varies. Earnings information collected from employer surveys should be based upon documentary evidence. In the LFS, information about the whole household is provided by one member, the respondent, sometimes without any reference to documentation such as pay slips. Where the respondent answers questions about other members of the household this is known as proxy response. Proxy response affects earnings data as the earning householder is more likely to be out (at work) when the interviewer arrives or telephones, and the proxy response is likely to be less accurate. Ormerod and Ritchie (2006b) demonstrate a significant rounding effect in the LFS. For this reason, employer-provided information on earnings is thought to be more reliable than employee-provided information.

The measure of hours worked reported is also likely to differ. Employers report paid hours, but individuals will tend to report the hours they actually work. Again, accuracy in household surveys is a problem: as well as proxy response, few people actually have a record of the numbers of hours they have worked in a week.

Both ASHE and the LFS offer an hourly wage rate stated by the earner, and one derived from dividing earnings period by hours worked. This information should be the same, but in practice in the LFS it can differ by considerable amounts. Both surveys collect a derived rate, but only ask for a wage rate if the employee is paid on an hourly basis.

For a household survey, a stated rate is more likely to be an accurate measure for pay per hour than the derived rate, as the latter requires more information to be recalled accurately (total earnings, total hours, and both, for the same period). For individuals providing both rates in the LFS, it has been shown that the distribution of the derived rate is much wider than the stated rate and more implausible. Again, proxy response may compound errors.

For employer surveys, the derived rate is seen as the best measure of actual hourly pay because it is based on actual earnings and hours worked. There may be some minor problems with hourly rates in ASHE (Griffiths *et al* (2006)). Nevertheless, ASHE figures on the whole are felt to be reliable.

The best source of earnings information is therefore the employer-provided ASHE, which also collects relatively accurate information about the job and the company (for example, employee’s occupation, industry, whether the work is part time). However, the amount of personal information collected on ASHE is limited to what is provided from the HM Revenue and Customs records used to generate the sample: age and gender. It is reasonable for a household member to be able to provide more personal data and so the LFS collects, for example, ethnicity and disability. For this

reason, the LFS survey is used when hours and earnings information is required to be broken down by personal characteristics.

In summary, ASHE provides accurate information on earnings, hours, and the characteristics of the employer, but little personal information. In contrast, the LFS has detailed personal information but there are concerns over the accuracy of the earnings information. There may, however, be advantages in linking these data sets to provide added value to both.

Linking methodology

ASHE and the LFS have a number of common variables which can be used for linking; variables of interest for comparison; and additional variables which can be used to supplement the main data sources. **Table 1** lists the variables used in this analysis.

The purpose of linking the two data sets is to bring them together using the matching variables (A), to produce a data set with earnings and hours information from both surveys (B1 and B2) and the supplementary information from the LFS (C). This allows the earnings and hours information to be compared across the two surveys. This could then support the idea of associating the supplementary information from the LFS (C) with the core information from ASHE (B1), as illustrated in **Figure 1**.

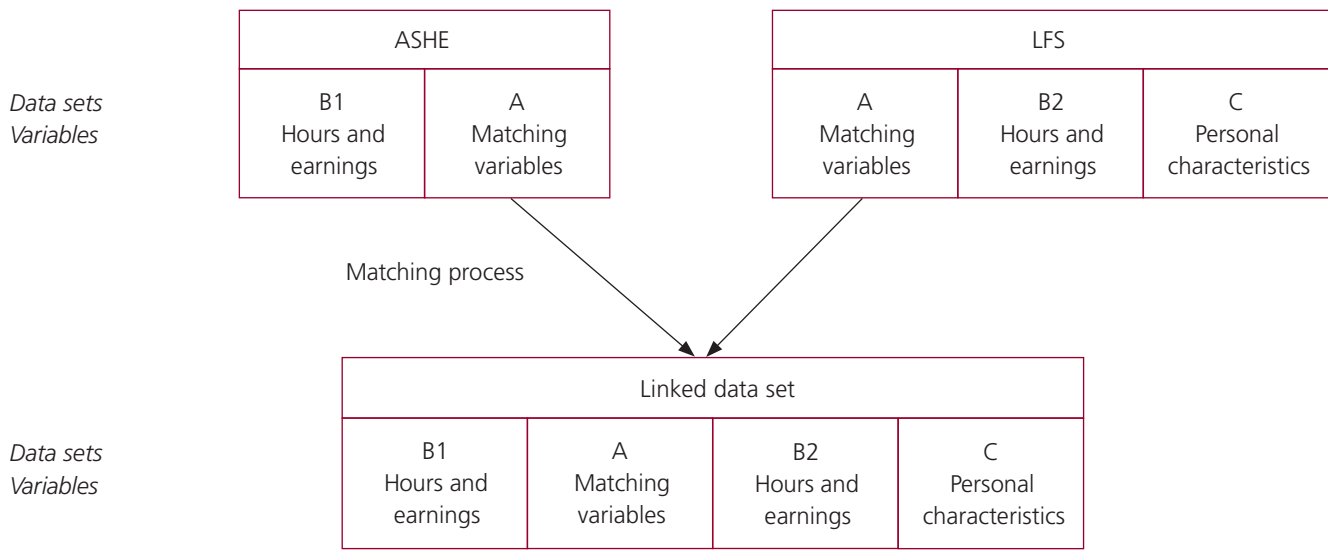
In matching, the assumption is that the linking variables are consistently collected across surveys. There may, however, be inconsistencies. For example, in the LFS, employees classify themselves as part time; in ASHE, ‘part time’ is a rigid definition based on hours of work. Even something as apparently obvious as ‘industry’ may differ between surveys. For example, employees may report the activity of their local office, not of the wider business; or they may confuse manufacturing with the sale of those manufactures.

A number of methods for linking data sets were investigated (see Lam and Ormerod (2005)). Because there is no exact identifier and little overlap between

Table 1
ASHE and LFS variables used for linking and further analysis

Matching variables (A)	Variables for comparison in ASHE and LFS (B)	Supplementary variables in LFS survey (C)
Age	Stated hourly pay	Ethnicity
Gender	Derived hourly pay	Disability
Full-time/part-time status	Hourly pay used for low pay analysis	Skill
Job status	Gross weekly pay excluding overtime	
Region	Basic hours worked in week excluding overtime	
Industry		
Occupation		

Figure 1
Aim of linking ASHE and LFS



the surveys, direct record linkage or probabilistic matching is not appropriate. Pure data fusion (linking cells one-to-one) requires a number of assumptions, not least because each observation in the LFS has potentially three observations in ASHE. Instead, a ‘cell group’ technique was employed, a generalisation of data fusion which creates matching groups of representative individuals, rather than a one-to-one match.

The grouped cell method of linking data sets involves creating a single record in the matched data set for each possible permutation of the matching variables. This record then represents a ‘typical’ person, for example a white male in a particular occupation and industry working in a permanent position on a full-time basis.

These cell groups can then be populated from the separate data sets. Each individual is given a reference code which contains the potential linking characteristics (for example, 2-digit industry codes, 1-digit occupation code, gender and age band). Within each survey, the information of interest for all records with the same cell reference is combined to produce an average value for the variable based on all contributing records. Where the survey has supplementary information of interest, a series of variables is produced for each possible category of the supplementary variable, indicating the proportion of records in the original data set having that category.

When the cell groups from the two surveys are combined, it is possible to compare ‘representative’ individuals from both surveys who have the same characteristics. By construction, the individuals in this cell, from whichever

survey, all share the same identifying characteristics. Inferences can then be made about the representative individuals from the two surveys, and analysis of whether, for example, any differences in survey distributions are related to the characteristics of the individuals.

Note that where there is only one individual from a survey in the cell, this method collapses to standard one-to-one or many-to-one data fusion methods. Also, it is only possible to create a ‘full’ linked data set, if no permutation appears for only one of the data sets. This does not occur, and so there is some information loss when individuals have no match.

It is natural that some permutations are more common than others and some do not appear at all in the data set. When cells are created from a larger number of underlying records, these should provide a better estimate for earnings, hours and supplementary variables compared with those created from a small number. It is also common in the LFS for individuals to have missing information; this does not occur in ASHE, due to imputation for missing information. Having an individual in a group does not therefore guarantee that information on earnings is available.

In practice, it is possible to derive the cell reference at a number of different levels. A balance therefore needs to be struck between creating a data set containing detailed records and ensuring the number of records contributing to a cell is high enough to provide an accurate picture of the variables of interest for that typical record. A more detailed description of the linking method can be found in Ormerod and Ritchie (2006a).

Comparison of ASHE and LFS

As discussed in detail in Ormerod (2005), differences are expected in the hours and earnings information collected in both surveys. Previously, comparison of these sources has only taken place at the aggregate level. The process of creating grouped cells brings together individuals with similar characteristics and pools their information. The cell group data set therefore provides an opportunity to compare the hours and earnings information for jobs from ASHE and the LFS at a very detailed level for the first time.

The following variables were compared across the two surveys:

- hourly pay variables used to measure low pay. For the LFS, this is the stated hourly pay if it is provided, otherwise it is the derived hourly pay (gross weekly pay divided by usual total hours); for ASHE, a derived rate is used based on dividing basic, incentive and other weekly pay by hours worked during the week.
- stated hourly pay variables. Hourly rates are only applicable for certain types of jobs which are generally low paid; the number of individuals in the data set with this variable is therefore small.
- gross weekly pay, that is total earnings for a reference week
- basic actual hours worked during the week

One of the main developments in ASHE from NES was to improve the coverage of low-paid employees. Previously, the LFS was considered to provide better coverage of the low paid than NES, as

the LFS samples all individuals within a population regardless of their earnings; NES sampled individuals who were paid above the PAYE threshold. ASHE has expanded its coverage to include some of those individuals. Earnings from the two surveys may still differ at different parts of the distribution. In order to compare ASHE and the LFS across the entire earnings and hours distribution, investigations have been carried out at different cut-off points for the variables. **Table 2** shows the values of the cut-off points used in this investigation.

Numbers and consistency of cell group records

In the process of creating the grouped cell data set, information for individuals with the same characteristics is merged to produce information for the cell group. Some combinations of characteristics will not appear in either data set. This may be because that particular combination of characteristics is structurally implausible (for example, it can be assumed that there are no working miners aged 65 or over living in London), or because the combination is

rare and none appear in the sample. If there are no individuals available to represent a particular combination of characteristics from one data set, but they appear in the other, the cell group will have missing information for variables which originate from the data set where they do not appear.

Even if individuals exist with the combination of characteristics to make up a cell group with contributions from both data sets, these individuals could have missing values for some of the variables of interest. The cell group variable can therefore be based on fewer individuals than the number actually observed in that category. An extreme case of this occurs when all individuals contributing to a cell group have missing values for a particular variable; the cell group then also has a missing value for that variable. Some cell records will therefore appear in the data set but not have any information for the variables of interest.

The value of a variable for a cell group will therefore be based on the number of individuals appearing in the originating data set with that combination of

characteristics and a valid value for that variable. This will naturally be more reliable (in the sense of providing an unbiased estimate of the cell mean) if it is based on more individuals, as outliers will influence the variable less. Cell groups based on more common combinations of characteristics will therefore tend to be more reliable than cell groups based on rare combinations of characteristics.

Table 3 shows the number of cell groups with information for the variables of interest. The corresponding ASHE and LFS variables can only be compared for a cell group if there is both an ASHE and LFS value for the corresponding variables for that cell group. Table 3 also shows the number of records with information for the comparable variables based on five or more and ten or more individuals. The information for these cell groups should be more reliable than information for cell groups based on fewer than five individuals.

Of the 9 million theoretically possible cell groups, between 31,000 and 32,000 are observed each year. Almost all of these have relevant ASHE information, but the number with LFS information is lower at around 7,000. Around 5,000 cell groups have hours and earnings information from ASHE and the LFS, which allows these cell groups to be compared. The number of valid observations varies with the variable considered; less than half of the comparable records have stated hourly pay. Finally, restricting the analysis to groups with at least five or ten observations from each data set reduces the number of valid observations dramatically.

Hence, the cell group method does reduce the number of observations considerably compared with, for example, simple data fusion, where one aim is to maintain at least the dimension of the smaller data set. A key question then is whether the cell groups continue to provide an adequate representation of the data sets. To answer this, each of the original variables was regressed on the relevant cell group mean plus the characteristics of the cell group:

$$x_i = \alpha + x_g \beta + Y_g \gamma + Z_i \delta + \varepsilon_i$$

where:

x_g is the group mean value (for example, for hourly pay) for the group to which x_i belongs

Y_g are the characteristics of the group, and

Z_i are other characteristics of x_i

Table 2
Cut off values used during investigation for earnings and hours variables, 2004 and 2005

	Mean	10th percentile	25th percentile	Median	75th percentile	90th percentile
Hourly pay (£)	13	5	7	10	15	21
Weekly pay (£)	423	105	213	350	540	767
Basic hours (number)	33	15	29	37	39	40

Table 3
Numbers of cell group records: by year and reliability

	2004			2005		
	All	Based on 5+	Based on 10+	All	Based on 5+	Based on 10+
Cell groups	32,590			31,133		
With ASHE records	30,862			29,358		
Low pay hourly pay	29,453	6,048	3,136	29,271	6,071	3,168
Stated hourly pay	20,472	3,341	1,514	18,627	2,918	1,345
Gross weekly pay	30,862	6,244	3,230	29,347	6,093	3,177
Basic hours	29,650	6,245	3,230	29,285	6,093	3,177
With LFS records	6,945			6,852		
Low pay hourly pay	6,510	543	182	6,374	544	181
Stated hourly pay	3,171	178	48	3,042	156	47
Gross weekly pay	6,534	546	182	6,405	545	180
Basic hours	6,518	516	174	6,425	524	169
With equivalent ASHE and LFS variables						
Low pay hourly pay	4,957	526	179	4,838	528	178
Stated hourly pay	2,252	171	47	2,064	152	46
Gross weekly pay	4,663	529	179	4,561	529	177
Basic hours	4,919	456	1	4,803	475	0

The aim of this regression is to identify whether the cell group is a true representation of the underlying data set by identifying, for example, if certain cells compress the wage distribution unduly or if important combinations have been omitted. Significant coefficients on Y_g and Z_i could be indicators that there is some bias in the cell group construction.²

The results show some significant coefficients for age and region, indicating that, for these two variables, the decision to compress variation into subgroups may be biasing results. However, for most variables – industry, occupation, full time, gender, job type – there were no significant coefficients. Overall, it seems that the cell group method does retain the characteristics of the individual data points. However, it must be remembered that there may be some bias in the omitted observations – those in one survey with no counterpart in the other. Testing the characteristics of these observations has been left for future work.

Can ASHE be used to predict the LFS?

Although ASHE is used for official estimates of low pay, legal constraints mean that access is limited to government departments. In contrast, the LFS is widely used by researchers in labour economics as it is available to download in an anonymised form. The LFS is therefore the prime source of research material on earnings in the UK, and the concerns noted above about the accuracy of the LFS figures are directly relevant to the bulk of UK research. Although ASHE and the LFS have been compared at the aggregate level, this is the first time it has been possible to compare the two data sets at such a detailed level.

Ormerod and Ritchie (2006a) studied the relative properties of the two data sets. They compared the hours and pay variables described above by studying the distribution and correlation between ASHE and LFS values in the cell groups. These supported some 'stylised facts'; for example, the LFS earnings distribution is missing many of the high earners, but the LFS shows much greater variation in hours worked. They also used regressions to test the hypothesis that the LFS was a poor estimate of the true earnings value. These regressions suggested that, throughout the broad range of earnings, ASHE and the LFS were surprisingly close in the estimate of earnings for groups. The data

sets diverge below the 10th percentile of the distribution, where there are few observations in the LFS, and above the 90th percentile, where the LFS does not have the high earners that ASHE has.

This is a significant result, in that it suggests that researchers using the LFS can have more confidence in the earnings data than was previously supposed.

However, one criticism is that regression analysis, in particular, does not capture fully the variability of the data. This can be addressed by studying scatter plots of the cell groups.

Figure 2 shows the relationship between ASHE and LFS cell group values for the earnings variable used in the official low pay calculations for 2005. Part (a) shows all

cell groups while parts (b) and (c) show the cell groups restricted to those with at least five or ten observations from both surveys respectively. The reference line is drawn on the chart to show the hypothetical ideal where ASHE and the LFS agree exactly.

Three observations can be made. First, there is significant variation, but there is clearly a relationship between surveys which follows the reference line. Second, as the scatter plots are restricted to the more populated groups (parts (b) and (c)), the relationship becomes more defined. Second, there are notable outliers, where groups have low earnings on the ASHE data set but large earnings on the LFS. These persist even for the common groups, and require further investigation. The relationship

Figure 2

Scatter plot of ASHE compared with LFS hourly earnings variable used to measure low pay, cell groups, 2005

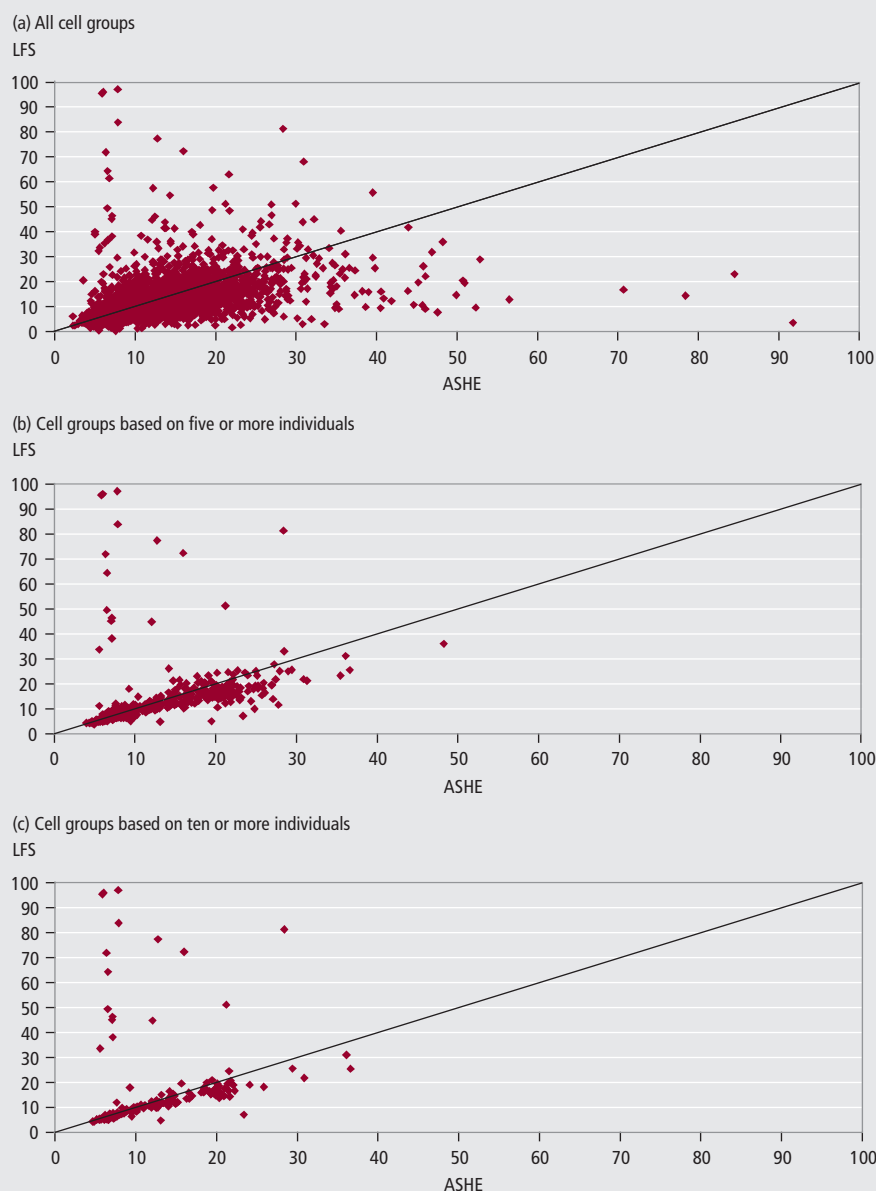
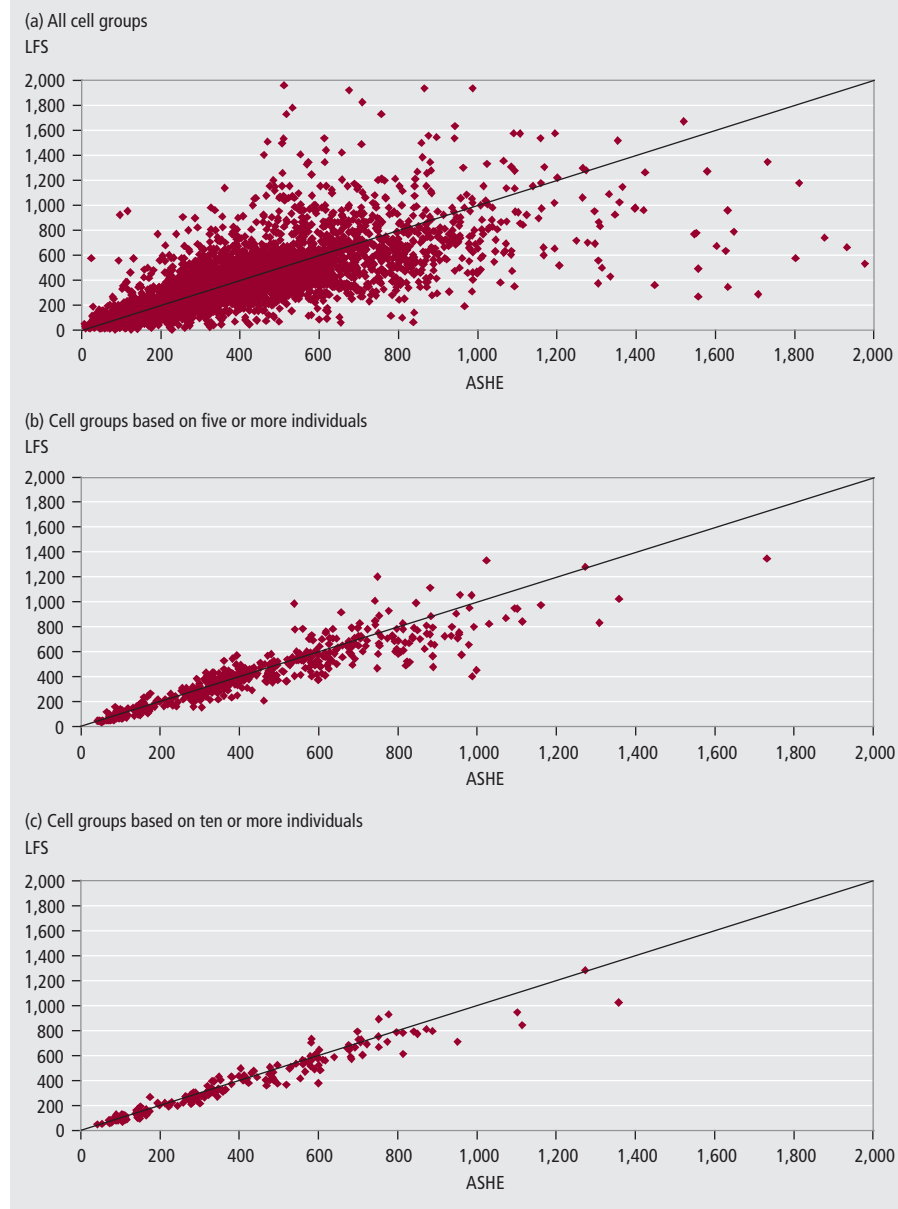


Figure 3

Scatter plot of ASHE compared with LFS gross weekly pay, cell groups, 2005

flattens beyond £21 per hour, the 90th percentile of earnings, in line with the simple regressions in Ormerod and Ritchie (2006a). Finally, although only the 2005 results are reported here, the results for 2004 are very similar.

Figure 3 shows similar figures for gross weekly earnings. It is clear that the relationship here is much closer and attenuates swiftly as the data points are restricted to the common groups. Again, there is some flattening of the relationship at high levels of ASHE earnings, but these are well beyond the 90th percentile of earnings.

What is noticeable is that the relationship seems to extend down to the bottom of the distribution. Regression analyses in Ormerod and Ritchie (2006a) failed because of the

limited number of observations, but the scatter plots do seem to show that the close relationship continues into the bottom decile.

Figure 4 shows the hours figures. These do support the view that ASHE and the LFS report on hours differently. It is clear that, for full-timers, ASHE earnings data are clustered around standard hours whereas LFS hours show much more variation. Interestingly, for part-timers, there is only a weak relationship but a positive one, and one which is particularly noticeable in the more common groups.

In this case, the stylised facts are partially correct: the hourly data in the LFS are not comparable to ASHE, but only for full-timers. This is consistent with the way the data are collected. Part-time employees are more

likely to be aware of, and work, the hours they are paid for, whereas full-timers are more likely to be salaried and to report hours based on their perception of hours. In both cases, ASHE reports the hours paid for.

There is thus strong evidence that the LFS is a more accurate record of earnings than was previously supposed. Ormerod and Ritchie (2006a) extended their regression analysis to incorporate industry and occupation dummies. These did not show statistically significant impacts, implying no persistent differences in the surveys as a result of industry or occupation. This is an important result, suggesting no systematic bias in ASHE-LFS linkages. Of course, there may be some more complex relationship not tested here, but on this broadbrush approach this is a reassuring outcome, and important for many of the researchers using LFS data who do not have access to the more reliable ASHE data.

In summary, gross weekly pay is very closely related across the entire distribution, even at low and high values. Basic hours differ in reporting for full-timers, those above 29 hours per week in this case. This may have caused the differences in the derived hourly rate variables at the low end of the distribution.

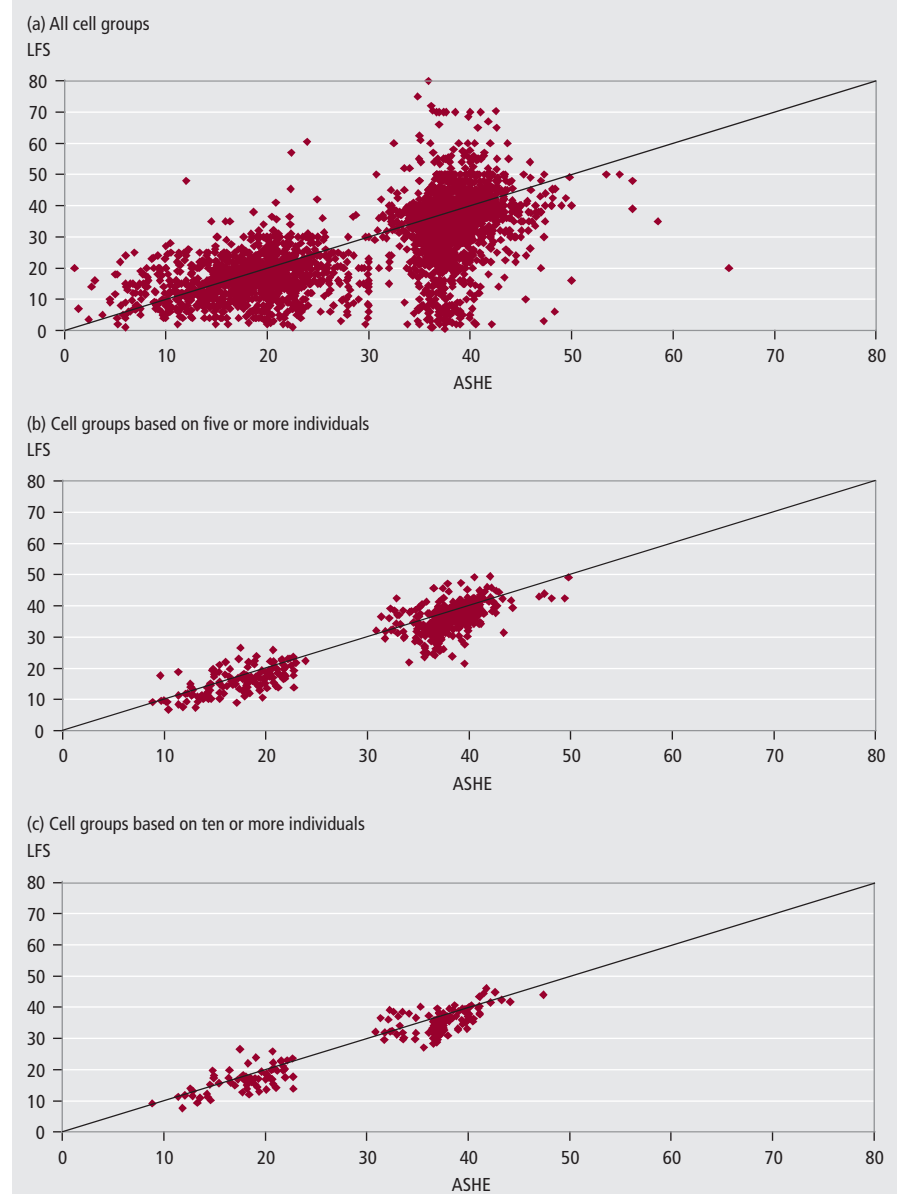
These results are somewhat surprising as the LFS has always been perceived as the poorer source of information on earnings. This investigation implies that analysis of earnings using the LFS may be more reliable than previously thought, and a breakdown of LFS earnings information by personal characteristics can be assessed with more confidence than in the past. The issue of low sample sizes for some rarer characteristics still remains, for example, some ethnicities, and this must be taken into account when commenting on the earnings distribution. Nevertheless, given the widespread use of the LFS for analysis, this has positive implications for much research currently underway in the UK.

What can be learnt from the linked data set

Although comparison of the data sets shows that they are more consistent than previously thought, analysis of the linked data set may still give insight into the data. Ormerod and Ritchie (2006a) looked at using the linked data set to analyse low pay and the distribution of earnings.

The broadbrush impression of consistency does hide some discrepancies. This is largely due to the fact that the cell group method accentuates the gaps

Figure 4

Scatter plot of ASHE compared with LFS weekly hours, cell groups, 2005

in the data where certain characteristics are concentrated. For example, in terms of ethnicity, the White group will be well-represented and distributed across a range of personal characteristics in the survey. Conversely, the sample size for individuals in the Chinese group is smaller and concentrated in similar groups. This is highlighted in the way that estimates for the Chinese group are very sensitive to the aggregating method.

This data set allows for alternative ways of scaling the LFS estimates to ASHE overall estimates. This makes comparison with the

more reliable total estimates from ASHE easier when looking at particular groups of the population.

In terms of the questions raised in the introduction, the linked data set has proved useful in analysing the structure of earnings. One outcome of this project has been to identify some of the areas where discrepancies between data sets seem to arise; even if they cannot be explained at this stage, this is useful information when considering the design of the two surveys. However, the data are of limited use for analysis in their own right.

Conclusion and future work

ASHE (and previously NES) and the LFS have been used separately to examine earnings in the UK depending on the type of analysis required. ASHE has been used as the main source as it is thought to be more reliable since it is based on employer records. The LFS is used when estimates of earnings broken down by personal characteristics are required, as this source is richer in terms of the information on the individual. The sources have been compared at a high level in the past and it is known that many of the differences are due to the fact that the LFS is provided by the employee, without reference to documentation, and sometimes by proxy response. This investigation compares these sources at a very detailed level for the first time.

This investigation shows that, against expectations, the major data sets are more consistent than thought. This is particularly important because non-governmental researchers can only get easy access to the LFS, and so this is taken as the main source of earnings data. The linking exercise has raised some interesting issues about differences between the sources at a very detailed level and highlighted possible gaps in coverage. Overall, this report shows that researchers are justified in their continuing use of the LFS data where ASHE is not available or appropriate.

Notes

- 1 The ASHE survey started in 2004. It was developed from NES. The NES sample was extended to improve the coverage of the low paid, and imputation and weighting was applied to ensure the sample was representative of the population. For more information see: www.statistics.gov.uk/STATBASE/Source.asp?vlnk=1319
- 2 It could be argued that the variables should be interacted, as the process of building cell groups does force this. However, interacting all variables would have led to the simple recreation of the cell group means, and any lower level of interaction would lead to the same criticism of not fully identifying the bias. Hence, identifying possible sources of bias at the broadest and simplest level were chosen here.

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FEATURE

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The measurement and role of government procurement in macroeconomic statistics

SUMMARY

This article details the measurement and role of government procurement in the UK National Accounts. The need for an accurate estimate has increased following both internal and external users' analytical requirements, in particular the development of measures of market sector gross value added, emphasis on government productivity and new methods for estimating National Accounts. Existing data collection methods are detailed, and specific initiatives are identified, some of which are already underway. These initiatives, which will involve working closely with HM Treasury, the Office of Government Commerce and other government departments, will focus on improving the product breakdown of, and price deflators for, government procurement data.

Government procurement is here defined as the intermediate consumption expenditure made by government on goods and services produced by the private sector in order to deliver public services (it does not include capital formation). This expenditure has grown substantially over recent years. Government departments need to monitor such expenditure for usual efficiency and value for money considerations. But equally, procurement expenditure is an important component of macroeconomic activity, the National Accounts and hence measures of GDP growth.

This article examines first the existing role of government procurement estimates in the UK National Accounts and how this role is developing; second, how these statistics are produced; and third, looks to improvements in these production processes in the future. Three new user demands give estimates of government procurement a more important role in economic estimation and assessment:

- derivation of an expenditure-based measure of market sector gross value added (GVA)
- production of more complete measures of government productivity as part of the work of the UK Centre for the Measurement of Government Activity (UKCeMGA), and
- changes to the quarterly and annual processes for estimation of Gross Domestic Product (GDP) following the future implementation of the National Accounts modernisation programme

It is aimed at providers and users of procurement statistics alike. For providers of procurement information, a number of initiatives, both within the Office for National Statistics (ONS) and in other government departments, are set out that build on ongoing improvements to the provision of this information. User requirements are set out and put into the context of existing National Accounts considerations.

The article is organised as follows: background and national accounts conceptual and practical issues; existing estimates of aggregate government procurement; the background to the changing demands; the current methods for compiling estimates of government procurement; problems with these methods; and specific initiatives to improve the quality of the data.

Government procurement and the National Accounts: concepts and treatment

Public services are delivered through a combination of those produced directly by government employees and purchases from the private sector. The private sector role extends from the direct provision of the services themselves to the provision of goods and services to support the public sector provision. So, for example, public health services are both delivered by the National Health Service and purchased directly from the private sector health companies with, in addition, the NHS purchasing electricity, medicines and equipment from private sector energy, pharmaceuticals and medical engineering companies.

By national accounts convention, general (that is, local and central) government is treated as a non-market sector – it provides goods and services not for profit. For this type of sector, the output is measured as the sum of its inputs. In this case, the inputs are the sum of compensation of employees (labour costs), intermediate consumption (goods and services used up in order to produce the output) and the consumption of fixed capital (depreciation of fixed assets). Furthermore, by convention, the GVA (contribution to the economy and to GDP) is measured as the sum of compensation of employees and the consumption of fixed capital.

The production approach to the measurement of GDP is based on the sum of the value added of all industries (including government). The expenditure or demand approach to GDP aggregates the final demand expenditures of each of the sectors of the economy (businesses, households, overseas, government) net of imports. The final demand of government, general government final consumption expenditure (GGFCE), is all government expenditure on providing public services. Therefore it can be defined in the same way as government output:

GGFCE = government output
= government GVA
+ government procurement
+ consumption of fixed capital

ONS produces early estimates of quarterly GDP, which are subsequently benchmarked to annual sources, from each of the production, expenditure and income approaches in both current price

(nominal) and volume (strictly chained-volume) terms. Estimates of procurement are required for the early expenditure-based estimate of GDP and for the benchmarking processes.

The early estimate of GDP volume growth is driven by the production measure. It is based on the assumption that measures of the volume of turnover are a reasonable indicator of movements in the volume of value added in the short term (see, for example, Reed, 2000). The contribution of private sector industries is hence generally based on turnover adjusted into volume terms (deflated) with a relevant producer or service price index. The contribution of government to GDP is based on a combination of direct measures of government output and measures of the costs of inputs deflated in various ways (discussed in **Box 1**). The expenditure and income measures are estimated separately, but balanced so that growth rates are the same as the production measure.

In terms of the main subject of this article, an estimate of government procurement is not necessary for the early estimate of the production measure. As noted, the production of the goods and services procured by government will be captured through the production of the relevant private sector industries. However, for the early estimates of the expenditure breakdown, quarterly estimates of procurement are required in both current price and volume terms. For the former, an estimate of government procurement in aggregate only is required. In volume terms, however, estimates of procurement are required for each category of government activity that is

based on deflated inputs. These categories are military defence and central and local government 'other'; deflators are based on producer price indices.

These measures are used until the annual benchmarking process takes place, when data for both supply and demand are balanced through an Input-Output Supply and Use Tables framework. These processes are described in ONS (1997), www.statistics.gov.uk/inputoutput, or Allsopp (2004, Chapter 5). At present, this is done in current price terms, with annual data only. Annual estimates of government procurement expenditure are required for the following: expenditure by the five government industries (public administration and defence; education; health and veterinary services; social work activities; and sewerage and sanitary services), on the 123 products on which Input-Output Supply and Use Tables balancing is based.

For each of the 123 products in the Input-Output Supply and Use Table, the estimates of supply (domestic production plus imports) are balanced with demand (final and intermediate use). The goods and services procured by government will appear on the supply side through the production of private sector companies and imports. For example, estimates for 'office machinery and computers' show that, in 2004, the intermediate consumption by the 'public administration and defence' industry was £4.0 billion out of total supply of £28.7 billion for that product; procurement is therefore an important component in ensuring supply and demand are balanced for that product.

Box 1

The measurement of government output

The measurement of the volume of government output has been the subject of a major review by Sir Tony Atkinson (Atkinson, 2005). The area has long been recognised as challenging in the context of the National Accounts for two main reasons:

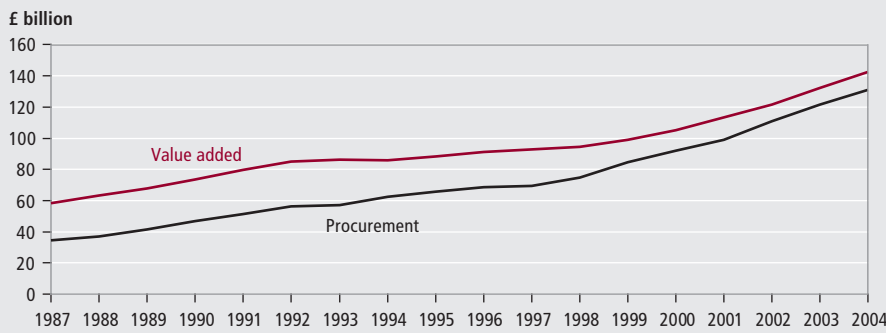
- most government output (such as health or education services) is supplied free or at prices that are not economically significant and so it is difficult to determine the value of the output, and
- some government services such as defence are provided on a collective basis and so it is hard to define or identify the exact nature of the output

As a result of these difficulties, the volume of government output was originally measured through measures of inputs adjusted for price where necessary. But from 1998, as first detailed by Caplan and Neuberger (1998), there has in the UK been a sustained effort to overcome some of these difficulties and a move to

gradually replace this approach by more direct measures of government output. The *Atkinson Review* then proposed substantial developments and extensions to these output measures. In 2005, UKCeMGA was established to take forward these initiatives.

At the time of writing (2007), around two thirds of government output is now calculated in this way. The other third of government activity remains measured by the input method: military defence, and two mixed categories known as 'central government other', including general public services and economic and environmental affairs, and 'local government other', including police, environmental protection, housing and community amenities. These measures are put into volume terms either through deflation, for example with producer price indices and a price index for local government pay, or through direct volume measurement, primarily with employment indicators.

Figure 1
Government output



Estimates of government procurement

In the National Accounts framework, government procurement is the intermediate consumption of government; intermediate consumption is defined as the goods and services that are used up as part of the production process. The production account for the UK general government sector shown as Table 5.1.1 of the *UK National Accounts* (or *Blue Book*) includes the relevant estimates. In 2004, government procurement was estimated at £131.0 billion (accounting for 11.1 per cent of GDP); **Figure 1** shows a time series of government procurement alongside a time series of government value added.

As shown in Figure 1, government procurement grew rapidly in cash terms between 1987 and 1993 and, following a period of more subdued growth in the mid 1990s, grew rapidly again between 1998 and 2004.

The proportion of government procurement as a share of government output has been increasing over the same period. **Figure 2** shows that, in 1987, government procurement was 37 per cent of government output; by 2004, this ratio had increased to 48 per cent, so that purchases of goods and services from the private sector now account for just under half of total government expenditure on

the provision of public services. These changes follow from both increases in certain procurement expenditures as well as increases in the share of government activity that is conducted by the private sector following contracting out of some government services and various public-private partnerships.

Changing user needs

This section discusses the changing requirement for government procurement estimates following changing requirements for macroeconomic and policy analysis, as well as evolving methods for the estimation of the National Accounts. In general terms there are increased needs for:

- quarterly measures
- detailed figures by product and activity
- deflators for the detailed figures

Calculating market sector GVA from the expenditure perspective

ONS has recently begun production of an experimental measure of business output entitled market sector GVA. A quarterly measure in chained-volume terms based on the production approach to GDP is published each quarter (see Herbert and Pike, 2005). An annual measure in current prices covering each of the production, expenditure and income approaches is

now published annually in the latest Input-Output analysis publication (see ONS, 2005). This work was initiated partly at the request of the Bank of England, as market sector GVA forms an important part of their analysis and modelling of the UK economy (see Hills *et al*, 2005).

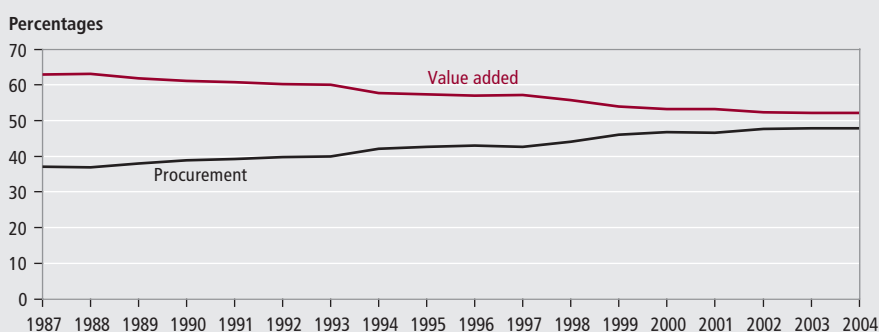
Alongside the chained-volume production measure, it is desirable to have an assessment from the expenditure perspective, both to ensure a coherent approach and to aid fuller understanding of the determinants of market sector GVA. The Bank of England and ONS have recently published a joint article (Churm *et al*, 2006), that provided a first estimate. The article shows an expenditure-based measure that corresponds very closely to the official production-based approach. Churm *et al* argue that the most accurate measure of market sector-based activity from the expenditure perspective would be one based on a bottom-up aggregation of the consumption of all market sector production in the economy. The element of government activity that contributes to the aggregate is government expenditure on goods and services produced by the private sector. They also argue that, under most circumstances, a top-down approach, based on removing identifiable components of non-market activity from estimates of whole economy activity, should provide an adequate approximation. Under this approach, a measure of market sector activity from the expenditure perspective can be achieved by subtracting general government final consumption expenditure from GDP and then adding back in government expenditure on procurement of goods and services, which are purchases from the market sector (including that from other parts of government). More fully:

Expenditure-based market sector GVA at basic prices = GDP(E)

- imputed rentals on dwellings
- government consumption
- + government procurement
- basic price adjustment

In order to construct this measure, total government procurement expenditure needs to be separately identified from other forms of government spending. The measure is also required on a quarterly basis, and relevant deflators need to be constructed or identified. This requirement goes significantly beyond the requirement in the existing GDP systems, where volume figures are only necessary for the input-based measures.

Figure 2
Government procurement as a percentage of government output



The approach adopted in Churm *et al* (2006) shows what can be done building on existing measures from a top-down approach. A fuller development of an official measure, based on a bottom-up approach, will require more detailed industry and component level deflators.

Measuring productivity in the public sector

The *Atkinson Review* examined the 'Measurement of Government Output and Productivity for the National Accounts'. The improvements to direct measures of government output are also a key contribution to better assessments of productivity for the public sector. The *Atkinson Review* states that any such productivity measures should be based on total (or multi-) factor productivity analysis, rather than measures of productivity based simply on labour input. Productivity change for specific public services is calculated by dividing the change in directly measured output of the public service by the change in the volume of inputs. Unlike measures of labour productivity, they include information on procurement and capital consumption of services in the denominator of the productivity change ratio. As the *Atkinson Review* states, such analyses require 'a comprehensive approach to input measurement' (paragraph 2.34). This means a product breakdown of government procurement spending and fit-for-purpose price deflators for each component for each public sector activity are required. Analyses of productivity for different public services have already been produced for health, education and adult social care, with further analyses planned, for example, for public order later this year (see for example the assessment of health productivity, UKCeMGA, 2006).

Modernisation of the National Accounts

The ONS Statistical Modernisation Programme (SMP) is aimed at an integrated public surveys operation within ONS. Key components of the work have been the re-engineering of key statistical systems; moving ONS surveys and other data onto a corporate database system; introducing a set of standard statistical tools; and standardising and systematising the processing and presentation of statistical outputs.

Under the National Accounts modernisation programme, a new methodology for deriving GDP is being developed. In the future, both quarterly and annual GDP estimates in both current price

and volume terms will be derived using the supply-use framework. This will replace the system discussed above, which has a number of widely recognised shortcomings (see Tuke and Aldin, 2004).

As with the present annual system, the quarterly estimates will be derived by matching the supply and use of individual products, and industry outputs with industry inputs. But this matching will take place not only in current prices but also in chained-volume terms. In addition, the framework will permit the derivation of GVA in volume terms by double deflation, which involves the direct estimation of GVA with gross output and intermediate consumption deflated separately.

More generally, the system will ensure fuller consistency between all measures of activity from the supply and demand sides.

In terms of data, the processes will therefore require additional and extensive product information on intermediate consumption for both the government and non-government sectors on a quarterly basis, both in cash terms and with associated price indices.

Moreover, the new system will have the ability to more fully analyse key sections of government activity in terms of the output produced and the inputs to that output, both in terms of procurement expenditure and labour costs. In the longer term, the aim is to have the ability to augment this in terms of analysing capital inputs and services generated, and productivity in general. It is therefore important that high-quality government procurement data are included in the new system but also that they are consistent with data used in analysis undertaken by UKCeMGA.

Current compilation methods

Introduction

This section explains how government procurement expenditure data are currently compiled. The collection of central government data is co-ordinated by HM Treasury and local government data by the Department for Communities and Local Government (DCLG) for England and the Devolved Administrations for Scotland and Wales. The explanation here focuses on government procurement data, but the processes follow from the more general processes to measure all types of government expenditure.

Central government data

HM Treasury collects expenditure information from all government departments, which includes data from the

Devolved Administrations. The systems are underpinned by detailed allocations of departmental expenditure by sub-programme (for financial years).

Monthly and quarterly data are then collected to monitor all departmental expenditure against agreed budgets, and to feed into assessments of monthly borrowing and annual expenditure outturn. The monthly data collection is at a high or aggregate level only; government procurement expenditure is identified at a quarterly data collection exercise according to National Account deadlines. The latter procurement allocation follows from a wider exercise to allocate government expenditure by economic category, for example, pay, procurement and subsidies. At this point, aggregate procurement expenditure is centrally available for each department, with some spending programme detail for larger departments. To conform to National Accounts definitions, HM Treasury data are adjusted for refunded VAT and for the payment of business rates. In addition, procurement expenditure is routinely supplied and calculated on a net basis, that is to say, calculated net of sales of goods and services. The figures therefore have to be adjusted onto a gross basis by adding back the sales data.

However, in general, there is very little product detail available. As discussed, for the National Accounts, quarterly government procurement data are required to derive the expenditure measure of GDP, and deflators are required for those areas where government activity is measured by the input method. No actual price data are centrally available for the prices government pays for its procured inputs, so deflation is carried out using various proxy deflators such as producer price index components.

The annual supply-use exercise is initially based on the same figures, allocated according to COFOG categories and industries (see **Box 2**). This is replaced with fuller financial year information on a detailed basis that becomes available when departments have completed their auditing process.

For the annual exercise, for the Department of Health and Ministry of Defence, some detailed product information is available (for defence, procurement is attributed to 20 products). For other areas, product information is largely estimated. For central government, the intermediate consumption breakdown for some government industrial categories is informed using the patterns of intermediate consumption for the market sectors (where

Box 2

The classification of government activity

HM Treasury allocation and monitoring of government expenditure is based on a departmental structure, with sub-programmes of spending for each government department. These are then allocated to a functional classification. The National Accounts use this functional classification, an industrial classification, as well as a breakdown into economic categories.

Government consumption is based on the UN Classification of the Functions of Government (COFOG). The classification operates at various levels of detail; the highest-level (one-digit) breakdown is as follows:

1. General public services
2. Defence
3. Public order and safety
4. Economic affairs

5. Environmental protection
6. Housing and community amenities
7. Health
8. Recreation, culture and religion
9. Education
10. Social protection

This classification is wholly consistent with the HM Treasury functional classification at the high level and partially consistent at a more detailed level.

Input-Output Supply and Use tables and the production measure of GDP are then based on the four industry/product groupings discussed earlier, and then an allocation of expenditure according to economic categories such as final consumption, procurement and investment.

the product allocation is derived from the ONS Purchases Inquiry). In other areas, production-side estimates of business output might be used as an indication of the consumption, and allocated to the various categories of demand, including government procurement.

Local government data

Data are collected from local government bodies and collated by the DCLG and by the respective Devolved Administrations. The English data come from two annual surveys, the first of which is the Revenue Outturn which covers the 477 English principal local authorities (Scotland and Wales have equivalent sources). Revenue Outturn data are received from all local government bodies on a financial year basis. This covers total expenditure and income, from which gross procurement data are then derived by residual: net current expenditure, *plus* procurement receipts, *less* compensation of employees, *less* subsidies, *less* current grants. The actual data are not available until seven to nine months after the end of the financial year to which they refer, though timeliness is improving; prior to that, forecasts are used. Calendar year and quarterly data are estimated from the financial year data. Once again there are no price data and so volume data have to be produced using proxy deflators, from both the consumer prices index and producer price indices.

The product breakdown for the annual Input-Output Supply and Use Tables balancing process is derived from the second survey, the Subjective Analysis Return (SAR). This is an annual survey of a static sample of 121 of the English local authorities. The survey gives a

limited breakdown for 12 service blocks, which align closely to COFOG, which is supplemented with data from private sector equivalents to meet the requirements of the supply-use balancing process. The product breakdown for other UK countries is approximated by the English data. Other techniques adopted in practice for the supply-use process follow those for the central government processes.

Summary of problems with existing processes

Chapter 5 of the Final Report of the *Atkinson Review* contains an extensive discussion of the issues and problems with input data. These largely fall into three main areas:

- classification issues and a lack of product detail
- problems with deflators, and
- poor data timeliness and periodicity

Classification issues and a lack of product detail

The *Atkinson Report* noted that 'a key element of the processing of government expenditure data is its classification into economic and functional categories'.

The classification of government expenditure to economic categories is complex and based on underlying rules that are not straightforward to interpret. HM Treasury and/or ONS have to attempt to put the figures onto the correct basis as part of their quality assurance processes. In some instances it may be difficult to do so correctly. A specific complexity is outsourcing: when services which previously occurred in-house, such as cleaning, are contracted to private

providers, expenditure which would previously have been classified as pay should then be classified as procurement.

Certain problems have been specific to local government. In particular, the local government bodies in England, Wales and Scotland provide their information using different returns made to DCLG, the National Assembly for Wales, and the Scottish Executive. Although a lot of work has been done historically to align these returns, there are some differences in formats of economic and service splits. This gives problems with consistency when trying to reconcile the data from the four countries to derive the government expenditure figures for the whole of the UK.

Finally on classification, the *Atkinson Review* drew attention to the 'long and complex chain of communication' involved in estimating government expenditure. For central government expenditure data, the process involves over 40 central government departments, as well as HM Treasury, the Devolved Administrations and ONS. The situation is very similar for local government expenditure data.

Product detail issues have been discussed in the previous section. Apart from a few areas, most government procurement information is available only in aggregate terms and not according to the product breakdown required for supply-use balancing and accurate deflation (see below).

Problems with deflators

The lack of price information on spending by government means that various proxy deflators have to be used when compiling chained-volume data. These deflators are usually based on data from the ONS

producer price index or similar such sources. In some cases, these deflators may be good proxies. However, it is unlikely that such deflation techniques fully reflect the product composition of, nor the prices paid under, government procurement.

In 2003, the Office of Government Commerce (OGC) examined expenditure data from 36 government departments. The study found a significantly higher proportion of expenditure went on services than on goods. This split is not reflected in the proxy deflators used by ONS to deflate government procurement spending, which continue to be dominated by goods deflators. If the rate of inflation is similar in goods and services, then this is not an issue of concern. However, given the different inflation rates for goods and service prices in recent years, inappropriate price indices may distort the volume data for government procurement. More generally, the problem again partly reflects the lack of product detail. Deflation processes are more accurate if they are carried out at a more detailed product level. Moreover, even where services prices are deflated, the existing processes do not make use of ONS's experimental services producer price index (the SPPI).

Another potential problem with the use of proxy deflators is that they are based on market prices and therefore there is an underlying assumption that government departments purchase goods and services at market prices. This assumption may or may not be plausible as it is possible that government departments are able to negotiate contracts that allow purchases at discounted rates. These rates will not be picked up by official measures of market prices. However, in deflating nominal spending, it is the change in prices rather than the level of prices that is important. So, providing that these two sets of inflation rates are the same, it would not matter for this purpose if government procurement were undertaken at prices that are different from those paid by the private sector.

Data timeliness and periodicity

The *Atkinson Review* noted that 'Poor data timeliness and lack of appropriate periodicity ... mean that ONS statisticians often have to make assumptions, use forecasts or budget estimates, so as not to delay production of final figures.'

For local government bodies, data are only available on a financial year basis rather than quarterly or by calendar year. Moreover, the data are sometimes not available until long after the financial year to which they refer. Data for English

local government bodies are not normally available until several months after the end of the financial year, and data from the Devolved Administrations have an even longer lag (approximately five to six quarters after the period to which they relate). ONS therefore uses budget estimates in the long interim period, until the actual outturn data become available, which can cause large late revisions.

Proposals for improving the data

Many of the problems with the processing of central government expenditure are being addressed by the introduction of the Combined Online Information System, known as COINS, which has been developed by HM Treasury. COINS is an integrated financial information system, which has replaced the three systems (GEMS, PES and GOLD) that HM Treasury used to collect financial information data from central government departments and the Devolved Administrations. The system will enable and require departments to take responsibility for their data used in the National Accounts. Data were transferred onto COINS gradually throughout 2005/06, and COINS is now operational.

The ONS specification of requirements from COINS is enabling processing of central government data so that quarterly (and monthly) data have the same level of detail as the annual figures; COINS is also on a basis that is gross of charges rather than net. The planned further development of COINS in 2006/07 will allow the estimation of COFOG categories at the UN level 2.

The Local Authority Data Working Group is also looking at aligning classifications, the feasibility of collecting short-period data, and improving timeliness.

In addition to these improvements, the following specific initiatives for improving the quality of government procurement data have been identified:

- to continue working closely with HM Treasury on improving the financial data in general for use in the National Accounts and to consider with HM Treasury and other government departments the feasibility of extending the COINS developments to obtaining a product breakdown of government procurement (if this information can be identified by government departments – see below)
- to continue working closely with DCLG to improve the financial data in general for use in the National Accounts and

in particular the data on the product breakdown for local government procurement

- to work closely with OGC and other government departments, to identify existing management information that could be used to estimate a greater breakdown of government procurement expenditure
- to work closely with OGC, HM Treasury and other government departments to identify priorities for short-term improvements to current methods for using government procurement data in the National Accounts
- to work closely with OGC, HM Treasury and other government departments on longer-term improvements by:
 - identifying government procurement spending areas for which producer price indices or the experimental SPPI are likely to be least appropriate
 - identifying more appropriate price information for these goods and services
 - on this basis, developing a product breakdown and a set of price deflators which would be appropriate for government procurement

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FEATURE

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The launch of the Index of Services as a National Statistic

SUMMARY

The service sector, since 1970, has increased from 53 per cent of the economy to 74 per cent today. It is now by far the largest and fastest changing sector of the UK economy. This article describes the significant improvements that the Index of Services (IoS) development programme has brought to the measurement of the output of the service sector, as well as the output measure of gross domestic product. The article also plots the journey of the IoS from its launch in December 2000 as an experimental statistic to its expected reclassification on 29 March 2007 as a National Statistic.

The increasing importance of the service sector has been one of the most significant economic developments over the last 30 years. **Figure 1** shows the current breakdown of the UK economy.

This change has presented a significant challenge to the statistical system, which had developed much of its methodology and data collection to suit the measurement of production and manufacturing. This is reflected in the fact that a monthly indicator, the Index of Production (IoP), measuring the output of the production and manufacturing industries, has existed since 1948.

The UK, encouraged by the *Pickford*, *Allsopp* and *Atkinson Reviews* has, though, over the last 15 years led the way in meeting the challenge of measuring the service sector.

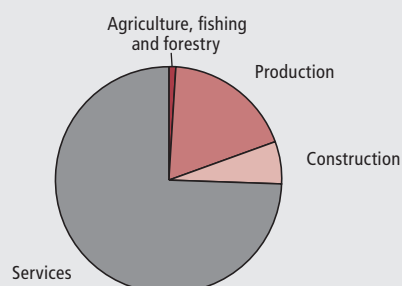
Rebalancing the priorities between the production and service sectors

In the late 1980s, the *Pickford Review* (Cabinet Office 1989) reported 'we do

not believe that the statistical recording system has adjusted adequately to changes in the structure of the economy.' Pickford recommended that there should be a review on a regular basis of the balance of statistical reporting between industries. In 1992, the 'Chancellor's Initiative' built on the conclusions of the review and a large programme of data collection for the service sector was put in place. The Index of Services (IoS) built on the outcome of these initiatives and also the improved deflators that were available from the services producer price index (SPPI) – known until November 2006 as corporate services price index (CSPI) – development programme.

Rebalancing these priorities has been a significant challenge. The measurement systems used to measure the production and service sectors are similar. It is, though, widely recognised that measuring the service sector is more complicated. The key challenge is the diversity of activity within the sector and that units of output cannot be

Figure 1
Breakdown of the UK economy: by sector



By gross value added weight

easily defined. Many services, in particular business to business services, tend to be tailored to each client's needs; this means that services have an uniqueness which makes them difficult to categorise as output units and consequently difficult to price. The manufacturing sector also produces a wide range of products; here, though, measurement is aided by the tangibility of the outputs produced (although this sector also faces measurement challenges as production processes become more specialised and fragmented).

Meeting user demands and key policy needs

Overarching the rebalancing between the production and service sectors (and the increased importance of services) was the challenge to meet the demands for monthly output indicators for services from users of economic data. These include HM Treasury, the Bank of England, the Monetary Policy Committee and the City.

Wider benefits of the development of the IoS

A large-scale development programme to improve the short-term measurement of the service sector was launched at the same time as the launch of the IoS. This programme of work has been successful and

there have been significant improvements in the last seven years, which are covered in detail later in the article. The success of this work has led to the expectation that the IoS will on 29 March 2007 be reclassified from experimental to National Statistic status.

The benefits of the IoS programme, though, go wider. The measurement of the service sector element of the output measure of GDP (GDP(O)) has also significantly improved, as IoS and GDP(O) share the same data sources. The links between the IoS and GDP(O) go even further in that the quarterly path of the IoS is constrained to be equal to the services component of GDP(O).

The improvement in GDP(O) is not only in terms of the methods used but also in the data content of the preliminary estimate of GDP(O), released around 25 days after the quarter. Before the launch of the IoS, 40 per cent of the service sector element of GDP(O) was based on a survey response of around 20 per cent. The launch of the IoS has led to the first two months of the quarter now being based on a response of over 80 per cent and the third month being based on a response of 20 per cent. The quarter as a whole can be derived as a weighted average, and a 60 per cent response is now achieved for the quarter (Skipper, 2005).

The UK is now viewed as a world leader in the short-term measurement of the service sector; indeed the UK is still the only country in the world to produce a monthly indicator for the whole of the service sector based mostly on internationally accepted methodologies. The UK has also played a large role in the drafting of an Organisation of Economic Co-operation and Development Index of Services Production Handbook.

Achievements since launch

Since the initial article, which described the launch of the IoS and set out the future work programme (Pike and Reed, 2000), a number of development projects have been taken forward. These have been described in three subsequent articles: Pike and Drew (2002), Drew and Morgan (2003) and Drew and Morgan (2005). Each of these articles reported the progress made along the development programme.

This article will now focus on the developments in the following areas:

- improvements made to data sources and methods
- improvements to seasonal adjustment
- improvements to data periodicity
- increases to the level of detail at which the IoS is published

Box 1
International guidance on price and volume

The development programme followed the guidance and recommendations made in the 'Handbook on price and volume measures in national accounts' (Eurostat 2001). In this handbook, methods are graded into one of three groups:

For the market sector, an A method would typically be output deflated by a price index that exhibits the following criteria:

- completeness of the coverage for the product
- valued on the correct basis (for market output this is basic prices)
- take quality changes into account
- is conceptually consistent with national accounts.

B methods do not generally respect all four of the criteria for A methods, and would include the use of direct detailed volume output indicators. C methods are where indicators fall a long way short of respecting the four criteria, and in practice include direct volume indicators

which are not detailed; input methods; secondary indicators; and general price indices. For non-market output, where prices are not charged, direct volume measures of either inputs or the outputs are the only options. In broad terms, output measures that meet the criteria above are at least acceptable for individual services (such as health and education), and input methods are classed as C methods, whereas for collective services (such as defence and prisons), input methods are accepted methods.

It is worth noting that the handbook is aimed at methods used in annual indicators, and while the same standards apply to quarterly and monthly data, 'this will undoubtedly mean that more B, and perhaps even C, methods will need to be employed, but this reflects the practical difficulties with deriving intra-annual data' (Eurostat 2001). It is also worth noting that the ratings applied within this article are derived by the authors and are not based on any independent assessment.

A methods	Most appropriate methods	A methods are the methods that approximate the ideal as closely as possible
B methods	Those methods which can be used in case an A method cannot be applied	B methods are acceptable alternatives: they are further away from the ideal but still provide an acceptable approximation
C methods	Those methods which shall not be used	C methods are too far away from the ideal to be acceptable. They would generate too great a bias or would simply measure the wrong thing

- improvements to the timeliness of the IoS publication

Finally, the article describes the journey the IoS has taken from experimental to National Statistic status.

Improved data sources and methods

Position in December 2000

Prior to the development programme, just under half of the methods, by gross value added (GVA) weight, used in both the IoS and GDP(O) were rated as being conceptually appropriate (see **Box 1**). The main area of weakness was in the business services and finance component of the IoS (see **Figure 2**). The predominant indicator in this component is turnover, but the lack of specific price indices led to the high proportion of 'unacceptable' ratings.

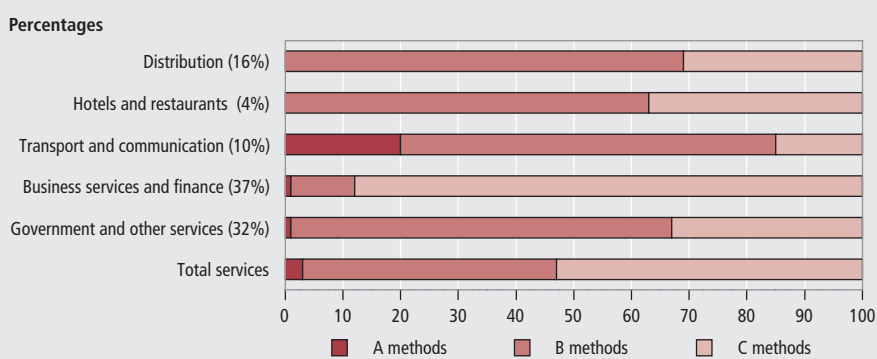
Current position

In terms of conceptual appropriateness, the proportion of acceptable methods has increased from 46 to 80 per cent. Across the main IoS components, **Figure 3** shows that nearly all the methods used in distribution, hotels and restaurants and transport and communication are now based on at least acceptable methods. Government and other services have seen a moderate increase, due mainly to the fact that one of the major components, the public sector, has always been based on acceptable methods. Improvements to concepts have been seen in areas such as recreation, private sector education and other service activities.

While big improvements have been made to the conceptual appropriateness of the indicators in the business services and finance component (from 12 to 62 per cent), the shortage of appropriate service sector price indices is the main challenge to further improvement.

Figure 2

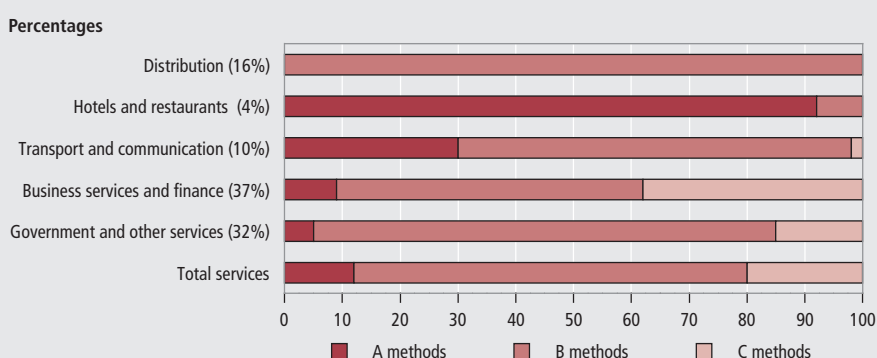
Conceptual appropriateness of IoS and main components, 2000



GVA weights in parentheses

Figure 3

Conceptual appropriateness of IoS and main components, 2007



GVA weights in parentheses

How was this improvement made?

In order to capitalise on the previous investments made by the Office for National Statistics (ONS) in measuring service sector activity, the development programme was split into a series of industry reviews (see **Box 2**).

Since early 2001, 30 industry reviews have been conducted and implemented in the National Accounts; **Table 1** shows the number of reviews implemented at each Blue Book.

All industry reviews have been fully documented and reports for each review

can be found on the National Statistics website (see link at the end of this article).

The reviews focused on three main areas:

- Indicator improvements
- Prices improvements, and
- Public sector indicator improvements

Indicator improvements

Through this review programme, progressively more ONS monthly turnover inquiry series (MIDSS – Monthly Inquiry

Box 2

Industry reviews

The development programme was broadly split into a series of work packages and focused on:

- indicator developments – essentially reviews of data sources, and methods developments
- reviews of concepts and statistical methodology

These developments were undertaken through an industry-by-industry review of the service sector industries – known as industry reviews.

Each review made a full assessment of the current indicators and reviewed them against the recommended methods set out in international guidance (see **Box 1**). Once this was understood, the review team consulted with colleagues within ONS, in other government departments and with recognised experts, in order to evaluate data availability and seek advice on output approaches. Potential data sources were then evaluated and recommendations then submitted for peer group appraisal. All new methods have been assessed through the national accounts quality assurance process, as set out in Robinson (2006).

Box 3**Monthly survey of service sector turnover**

The MIDSS turnover data covers 53 per cent (in terms of GVA) of the IoS; this makes this survey IoS's largest single data source. Of this MIDSS total, the IoS currently uses 92 per cent of these series (again by GVA).

The survey collects turnover data every month and employment data every quarter. It is a sample-based survey of 25,000 businesses in Great Britain; employment data, though, is collected from only 17,000 of the 25,000 businesses. Businesses return data around one week after the end of the reference period, for example, data for March will be returned by around 7 April.

The sample of businesses is selected from the ONS Inter-Departmental Business Register (IDBR). The IDBR consists of all businesses within the UK that are either registered for value added tax or have a Pay As You Earn scheme; businesses on the IDBR account for 99 per cent of UK economic activity.

The sample is designed so that all large businesses (with 100 or more employees) are always included. To reduce the burden on business though, only a small proportion of medium-sized (10 to 99 employees) and small (less than 10 employees) businesses are selected, and these types of business tend to remain in the sample for no more than two years. The sample covers 3 per cent of businesses within the service sector industries covered by MIDSS; this equates to 58 per cent of the industries' turnover and 53 per cent of employment.

A response rate of over 80 per cent is achieved for the industries in terms of both the number of businesses selected and also in the coverage of total value of turnover.

The MIDSS sample size is almost three times as large as the equivalent survey for manufacturing, the monthly production inquiry (MPI), reflecting the relative importance of each sector to aggregate activity. In terms of sampling frame, response rates and the timing of data collection, the MPI is, though, very similar.

Table 1**Industry review implementation: by Blue Book**

Date implemented	BB2002	BB2003	BB2004	BB2005	BB2006
Number of reviews	2	5	7	8	8
Cumulative number of reviews	2	7	14	22	30
Percentage of IoS covered	82	22	25	20	13
Cumulative percentage of IoS covered	8	30	55	75	88

into Distribution and Service Sectors – See **Box 3**) have been introduced to the IoS. In 2000, around two thirds of the survey fed into the IoS; currently, the figure is 97 per cent. In terms of MIDSS usage by GVA weight, this represents an increase from 82 to 92 per cent. There are four industries where MIDSS are collected and not currently used, but it is envisaged that at least three of these four series will be taken on in the near future.

Prices improvements

The improvement and refinement of service sector deflation is in many cases the only path to moving from conceptually 'unacceptable' to 'acceptable' methods. Hence the IoS development programme has worked in close tandem with the ongoing development of SPPIs (see **Box 4**).

When the IoS development programme had started, only eight SPPIs were being used in IoS and GDP(O). This has since increased to 22 SPPIs being used as direct deflators, with a number of others being used as proxy deflators.

As Tily (2006) sets out, there are three main approaches to deflation:

- services sold direct to consumers use components of the monthly consumer prices index
- services sold to other companies use:
 - quarterly SPPIs
 - where SPPIs are not available or applicable, various proxy measures based on earnings and (often aggregate) consumer prices

Table 2 shows the main methods of deflation in the IoS.

Table 2**Methods of deflation in the IoS**

Deflator	Percentage	Excluding volume percentage
SPPI	11	20
RPI	24	41
PPI	6	10
AEI/RPI	14	23
Direct volume	42	
Other	3	5

Table 2 shows that SPPIs and RPIs (the appropriate deflators for household and non-household output) are used for 35 per cent of

the IoS. After discounting the 42 per cent of the IoS that is not deflated, as direct volume measures are used, 61 per cent of the service sector is covered by preferred approaches.

Producer price indices (PPIs) of underlying goods are used (and are an accepted method) to deflate wholesale and rental output in the absence of the preferred deflators.

Where no appropriate deflators are available, the approach adopted in the IoS is to use a combined average earnings index (AEI)/retail prices index (RPI) deflator, which reflects the movements in service sector wages relevant to the industries in question and the general price movements of households. This approach is used for 14 per cent of the service sector.

Public sector indicators improvements

It was an original stated aim of this review programme to improve the indicators used to measure the output of public sector methods. However, this element of the work programme was overtaken by the Atkinson Review (Atkinson, 2005) and the work of the subsequently formed UK Centre for the Measurement of Government Activity (UKCeMGA). The IoS development team have worked with colleagues in UKCeMGA and introduced methods that have been subsequently passed through the national accounts quality assurance process.

Outstanding areas

While much progress has been made in improving data sources and methods, there are still areas of development required:

Box 4**Services producer price index**

SPPIs have been developed since 1994. At present, 33 indices corresponding to 33 of the 60 SIC classes regarded as services provided to businesses are published each quarter. These measures are based on prices for 4,400 products and drawn from 1,300 firms across the UK.

Results are published nine weeks after the end of the reference period. Of the 33 SPPIs that are published, 22 are used

in the deflation of IoS and GDP(O). SPPIs are published on a quarterly basis and in order to be used as a monthly deflator, the series are interpolated using a cubic spline. Full details of this function are available as part of the IoS Methodology on the National Statistics website. A full breakdown of which SPPIs are published and how these are used can be found in Drew and Morgan (2005).

- SPPI coverage – as Box 4 details, SPPIs cover 33 out of the 60 potential products; further development is essential for the further improvement of the conceptual quality of the IoS
- timeliness – while many of the ONS data sources are available in time for the first publication of IoS, the timeliness of non-ONS data sources is an area where improvements will be sought
- MIDSS coverage – industry review work has identified a number of industries where the MIDSS survey could be extended

Seasonal adjustment**Position in December 2000**

The IoS was based on 39 per cent monthly data in December 2000. However, the time series for most of these data were too short to allow a robust and reliable seasonal adjustment. The IoS data, therefore, was seasonally adjusted monthly but then benchmarked to the equivalent quarterly GDP(O) data. This was a sensible approach until the IoS monthly data matured and became established; it did, though, mean month-on-month movements in the monthly data had the potential to be lost.

Current situation

The IoS is now based on 57 per cent monthly data. Almost three-quarters of these data are now seasonally adjusted monthly and are no longer benchmarked to quarterly GDP(O). Instead, the GDP(O) quarter is formed by an average of the seasonally adjusted months. The time series of the remaining 25 per cent of monthly data are still too short to be seasonally adjusted monthly. In time we expect all these data to be seasonally adjusted monthly.

How was this improvement made?

ONS's experts in time series now conduct the routine annual seasonal adjustment reviews for IoS and quarterly GDP(O) as joint exercises and recommend the optimum seasonal adjustment.

The seasonal adjustment method used in the IoS is now much closer to that used in the IoP. In the production and manufacturing industries, the GDP(O) quarter is formed by an average of the seasonally adjusted months.

Improvements to periodicity
Position in December 2000

As mentioned previously, when the development programme began, just under 40 per cent of the indicators being used were based on monthly data by GVA weight. The distribution of this was not equal across the service sector. While distribution, and hotels and restaurants were predominantly monthly, transport and communication was based on 80 per cent

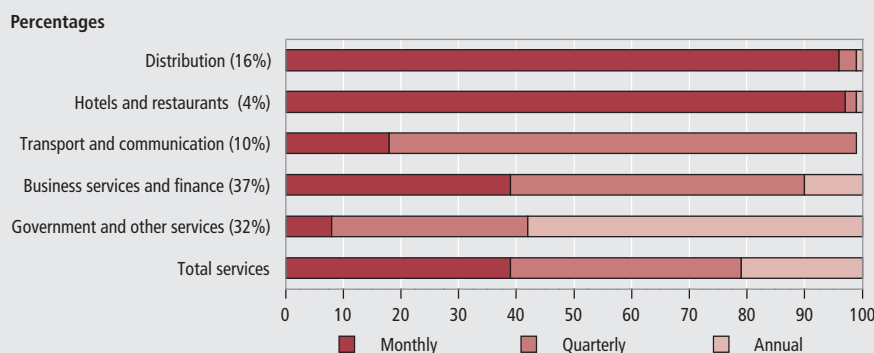
quarterly data, over half of business services and finance was based on quarterly data and over half of the data in government and other services was annual.

Current position

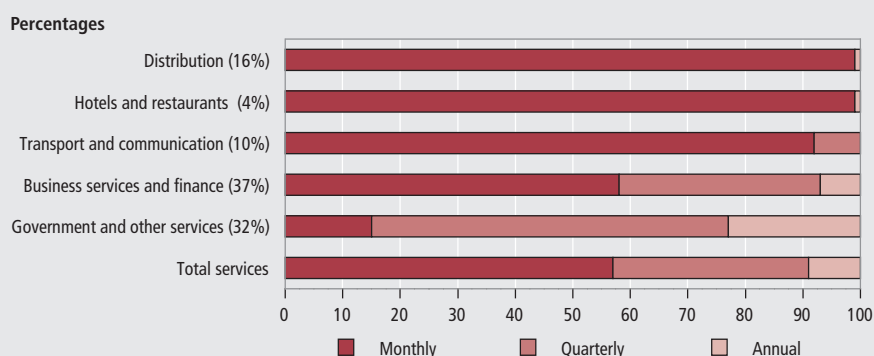
As at the last Blue Book in 2006, almost 60 per cent of the IoS is based on pure monthly data. The biggest improvements have been made in the transport and communication section. **Figure 4** and **Figure 5** illustrate the change in periodicity since 2000.

How was this improvement made?

One of the other main objectives of the industry review programme has been to improve the periodicity of the indicators used in the IoS and GDP(O), that is, to

Figure 4**Periodicity of IoS and main components, 2000**

GVA weights in parentheses

Figure 5**Periodicity of IoS and main components, 2007**

GVA weights in parentheses

move away from quarterly and annual indicators wherever possible in favour of monthly data.

Improvements to periodicity have been made through sourcing new data sources that are available on a monthly basis (such as postal and air transport data), but the bulk of the increase has been through taking on more MIDSS data and using this on a monthly basis. As previous articles have explained, most service sector industries used to be only collected on a quarterly basis.

One of the first areas tackled through the IoS project was to move all MIDSS turnover data collection to monthly collection. This was done in two phases: the first in 2000 moved all forms that were used in IoS and GDP(O) at that time to monthly, and a year later the remainder were moved. One issue of changing to monthly collection is that a proportion of these data still needed to be summed to quarters for seasonal adjustment purposes (monthly data were then produced by interpolating a monthly path through the quarterly data), as seasonal adjustment requires a long run of monthly data in order to effectively seasonally adjust on a monthly basis. For this reason, it was not until Blue Book 2006 that all MIDSS were finally passed as being fit for monthly seasonal adjustment, and in effect useable as monthly indicators. Up until that point, MIDSS series being summed to quarters were still regarded for the purpose of evaluation as quarterly indicators, even though they were based on a monthly survey.

In terms of further progress in improving the level of monthly data, the main shortfall can be found in the government and other services section. This is due to the supply of non-market data. The breakdown of periodicity between market and non-market shows that 70 per cent of market sector data is available on a monthly basis, whereas for the non-market sector there are no series available on a monthly basis. However, it is worth noting that, when the IoS development programme started, 83 per cent of the indicators used for non-market were available only annually, whereas now non-market is made up of 70 per cent quarterly data. In many cases quarterly data collection may suffice for the non-market.

Level of detail published in the IoS

Position in December 2000

In December 2000 headline IoS and the following five high level components were published:

Table 3

Level of detail currently published in the IoS

Published			Not published		
SIC Division	Description	Weight within IoS	SIC Division	Description	Weight within IoS
50	Motor trades	2.8	61	Water transport	0.4
51	Wholesale trades	5.9	66	Insurance and pension funding	2.2
52	Retail trade	7.7	67	Activities auxiliary to financial intermediation	1.4
55	Hotels and restaurants	4.2	71	Renting of machinery and equipment	1.5
60	Land transport	2.9	73	Research and development	0.6
62	Air transport	0.8			
63	Supporting and auxiliary transport activities	2.4			
64	Post and telecommunications	4.0			
65	Financial intermediation	7.0			
6x	Financial services adjustment	-6.2			
70	Real estate activities	3.4			
79	Letting of dwellings	10.6			
72	Computer and related activities	3.9			
74	Other business activities	12.9			
75	Public administration and defence	7.0			
80	Education	7.9			
85	Health and social work	9.6			
90	Sewage and refuse disposal	0.9			
91	Activities of membership organisations nec	0.8			
92	Recreational, cultural and sporting activities	3.9			
93	Other service activities	0.8			
95	Private households with employed persons	0.7			
Total		93.9			6.1

- distribution
- hotels and restaurants
- transport, storage and communication
- business services and finance, and
- government and other services

Current position

The level of detail, from the September 2005 IoS release, was significantly expanded to include 22 of the 27 service sector divisions. These 22 divisions equate to 94 per cent of the service sector (Table 3 provides further details). Users now have available a far greater breakdown of the service sector; this significantly improves their ability to analyse and understand this ever-increasing important sector of the economy.

The IoS development programme also delivered a further improvement to the data available to users. Divisional level data are now first published one month earlier in the quarterly GDP releases, in the UK Output, Income and Expenditure First Release rather than the Quarterly National Accounts First Release.

How was this improvement made?

A range of analyses were conducted to assess if the divisions were of suitable quality to be published. The analyses included:

- data content – what proportion of the division was based on actual data rather than forecasts when it was first published
- revisions performance – the average revision, absolute average revision and mean relative absolute revision were calculated for each division. This helped reach a conclusion whether publishing the data would prove helpful to users (for example, data could be used with the knowledge that the numbers were unlikely to be revised significantly). The results were also compared against equivalent data that are published as part of the IoP; this was done to better understand the quality of data already available to users
- volatility – the stability of the each division was assessed by calculating the ratio of the irregular and trend components

A key criterion that informed the final decisions was a comparison of the performance between the IoS data and those data that were already considered to be of suitable quality to be published within the IoP (an already established National Statistic).

IoS: the journey from experimental to National Statistic status

Position in December 2000

The IoS was launched in December 2000; the headline IoS and all components within the index were classified as experimental statistics. The main reason for the experimental label was the large-scale development programme that began at the same time as the IoS launch. This programme of work was expected to significantly improve the short-term measurement of the output of the service sector; a key element of the rationale for why statistics are classified as experimental is that they are in the testing phase and are not yet fully developed.

Current position

The headline IoS is expected to become a National Statistic on 29 March 2007. This is in recognition of the significant improvements that have been made in the short-term measurement of the output of the service sector. Over 80 per cent (including four of the five high level components) of the IoS is now classified as a National Statistic. **Table 4** provides a breakdown of total IoS between those industries that are classified as National Statistics and those that are still experimental.

How was this improvement made?

The IoS was subject to a trailblazing and robust evaluation process that has helped establish a benchmark for the development of other statistics in ONS. The process is summarised below in five main headings.

Improved methods in the measurement of the output of the service sector

The first step was to identify and implement improved methods to measure the service sector. These improvements were delivered via the industry review programme explained earlier in this article.

Creation of a quality assurance team

A quality assurance team from ONS's methodology directorate was created. The team comprised experts in index numbers, prices and deflation, time series and sample design and estimation.

Documentation and performance of methods used

The methods and the data sources used to measure each industry were fully documented and the performance of the methods was analysed by the IoS team. Topics and analyses covered included:

- conceptual appropriateness of the data sources and methods used; this included an assessment against international guidelines
- coverage of the data sources
- response rates
- data content at first publication
- contribution to key estimates from imputed values
- revisions performance
- are the statistical methods sufficiently robust to suit the circumstances material to their use, for example, robustness of computer system and data quality assurance procedures

- speed of publication compared with reference period being published
- user feedback on usefulness and credibility of the statistics produced

Review of documentation and performance of methods

The quality assurance team reviewed this information and then made a decision. This was often following further discussion with the IoS team regarding requests for further information or clarification on certain issues.

Reclassification in the IoS release of an industry and/or high level component to National Statistic status

The IoS release was updated as soon as possible to reflect a decision made on the appropriateness of an industry or high-level component to be reclassified to National Statistic status. Users were therefore kept fully up to date on the National Statistic content of the IoS.

Improving the timeliness of the publication of the IoS

Position in December 2000

The IoS was published around 15 weeks after the end of the month to which it related – at the IoS launch in December 2000, data for August 2000 were first published.

Current position

The publication of the IoS has been speeded up by seven weeks. The IoS is now published around eight weeks after the end of the month to which it relates and is a leading indicator every one month in three (in March, June, September and December), when data are published for one month beyond the current GDP quarter. For example, on 28 March 2007, the Quarterly National Accounts First Release will publish the third estimate for Q4 2006 GDP; the IoS First Release on 29 March will publish data for January 2007.

How was this improvement made?

Speeding up the IoS has mainly been achieved by improving the efficiency in three aspects of operational procedures – the quality assurance of data, index compilation via a quicker production system and the production and dissemination of the IoS release. There has been minimal impact on the availability of source data.

Conclusion

This article marks the conclusion of a very successful development programme which has met the aims that were set out at the

Table 4
Total IoS: breakdown of National Statistics by division

National Statistic			Experimental		
SIC Division	Description	Weight within IoS	SIC Division	Description	Weight within IoS
50	Motor trades	2.8	61	Water transport	0.4
51	Wholesale trades	5.9	65	Financial intermediation	7.0
52	Retail trade	7.7	66	Insurance and pension funding	2.2
55	Hotels and restaurants	4.2	67	Activities auxiliary to financial intermediation	1.4
60	Land transport	2.9	6x	Financial services adjustment	-6.2
62	Air transport	0.8	70	Real estate activities	3.4
63	Supporting and auxiliary transport activities	2.4	71	Renting of machinery and equipment	1.5
64	Post and telecommunications	4.0	72	Computer and related activities	3.9
74	Other business activities	12.9	73	Research and development	0.6
79	Letting of dwellings	10.6	85 (pt)	Health and social work: private sector	2.1
75	Public administration and defence	7.0	91	Activities of membership organisations nec	0.8
80	Education	7.9	92 (pt)	Recreational, cultural and sporting activities: radio and TV, and betting and gaming	1.6
85 (pt)	Health and social work: public sector	7.5	95	Private households with employed persons	0.7
90	Sewage and refuse disposal	0.9			
92 (pt)	Recreational, cultural and sporting activities: excluding radio and TV, and betting and gaming	2.3			
93	Other service activities	0.8			
Total		80.6			19.4

end of 2000. An exhaustive development programme has seen:

- the conceptual quality of the indicators almost double
- the proportion of monthly data reach almost 60 per cent
- the increased use of ONS survey data
- an increase in industrial detail that is published
- the speeding up of the publication of the IoS
- the IoS being a leading economic indicator for every one month in three

With the dropping of the experimental status of the IoS, users now have monthly indicators for 93 per cent of the economy. As part of the re-engineering of the National Accounts (see Aldin and Tuke, 2004), a monthly estimate of GDP will be produced which will bring together the IoS, IoP and GDP(O) systems into one integrated system. As well as being a leading indicator in its own right, the system will also be a key provider of output and deflators for central systems in the National Accounts and in particular the proposed quarterly supply and use system.

ONS will continue developing service sector data sources and methods as part of the wider methods developments for re-engineering the National Accounts.

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IoS Industry Review Reports are available at www.statistics.gov.uk/iosmethodology/future_improvements.asp

IoS Methodology is available at www.statistics.gov.uk/iosmethodology

FEATURE

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Market sector GVA productivity measures

SUMMARY

Measurement of the market sector is becoming increasingly important to policymakers. In response to user demand, this article introduces two new experimental series measuring the productivity of the market sector. Both series utilise the experimental market sector gross value added (GVA) series and employment data. Analysis of the market sector per worker series suggests that, while the series follows the same trends as the whole economy GVA per worker measure, it generally records higher rates of growth especially during periods of high economic growth. The market sector GVA per hour series currently has a short time series, so only limited conclusions can be drawn. However, it does closely follow the whole economy measure of productivity per hour.

In 2005 the Office for National Statistics (ONS) began publishing a market sector gross value added (GVA) series, following a joint project with the Bank of England. It measures the contribution of the market sector to economic activity and is published quarterly in a seasonally adjusted, chained volume index.

The publication of a market sector GVA series has enabled the calculation of labour productivity measures for the market sector. This article introduces two new experimental labour productivity measures for the market sector, namely market sector GVA per worker and market sector GVA per hour.

The article gives a definition of the market sector and then examines the user requirement for market sector GVA productivity data. The market sector GVA per worker and market sector GVA per hour series are then illustrated, movements in the series are analysed and comparisons are made with the whole economy measures of productivity. The final sections discuss non-market productivity, future developments for the market sector GVA productivity series and conclusions.

The market sector

It is important to understand the definition of market activity and market output before looking at the two new productivity measures.

Market output is defined in *National Accounts Concepts, Sources and Methods* as output that is sold at prices that are economically significant or otherwise disposed of on the market or intended for

sale or disposal on the market. Market activity is defined in a similar way.

ONS market sector productivity measures are based on the National Accounts definition of the market sector. The market sector GVA measure includes almost all market activity and excludes most non-market activity, in particular that of general government. The measure includes the output of public corporations (for example British Nuclear Fuels). Rental income received from housing is included as this is a market activity.

Data limitations mean there are some differences compared with the National Accounts definition:

- the value added of non-profit making institutions serving households (NPISH) such as charities cannot be excluded. NPISH should not be included according to the National Accounts definition
- although some parts of general government value added are marketed (for example the sale of hard copies of *Economic & Labour Market Review* by ONS) it is all treated as non-market activity and therefore not included in the measure

Market sector gross value added (GVA)

GVA measures the contribution to the economy of each individual producer, industry or sector in the UK (*Guide to Gross Value Added*). It differs from GDP at market prices because it is constructed net of taxes and subsidies.

Market sector GVA is calculated using existing GVA data from the production measure of GDP and measures the contribution of the market sector to economic activity. The series is published quarterly as a seasonally adjusted, chained volume index.

For further information on market sector GVA, users should refer to Herbert and Pike (2005).

Market sector GVA productivity – a user's perspective

In recent years the Bank of England (BoE) has placed an increased emphasis on market sector data. In an article published by them (Hills *et al* (2005)), there is a discussion of how it may be inappropriate to use a whole economy measure of GDP when assessing aggregate demand pressures. It is argued that, as the consumer prices index (CPI) and other price indices are based almost exclusively on prices from the private sector, the level of CPI inflation will reflect the balance of demand and supply pressures on the market sector of the economy.

As a result of this, the BoE now analyses movements in market sector output and productivity in their Inflation Report. For example, in the *November 2006 Inflation Report*, it uses a measure of market sector output to help assess movements in the spare capacity of businesses. The balance of demand and supply pressures on the market sector of the economy is a key concept in the Bank's Quarterly Model.

'The concept of output most applicable to the model's production function is the (value-added) output of private sector firms. And the principle inputs into the production function should, correspondingly, be private sector hours worked and the private sector capital stock.'

To facilitate its analysis, the Bank has constructed a measure of market sector GVA built from the expenditure side of the National Accounts, as it helps decompose aggregate demand pressures on the market sector into the different components of spending. This measure conforms closely to the ONS market sector GVA measure built from the output side. A Quarterly Bulletin article (Churm *et al*) discusses how the Bank uses information from both the expenditure-based and output-based estimates in its analysis of demand pressures of the economy.

In the 2005 *Budget Report*, HM Treasury (HMT) discussed the use of market sector productivity to estimate the output gap and trend output.

'The output gap should measure fluctuations in activity arising from the business cycle, and as such it should be determined by factors affecting the behaviour of only the private or market sector of the economy.'

At present, to produce trend-output growth estimates, HMT uses productivity estimates for the whole economy in terms of output per hour. If a decision is made to start measuring the output gap and trend growth in terms of the market sector, HMT would need to use the market sector GVA per hour series – at present this option is being kept under review.

'The Treasury will keep under review the issue of whether to switch to a market sector-based approach to estimating the output gap and trend growth.'

Market sector productivity figures are also helpful in making international comparisons of productivity, especially with the US, as they do not publish a whole economy measure of productivity. Instead, they publish an output per hour series for what are described as the 'business' and 'non-farm business' sectors.

The *OECD Compendium of Productivity Indicators 2006* publication also reiterates the importance of market sector productivity because it ultimately determines the development of an economy's potential output and its tax base. The Organisation for Economic Co-operation and Development's (OECD) preferred measure is market sector productivity per hour.

'...labour input for an industry is most appropriately measured as the number of hours actually worked.'

In summary, market sector productivity measures are increasingly regarded as important by policymakers. These measures also enable international productivity comparisons to be made and could be used in the future as part of HMT's assessment of the output gap and trend output.

Productivity measures published by ONS

ONS currently publishes productivity measures in the *Productivity First Release*. Published measures include:

- whole economy productivity: output per worker, output per job, output per hour and unit wage costs
- output per job and output per hour worked are split into total production industries, total manufacturing and

a further (more detailed) split of manufacturing

- productivity measures are also published by region

Experimental estimates of service sector productivity are also published in the form of output per job and output per hour worked. These series will be incorporated in the *Productivity First Release* during 2007.

This article is the first time ONS has published experimental estimates of market sector productivity. Both market sector measures will be published on a quarterly basis, with the intention of incorporating these measures in the *Productivity First Release* in the future.

Market sector gross value added per worker

Market sector GVA per worker is a quarterly series calculated using the experimental market sector GVA series and an index of market sector workers, where SA denotes a seasonally adjusted estimate.

$$\text{SA Market sector GVA per worker} = \frac{\text{SA market sector GVA}}{\text{SA index of market sector workers}}$$

The index of market sector workers is defined as follows:

Market sector workers = LFS workers - public sector workers + public corporation workers

The seasonally adjusted estimates for the market sector GVA per worker time series are derived as the ratio of two seasonally adjusted estimates (SA index of market sector GVA and SA index of market sector workers). This is known as indirect seasonal adjustment, where the components of the series of interest are individually directly seasonally adjusted.

The LFS workers figure is calculated from the Labour Force Survey (LFS). The LFS is a household survey; it covers 53,000 households in the UK every three months. The LFS workers figure uses data from the LFS survey to calculate the number of workers in employment in the UK aged 16 and over.

Public sector workers are defined as people who are employed in central government, local government and public corporations. Data are collected from public sector organisations via the ONS *Quarterly Public Sector Employees Survey* and other sources.

Public corporations are defined in *National Accounts Concepts, Sources and Methods* as corporate enterprises which are

publicly owned and controlled but which have a substantial degree of independence to conduct their day-to-day business. Examples of public corporations are British Nuclear Fuels, the BBC and Ordnance Survey.

For more information on labour market statistics, refer to the *Labour Market First Release*.

Market sector GVA productivity growth rates can be calculated in the form of quarter on quarter and quarter on the same quarter a year earlier. In practice, the quarterly growth rate is volatile; this is partly due to lags between output and employment. These lags exist as it takes time for employers to change their employment levels in response to changes in output. In particular, employers would need to determine whether a change in output is permanent or temporary before making employment decisions. The annual rate is probably a better guide to movements in market sector productivity, although this is still affected by cyclical lags. **Figure 1** shows, for market sector GVA per worker, the quarter on quarter and quarter on the same quarter a year earlier growth rates. In the latest quarter (Q3 2006), the quarter on quarter growth rate is 0.5 per cent and the quarter on the same quarter a year earlier growth rate is 2.6 per cent.

As would be expected, movements in the growth rate of the market sector productivity per worker series correspond with events in the UK economy as a whole. The bullet points below compare the performance of the UK economy with the market sector GVA per worker using quarter on the same quarter a year earlier growth rates.

- During 1991 and 1992 the UK economy was in recession. The housing market crashed and many households found they were in a situation of negative equity due to the high interest rates

- On 15 September 1992 the Government announced that the UK was leaving the ERM. This enabled the Government to lower interest rates and aided the economic recovery
- The recovery continued in 1993 and led to strong economic growth. During 1994 there were very high levels of market sector productivity growth due to strong market sector output growth. In 1995 market sector productivity declined as market sector employment growth picked up. In Q4 1995 there was a sharp fall in market sector productivity. This was due to a fall in market sector output compared with Q4 1994, and high levels of employment growth. Growth in market sector productivity then increased until early 1997, when high levels of market sector employment growth lowered productivity
- During 1998 and 1999 economic growth continued. Market sector productivity also had a high average growth rate
- In 2000 there was strong activity in the UK economy which was reflected in the high market sector GVA per worker growth rate
- In 2001 the slowdown of the global economy caused UK economic growth to fall. The market sector GVA per worker growth rate also fell
- During 2002 the slower growth of the UK economy continued; there was also uncertainty surrounding the Middle East and oil prices. The growth rate for market sector GVA per worker continued to be low
- There was an increase in global demand in 2003. Economic growth in the UK increased, with significant rises in private consumption and business investment. The market sector GVA per worker growth rate increased sharply towards the end of the year

- In 2004 world growth was at its strongest for three decades. In the UK, GDP was expanding at its fastest rate for four years. Growth in market sector productivity reached a peak in Q2 and then began to decline
- For most of 2005 the UK economy was affected by a sustained rise in oil prices, weak economic growth in the euro area and a depressed housing market. Towards the end of the year, UK economic growth began to pick up. Growth in market sector GVA per worker showed the same pattern, with a fall in the rate of growth at the beginning of the year and an increase in Q4
- Market sector productivity growth continued to increase during 2006

Comparison of whole economy productivity and market sector productivity measures

The publication of market sector productivity measures allows the comparison of market sector and whole economy productivity. As the market sector GVA per worker series has the longer time series (Q2 1992 to Q3 2006), it is the most appropriate market sector productivity series to use; this is shown in **Figure 2**.

As can be seen in Figure 2, between Q2 and Q4 1993, the recession had a greater impact on market sector productivity than whole economy productivity. From Q1 1994 onwards the market sector growth rates are at least as high as those for the whole economy; during some periods, for example, Q1 1998 to Q2 2001, the growth rate for the market sector is considerably higher. In general, market sector productivity rates tend to be higher than the productivity implied by non-market sector measures of output and employment (see later section for discussion of non-market productivity).

Productivity can be broken down into its components: output and employment. The following graphs compare the growth rates of these components for the whole economy and the market sector.

The growth in output (in terms of GVA) for the whole economy and the market sector are shown in **Figure 3**. The two series follow a similar path over the time period. This is unsurprising, as market sector GVA represents 89 per cent of whole economy GVA (Table 11.27 *UK Input-Output Analysis*, 2006 edition). Market sector GVA is slightly more cyclical compared with whole economy GVA, illustrated by the higher peaks and lower troughs, and with higher rates of growth during periods

Figure 1
Market sector GVA per worker

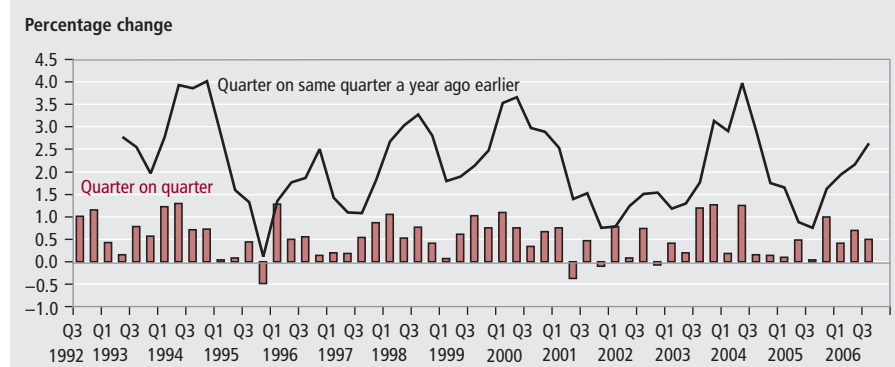


Figure 2
Whole economy and market sector productivity per worker

Percentage change, quarter on same quarter a year earlier

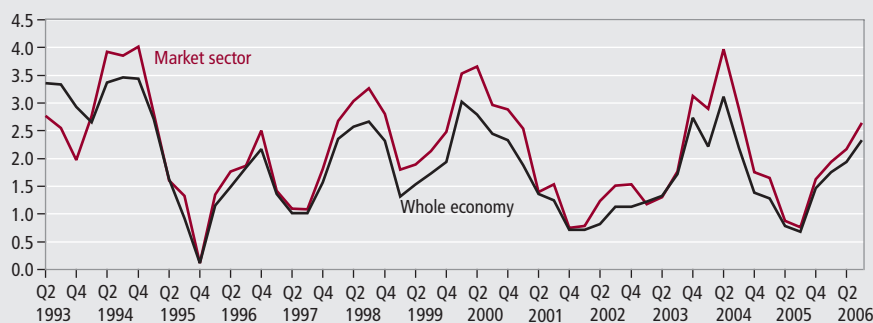
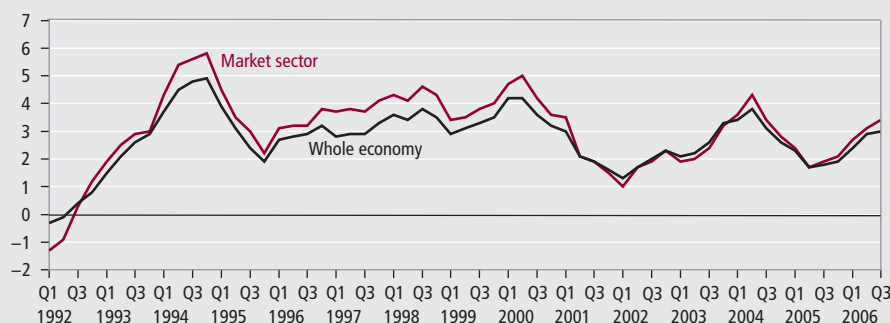


Figure 3
Whole economy and market sector output

Percentage change, quarter on same quarter a year earlier



of high growth (roughly 2000 and 2004). This is because demand for private sector products is more cyclical than government demand.

While the differences between the series are not large, in conjunction with the employment data below, they explain the extent of the divergence between market and whole economy productivity measures in Figure 2. The time series can be split into four periods:

- Q1 1993 to Q1 2001: the recovery and subsequent strong economic growth was led by the market sector
- Q2 2001 to Q4 2002: growth slowed and market sector measure coincided with the whole economy measure
- Q1 2003 to Q3 2003: whole economy output outstripped market sector output as government output grew more quickly, and
- Q4 2003 to Q3 2005: stronger economic growth was again driven by the market sector

Most straightforwardly, the periods when growth is highest correspond with the periods of highest market sector productivity and when the gaps between market and whole economy productivity are largest.

Figure 4 compares the rate of growth in employment for the whole economy and the market sector.

The same periods can be analysed as above. In the periods of higher market sector output growth, employment growth is also driven primarily by the market sector, for example, between Q4 1993 and Q4 1999. However, in the period of slower economic growth from Q2 2001 to Q4 2002, whole economy employment growth tended to outstrip market sector employment growth as the government sector became more important to activity as a whole. In

such a period, whole economy productivity is dominated by the government sector. Finally, over the period Q1 2003 to Q3 2003, non-market sector employment growth accelerated, causing whole economy employment growth to be greater than that for the market sector. Therefore the gap between market sector and whole economy productivity narrowed again.

Between Q4 2000 and Q2 2005, employment growth has been greater in the whole economy than in the market sector. The difference between the two employment measures is the inclusion of public sector employment in the whole economy measure. Between 1999 and 2005, public sector employment increased as a percentage of total employment. After Q1 2005 public sector employment stabilised at 20.4 per cent of total employment before falling until the end of the time series. Hence, whole economy employment grew faster than market sector employment until 2005. In 2005 employment grew at similar rates for both the market sector and the whole economy.

Market sector gross value added per hour

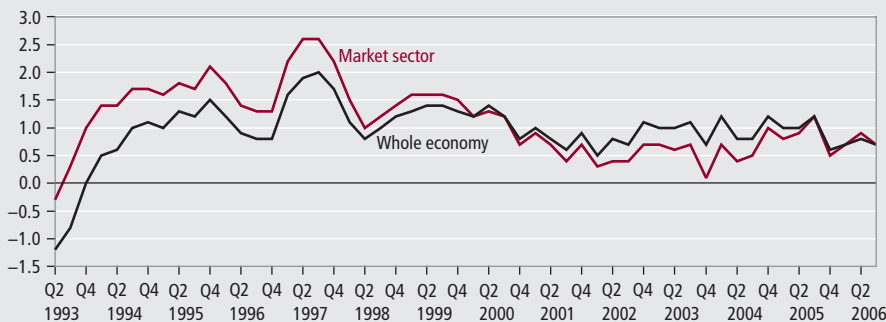
The seasonally adjusted estimates for the market sector GVA per hour series is a ratio of two seasonally adjusted estimates, market sector GVA to the total hours worked in the market sector. Total hours worked in the market sector is derived using several different data sources. This leads to several quality issues which are discussed below.

Due to current data limitations, the time series for the market sector GVA per hour series is short: Q1 1999 to Q1 2006. Further development work is currently in progress to extend the back series.

Figure 5 illustrates the construction of the market sector GVA per hour series. As with the per worker series, the output of

Figure 4
Whole economy and market sector employment

Percentage change, quarter on same quarter a year earlier



the market sector uses the market sector GVA series. The total actual weekly hours worked in the market sector series is derived using several different data sources: LFS microdata, public sector employment (PSE) data and headline LFS data. The main steps involved in calculating the series are outlined below:

- LFS microdata is used to calculate the average weekly hours worked in the market sector because a market/non-market split is not available for the published LFS 'total actual weekly hours worked' series. Using the LFS microdata, a market sector variable is defined and created. It is based on the private sector variable available in the microdata but also includes 'university/other grant-funded education establishment' and 'nationalised industry/state corporation'
- the market sector variable is combined with a 'total actual weekly hours worked in main and second jobs' variable to obtain estimates of mean actual weekly hours worked in each sector.
- market sector employment levels are calculated using the quarterly PSE series and the published LFS total employment series
- total actual hours worked in the market sector are calculated by multiplying the LFS 'average actual weekly hours' results by the PSE-based market sector employment levels
- the derived 'hours worked for the market sector' series combined with the resulting 'hours worked for the non-market sector' series sum to less than the published LFS 'total actual weekly hours worked' (non-seasonally adjusted) series. This is because the published LFS series is weighted to more recent population estimates than the LFS microdata, and there are cases in the microdata where the public or private sector status is unknown due to question non-response. To remove this inconsistency, the 'total hours' series for each sector within the market sector series is constrained to the published 'actual weekly hours' LFS series on a pro rata basis.

As mentioned previously, the derivation of a total hours worked in the market sector series produces a number of quality issues.

- Differing time periods: the three different data sources use differing time periods. These time periods

were matched as far as possible to the calendar quarters in order to be coherent with market sector GVA (see **Table 1**)

- LFS microdata change to time periods: since the January 2006 (published in May 2006) LFS, microdata sets have been produced on a calendar-quarter basis as opposed to the seasonal quarters (for example, December to February; March to May) currently used in the hours worked series
- Hours worked in second jobs: the LFS does not ask respondents what sector their second job is in. It is therefore impossible to tell whether a respondent's second job is in the market sector. The methodology used to produce the 'total actual hours worked in the market sector' series assumes that a respondent's second job is in the same category as their main job. This approach could cause the hours worked in the market sector to be underestimated or overestimated. However, as market sector GVA per hour is in index form, any misallocation of hours worked is only an issue if it varies substantially over time
- Double-counting: the PSE estimate relates to the number of people employed in the public sector rather than the number of jobs. These estimates will, however, include a number of people with a second job in the public sector whose main job is in the private sector or a separate public sector organisation. Double-counting will only be an issue to the market sector GVA per hour series if the amount varies substantially over time

Figure 5

Construction of market sector (MS) GVA per hour

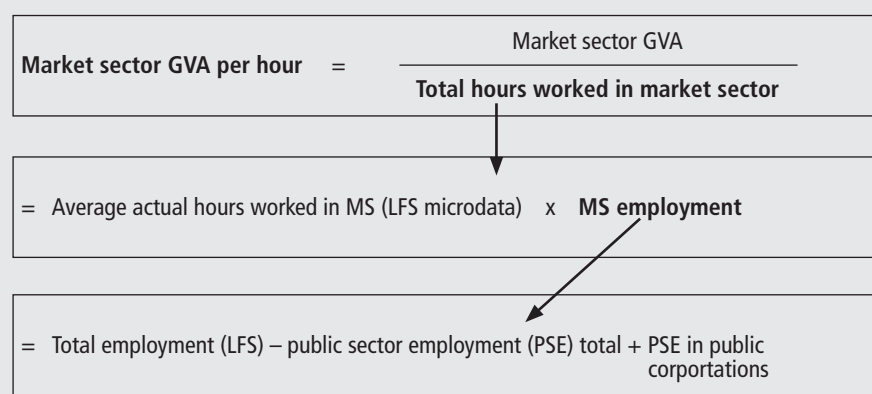


Table 1

Differing time periods of data sources

	Market sector GVA	PSE series	LFS	LFS microdata
Q1	January to March	Average previous December and March	January to March	2/3(December to February) + 1/3(March to May)
Q2	April to June	Average March and June	April to June	2/3(March to May) + 1/3(June to August)
Q3	July to September	Average June and September	July to September	2/3(June to August) + 1/3(September to November)
Q4	October to December	Average September and December	October to December	2/3(September to November) + 1/3(December to February)

Figure 6 shows the market sector GVA per hour series in the form of quarter on quarter and quarter on the same quarter a year earlier growth rates. It follows a similar pattern to that of market sector GVA per worker (Figure 1), but is more volatile. The extra volatility is because hours worked can change more rapidly in response to a change in economic conditions (by increasing or decreasing the hours of overtime worked), whereas extra labour is not employed if the conditions are not expected to last. The latest available quarter is Q1 2006, as methodology to incorporate the change in the LFS microdata from seasonal to calendar quarters is currently being developed.

Figure 7 compares the growth rates of GVA per hour for the market sector and the whole economy. In general, the

Figure 6
Market sector GVA per hour

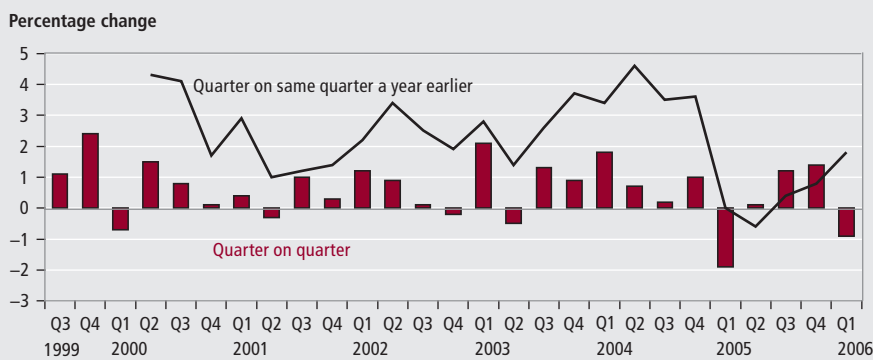
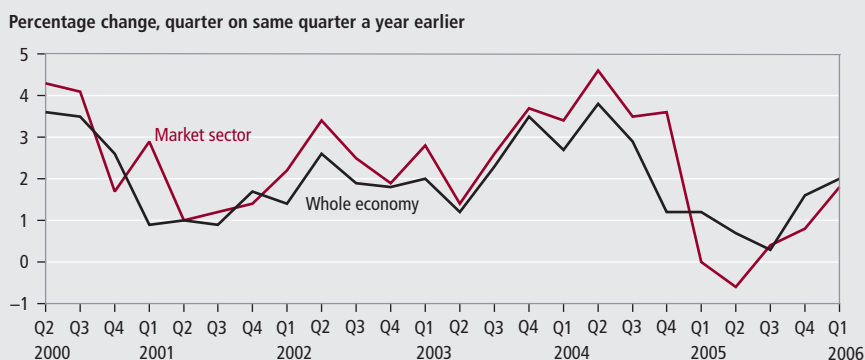


Figure 7
Whole economy and market sector productivity per hour



difference between the two series is not as systematic as those for productivity per worker measures (Figure 2). It is noticeable, though, that during periods of weaker economic growth, for example, between 2001 and 2002, the rate of productivity growth for the market sector is higher than the growth for the whole economy. Initial analysis suggests that this is because the market sector is more able to vary the hours worked by employees compared with the economy as a whole. The market sector would also derive more benefit from varying employees' hours, depending on economic conditions. Further investigation will be carried out on this issue.

Non-market sector GVA productivity

The new measure of market sector GVA productivity has been derived using whole market sector statistics currently used in the National Accounts. It should be noted that this improved methodology is not appropriate to use for a similar derivation for non-market sector GVA productivity. The measurement of non-market sector productivity is currently being taken forward

by the UK Centre for the Measurement of Government Activity (UKCeMGA) in ONS, in response to the final *Atkinson Review* report that was published in January 2004, available at www.statistics.gov.uk/about/data/methodology/specific/PublicSector/output/default.asp

The methodology used by UKCeMGA follows a number of general principles, as well as specific recommendations for individual public services, as established by the *Atkinson Review*. In short, this is a bottom-up approach, whereas the new measure for market sector GVA productivity is top-down. A particularly important principle (B) from the *Atkinson Review* is that 'the output of the government sector should in principle be measured in a way that is adjusted for quality, taking account of the attributable incremental contribution of the service to the outcome'. As this and many other recommended adjustments are not yet reflected in the National Accounts estimates of government output, it would not be appropriate, therefore, to estimate non-market sector productivity on a similar basis to market sector GVA productivity. In addition, the work of UKCeMGA is based

on multi-factor productivity, whereas the market sector GVA approach is based on labour market productivity.

UKCeMGA has a rolling programme of development and reviews for the measurement of different public services. Direct measures of outputs are currently made for the following services: health, education, social protection, and public order and safety, with plans to cover more services in the future. These direct measures of output cover around two thirds of spending on public services. Productivity statistics for these individual public services are published in a series of productivity articles, which can be found at www.statistics.gov.uk/UKCeMGA

Conclusions

The market sector productivity measures published in this article broadly follow the economic cycle. In general, the growth rate for market sector productivity per worker tends to be higher than the rate of growth for the whole economy. However, both the market sector and whole economy measures follow the same general trends. This is unsurprising, as the market sector makes up a significant proportion of the whole economy measure. The market sector productivity per hour series closely follows the whole economy measure. However, at present, the short time series means that only limited comparisons can be made.

Future work

Work is underway to produce a market sector GVA per hour series excluding oil and gas extraction. This will be in line with the GVA series excluding oil and gas extraction used by HM Treasury for output gap and trend growth assessment.

The market sector GVA per hour series only has a time series starting in 1999. Work is continuing on increasing the length of the back series as far as data allow.

An update to both market sector GVA productivity series will be published on the ONS website in June/July. It is expected that the market sector productivity figures will be included in the *Productivity First Release* towards the end of 2007.

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Methods explained

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

Index numbers

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Office for National Statistics

SUMMARY

Many of the statistics produced by the Office for National Statistics, particularly economic statistics, are published in the form of indices. However, there are a number of different forms of indices and this article attempts to explain the subtle differences in the methodologies used to construct them, and also factors that feed into the choice of which type of index to use. Hypothetical examples are provided to illustrate the effects of using different index forms.

Index numbers are a common and convenient way of expressing time-series variables. They are useful because the movement from one period to the next is expressed as the percentage of the value in the base period, the choice of the base period depending on the type of index used. The concept of the base period is discussed later. This article summarises the common types of indices used, particularly those used by the Office for National Statistics (ONS), and the differences between them. Some common variables expressed in index form are capital, labour, output, prices, earnings and productivity.

In **Table 1** below is a simple example of an index. Say we are interested in a variable X and its evolution over time. Then the index is simply the growth in X multiplied by the value of the index in the previous period. That is:

$$I_{(t)} = \left(\frac{X_{(t)}}{X_{(t-1)}} \right) I_{(t-1)} \quad (1)$$

or, for the year 2003, the index is equal to $(37/34) \times 113.33 = 123.33$.

The informed reader will notice that the above index has been chained. The difference between chained and non-chained indices is discussed below.

Table 1
Simple example

Time (t)	X	Index (I)
2000	30	100
2001	33	110
2002	34	113
2003	37	123
2004	35	117
2005	36	120
2006	40	133

It should be noted that, when constructing an index, the variables in question need to be in the same unit, or converted into the same unit. Also the index in the above example was made up of just one input variable. If the variables used to create the index are in different categories, then these will need to be weighted together to form the aggregate index, based on their relative importance. Weighting is discussed below in reference to Laspeyres indices.

Laspeyres

One of the most common forms of indices used at the ONS is the Laspeyres. The main feature of the Laspeyres is that the weights used are taken from the base period. For example, if we consider a price index with a base $t-1$, then the prices will be aggregated for all periods using weights from that period. However, if the index is chain-linked, then the weight will be taken from the previous period. Chain-linking simply means updating the weights so that, for each period, the base used is the weight from the previous period. ONS output (GDP or GVA) measures are now calculated as chain-linked Laspeyres indices and are referred to as chained volume measures (CVM). For a fuller discussion of chain-linking in relation to National Accounts output measures, see Robjohns (2006).

Below are two simple examples of a weighted price index consisting of two goods, X and Y . The weights used are the quantities of the goods consumed and so represent their relative importance. The price is multiplied by the quantity, to obtain expenditure, and the change is expressed as a percentage of the expenditure in the base period. Equation 2 below shows a standard Laspeyres price index; however, the principle is true for any type of index, not just prices, that is the weight is taken from the base period. For instance, for a quantity index, the quantity in the numerator term would be updated rather than the price, and the denominator would remain the same.

$$I_{i,0}^L = \left(\frac{\sum_i P_{i,t} Q_{i,0}}{\sum_i P_{i,0} Q_{i,0}} \right) 100 \quad (2)$$

Table 2 presents a Laspeyres index using a base year of 2000, and **Table 3** shows the effect of chain-linking the index.

As can be seen above, chain-linking has the strongest impact on the index when there is a relative shift in composition of the variable. In this case, there has been a relative shift toward consumption of

Table 2
Example of a weighted Laspeyres index

Time (t)	P(X)	P(Y)	Q(X)	Q(Y)	Expenditure in base period:		Index: base (2000)
					Expenditure: $P_t * Q_0$	$P_0 * Q_0$	
2000	10	5	30	60			100
2001	14	7	32	60	840	600	140
2002	19	6	38	55	930	600	155
2003	28	7	43	52	1,260	600	210
2004	40	8	47	50	1,680	600	280
2005	44	9	53	50	1,860	600	310
2006	56	11	60	45	2,340	600	390

Table 3
Example of a weighted chain-linked Laspeyres index

Time (t)	P(X)	P(Y)	Q(X)	Q(Y)	Expenditure in base period:		Index: chain-linked
					Expenditure: $P_t * Q_{t-1}$	$P_{t-1} * Q_{t-1}$	
2000	10	5	30	60			100
2001	14	7	32	60	840	600	140
2002	19	6	38	55	968	868	156
2003	28	7	43	52	1,449	1,052	215
2004	40	8	47	50	2,136	1,568	293
2005	44	9	53	50	2,518	2,280	324
2006	56	11	60	45	3,518	2,782	409

good X, the more expensive good, causing the chain-linked index to rise by a greater amount than the standard Laspeyres, since the price of good X has risen more than that of good Y. This is obviously relevant to a number of areas, for instance the changing industrial composition of the economy. Therefore, chain-linking is a way of improving the methodology because it takes account of more information and so provides a more accurate measure. However, the ability to chain-link does depend on the timeliness of the data used for the weights.

The first main benefit of chain-linking is that new items can be added to the 'basket' every year. If the index is non-chained, new items can only be added to the base year. The second benefit is that by chaining the series, the comparison is with the previous year, rather than the base year. This is obviously relevant when most of the interest is in the annual change such as with prices, output and most economic indicators.

Another benefit of chain-linking is that it removes 'substitution bias'. This is a problem that is encountered when there are large shifts in both the weight and in the actual variable that is being indexed. This was encountered in the US with data for computer hardware, but also applies more generally to all technology goods. Prices for such goods have reduced dramatically, causing the quantities consumed to increase. However, when the output index is unchained, it means that the index is being weighted on prices from the base year, when current prices are far removed from those in the base year, that is, the weights used are too high. Therefore, when the index is rebased, which in the US was every five years, the rebasing has the effect of reducing the index, causing large revisions. Chain-linking removes this problem.

The retail prices index (RPI) is an annually chain-linked Laspeyres index.¹ Other data produced as Laspeyres indices are the quality-adjusted labour input measure (QALI), the volume index of capital

services (VICS), both produced by the ONS, and also the house price index, produced by the Department for Communities and Local Government (DCLG).

Paasche

The main difference between Laspeyres and Paasche indices is that, with the Paasche, the weights are taken from the current period. The formula for the Paasche is given below in equation 3:

$$I_{t,0}^P = \left(\frac{\sum_i P_{i,t} Q_{i,t}}{\sum_i P_{i,0} Q_{i,t}} \right) 100 \quad (3)$$

So, whereas the Laspeyres calculates what expenditure in the current period would be if the quantity consumed were the same as in the base period (a pure price effect), the Paasche calculates the expenditure needed to buy current year quantities, and is expressed as a percentage of what the expenditure would have been in the base period if the quantity consumed had been at current levels. Examples of a Paasche price index, both unchained and chained, are shown below in **Table 4** and **Table 5** using the same data as in previous examples.

Unlike the Laspeyres, in the case of the Paasche, chain-linking has the effect of reducing the index. This is because growth is not calculated as a percentage of expenditure in the base period but instead is backward-looking. Therefore, the effect of the high increases in the price of X, and substitution from Y to X, is less pronounced when the index is chained together. Put another way, there is an incremental weighting effect, that is, the shift in the weights (quantities) is more pronounced between the starting and

Table 4
Example of a weighted Paasche index

Time (t)	P(X)	P(Y)	Q(X)	Q(Y)	Current expenditure using base year prices:		Index: base (2000)
					Current expenditure: $P_t * Q_t$	expenditure using base year prices: $P_0 * Q_t$	
2000	10	5	30	60			100
2001	14	7	32	60	868	620	140
2002	19	6	38	55	1,052	655	161
2003	28	7	43	52	1,568	690	227
2004	40	8	47	50	2,280	720	317
2005	44	9	53	50	2,782	780	357
2006	56	11	60	45	3,855	825	467

Table 5
Example of a weighted chain-linked Paasche index

Time (t)	P(X)	P(Y)	Q(X)	Q(Y)	Current expenditure using base year prices:		Index: chain-linked
					Current expenditure: $P_t * Q_t$	expenditure using base year prices: $P_{t-1} * Q_t$	
2000	10	5	30	60			100
2001	14	7	32	60	868	620	140
2002	19	6	38	55	1,052	917	161
2003	28	7	43	52	1,568	1,129	223
2004	40	8	47	50	2,280	1,666	305
2005	44	9	53	50	2,782	2,520	337
2006	56	11	60	45	3,855	3,045	427

current period than it is between the previous and current period, causing the index to increase more slowly.

The choice of whether to use a Laspeyres or Paasche is fairly arbitrary. The decision will probably make very little difference to the final index unless there has been a substantial change to the weighting of the variable, as there has been in the examples above. Therefore, the decision tends to be based on practicalities. To construct a Paasche index, as explained above, weights for the actual year of the series, or current weights, are required. Such data are often unavailable. Therefore, the Laspeyres tends to be used, as weights from a previous period are more readily available. Also, using a Paasche index means that the denominator changes every year, so different years can only be compared with the base year and not with each other.

An example of a Paasche index produced by ONS is the implied GDP deflator, which is also chain-linked.

Fisher

The Fisher index, or the Fisher ideal index, is a form of compromise between the Laspeyres and Paasche. Its formula is a geometric mean of the Laspeyres and Paasche, as shown in equations 4 and 5. In general, the Laspeyres is always greater than or equal to the Fisher, and the Paasche is always less than or equal to the Fisher (6):

$$I_{t,0}^F = \sqrt{\left(\frac{\sum_i P_{i,t} Q_{i,t}}{\sum_i P_{i,0} Q_{i,t}} \right) \cdot \left(\frac{\sum_i P_{i,t} Q_{i,0}}{\sum_i P_{i,0} Q_{i,0}} \right)} 100 \quad (4)$$

$$I_{t,0}^F = \sqrt{I_{t,0}^L \cdot I_{t,0}^P} \quad (5)$$

$$\text{Laspeyres} \geq \text{Fisher} \geq \text{Paasche} \quad (6)$$

It should be noted that the reason the inequality given in equation 6 does not hold in the above examples is that the numbers used for price and quantity suggest a perverse demand relationship. That is, in general, if there is an increase in the price ratio (P_X/P_Y) of the two goods, we would expect the quantity ratio (Q_X/Q_Y) to decrease. This is not the case in the hypothetical numerical examples given.

In general, the Fisher is used when prices and quantities in the base and observation periods are substantially different. Examples of a Fisher index, both unchained and chained, are provided below in **Table 6** and **Table 7**, again using the same data as used previously.

Table 6

Example of a weighted Fisher index

Time (t)	Laspeyres	Paasche	Product	Fisher: square root of product
2000	100	100	10,000	100
2001	140	140	19,600	140
2002	155	161	24,895	158
2003	210	227	47,722	218
2004	280	317	88,667	298
2005	310	357	110,567	333
2006	390	467	182,236	427

Table 7

Example of a weighted chain-linked Fisher index

Time (t)	Laspeyres	Paasche	Product	Fisher: square root of product
2000	100	100	10,000	100
2001	140	140	19,600	140
2002	156	161	25,076	158
2003	215	223	47,969	219
2004	293	305	89,429	299
2005	324	337	109,032	330
2006	409	427	174,555	418

The Fisher index is termed 'ideal' because it gets around the practical problem of 'time reversal'. This is particularly relevant when the data are seasonal and was encountered when attempts were made to construct a quarterly Laspeyres version of QALI. Basically, what happens is that when growth in the variable increases, but in a subsequent period decreases, the index fails to decrease all the way back and remains at a higher level. Superlative² indices, such as the Fisher, and also the Törnqvist, which is discussed in the next section, overcome this problem and this is the reason why they are sometimes preferred.

Another convenient property is that multiplying a Fisher price and Fisher quantity index produces a Fisher expenditure index.

Törnqvist

The main feature of the Törnqvist index is that the weight used is an average of the weight in the current and base period. Therefore, like the Paasche, it tends to be used on historic data sets, as current period information is needed to weight the series. Another difference is that it is calculated geometrically rather than arithmetically. The formula for a Törnqvist index is shown below in equations 7 and 8, and examples of both unchained and chained Törnqvist indices are shown below in **Table 8** and **Table 9** (the price and quantity data are the same as those used previously, but are omitted to save space).

$$I_{t,0}^T = \prod_i \left(\frac{P_{i,t}}{P_{i,0}} \right)^{\frac{(w_{i,t} + w_{i,0})}{2}} \quad (7)$$

where:

$$w_{i,t} = \frac{P_{i,t} Q_{i,t}}{\sum_i P_{i,t} Q_{i,t}} \quad (8)$$

For ease of composition, the Törnqvist is often written as:

$$I_{t,0}^T = \exp \left[\sum_i \left(\frac{w_{i,t} + w_{i,0}}{2} \right) \ln \left(\frac{P_{i,t}}{P_{i,0}} \right) \right] \quad (9)$$

Table 8
Example of a weighted Törnqvist index

Time (t)	Relative change in P(X)	Share of Good X	Share of X averaged over both periods	X ^{share}	Relative change in P(Y)	Share of Good Y	Share of Y averaged over both periods	Y ^{share}	(X ^{share})*(Y ^{share})	Index: base (2000)
2000	1.0	0.50	0.50	1.00	1.00	0.50	0.50	1.00	1.00	100
2001	1.4	0.52	0.51	1.19	1.40	0.48	0.49	1.18	1.40	140
2002	1.9	0.69	0.59	1.46	1.20	0.31	0.41	1.08	1.58	158
2003	2.8	0.77	0.63	1.92	1.40	0.23	0.37	1.13	2.17	217
2004	4.0	0.82	0.66	2.50	1.60	0.18	0.34	1.17	2.94	294
2005	4.4	0.84	0.67	2.69	1.80	0.16	0.33	1.21	3.27	327
2006	5.6	0.87	0.69	3.26	2.20	0.13	0.31	1.28	4.18	418

Table 9
Example of a weighted chain-linked Törnqvist index

Time (t)	Relative change in P(X)	Share of Good X	Share of X averaged over both periods	X ^{share}	Relative change in P(Y)	Share of Good Y	Share of Y averaged over both periods	Y ^{share}	(X ^{share})*(Y ^{share})	Index: chain-linked
2000	1.00	0.50	0.50	1.00	1.00	0.50	0.25	1.00	1.00	100
2001	1.40	0.52	0.51	1.19	1.40	0.48	0.49	1.18	1.40	140
2002	1.36	0.69	0.60	1.20	0.86	0.31	0.40	0.94	1.13	158
2003	1.47	0.77	0.73	1.33	1.17	0.23	0.27	1.04	1.38	219
2004	1.43	0.82	0.80	1.33	1.14	0.18	0.20	1.03	1.37	299
2005	1.10	0.84	0.83	1.08	1.13	0.16	0.17	1.02	1.10	330
2006	1.27	0.87	0.85	1.23	1.22	0.13	0.15	1.03	1.27	417

The Törnqvist has a number of useful features. As well as removing the problem of 'time reversal', it can also be used to show the contribution of each component to aggregate growth because it is log-linear. Therefore, the contributions can be broken down into additive form. Another feature is they correspond to translog production and cost functions and are hence widely used in empirical work. For instance, using a standard Cobb-Douglas production function where:

$$Y = K^{\alpha} L^{(1-\alpha)} \quad (10)$$

and:

Y = output,

K = capital,

L = labour

α and $(1-\alpha)$ = income shares of K and L, respectively

In general, the income shares are assumed to be constant. However, the use of Törnqvist indices means these are more flexible and can change according to the returns to labour or capital.

Conclusion

There are, therefore, various forms of indices and their construction affects the result and how they should be interpreted. The choice of which to use tends to depend on what is being compared over time, the timeliness of the available data, how much flexibility is needed and what its final use is, for example, is it going to be used as an input into another piece of analysis which requires an index of a certain form.

Notes

- 1 Technically the RPI is not a true Laspeyres index, but it is a very close approximation. For further detail and reasons consult the Retail Price Index Technical Manual, available at www.statistics.gov.uk/statbase/Product.asp?vlnk=2328
- 2 A superlative index is one that uses more information in its construction than a base index, and is more flexible. The OECD definition is as follows: 'Superlative indices are price or quantity indices that are 'exact' for a flexible aggregator. A flexible aggregator is a second-order approximation to an arbitrary production, cost, utility or distance function. Exactness implies that a particular index number can be directly derived from a specific flexible aggregator.'

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Key time series

National accounts aggregates

Last updated: 23/02/07

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
2001	996,987	882,753	89.8	89.6	93.8	95.4	95.7	94.1	93.6
2002	1,048,767	930,297	94.5	94.4	97.2	97.4	97.4	97.0	96.9
2003	1,110,296	985,558	100.0	100.0	100.0	100.0	100.0	100.0	100.0
2004	1,176,527	1,044,165	106.0	105.9	103.4	103.3	103.3	102.6	102.6
2005	1,225,339	1,087,868	110.4	110.4	104.5	105.3	105.3	104.8	104.8
2006	1,288,205	1,144,032	116.0	116.1		108.1	108.2	107.3	107.3
2001 Q1	246,345	217,972	88.7	88.5	93.2	95.0	95.4	93.4	92.7
2001 Q2	248,058	219,362	89.4	89.0	93.4	95.1	95.4	94.0	93.3
2001 Q3	249,447	220,955	89.9	89.7	94.5	95.7	95.9	93.9	93.5
2001 Q4	253,137	224,464	91.2	91.1	94.2	96.0	96.1	95.0	94.8
2002 Q1	257,368	228,051	92.7	92.6	95.9	96.5	96.6	96.1	95.8
2002 Q2	261,028	231,626	94.0	94.0	96.3	97.1	97.0	96.9	96.9
2002 Q3	264,049	234,316	95.1	95.1	98.4	97.8	97.7	97.3	97.3
2002 Q4	266,322	236,304	95.9	95.9	98.3	98.3	98.2	97.6	97.6
2003 Q1	270,918	240,577	97.6	97.6	99.4	98.8	98.8	98.8	98.8
2003 Q2	275,130	244,438	99.1	99.2	98.9	99.3	99.3	99.8	99.9
2003 Q3	280,024	248,520	100.9	100.9	100.0	100.4	100.4	100.5	100.5
2003 Q4	284,224	252,023	102.4	102.3	101.7	101.5	101.6	100.9	100.7
2004 Q1	286,975	254,169	103.4	103.2	101.9	102.2	102.2	101.1	100.9
2004 Q2	293,120	260,148	105.6	105.6	103.2	103.1	103.2	102.4	102.4
2004 Q3	295,998	262,789	106.6	106.7	103.0	103.5	103.5	103.0	103.0
2004 Q4	300,434	267,059	108.2	108.4	105.4	104.1	104.2	103.9	104.0
2005 Q1	301,743	267,783	108.7	108.7	104.3	104.5	104.5	104.1	104.0
2005 Q2	304,407	270,286	109.7	109.7	105.5	104.9	105.0	104.5	104.5
2005 Q3	306,650	271,811	110.5	110.3	103.9	105.5	105.5	104.7	104.6
2005 Q4	312,539	277,988	112.6	112.8	104.3	106.2	106.3	106.0	106.2
2006 Q1	315,098	280,078	113.5	113.7	105.5	107.0	107.0	106.1	106.2
2006 Q2	318,685	282,849	114.8	114.8	107.0	107.8	107.8	106.5	106.4
2006 Q3	324,837	288,363	117.0	117.0	107.4	108.5	108.5	107.9	107.8
2006 Q4	329,585	292,742	118.7	118.8		109.3	109.4	108.6	108.6

Percentage change, quarter on corresponding quarter of previous year⁴

2001 Q1	5.0	5.3	5.0	5.4	3.3	2.9	2.9	2.0	2.3
2001 Q2	4.6	5.0	4.6	5.0	3.1	2.3	2.1	2.3	2.8
2001 Q3	4.1	4.5	4.2	4.5	3.1	2.4	1.9	1.7	2.5
2001 Q4	4.7	5.1	4.7	5.2	3.7	2.0	1.6	2.7	3.5
2002 Q1	4.5	4.6	4.5	4.6	2.9	1.6	1.3	2.9	3.3
2002 Q2	5.2	5.6	5.1	5.6	3.1	2.1	1.7	3.1	3.9
2002 Q3	5.9	6.0	5.8	6.0	4.1	2.2	1.9	3.6	4.1
2002 Q4	5.2	5.3	5.2	5.3	4.4	2.4	2.2	2.7	3.0
2003 Q1	5.3	5.5	5.3	5.4	3.6	2.4	2.3	2.8	3.1
2003 Q2	5.4	5.5	5.4	5.5	2.7	2.3	2.4	3.0	3.1
2003 Q3	6.1	6.1	6.1	6.1	1.6	2.7	2.8	3.3	3.3
2003 Q4	6.7	6.7	6.8	6.7	3.5	3.3	3.5	3.4	3.2
2004 Q1	5.9	5.6	5.9	5.7	2.5	3.4	3.4	2.3	2.1
2004 Q2	6.5	6.4	6.6	6.5	4.3	3.8	3.9	2.6	2.5
2004 Q3	5.7	5.7	5.6	5.7	3.0	3.1	3.1	2.5	2.5
2004 Q4	5.7	6.0	5.7	6.0	3.6	2.6	2.6	3.0	3.3
2005 Q1	5.1	5.4	5.1	5.3	2.4	2.3	2.3	3.0	3.1
2005 Q2	3.9	3.9	3.9	3.9	2.2	1.7	1.7	2.1	2.1
2005 Q3	3.6	3.4	3.7	3.4	0.9	1.9	1.9	1.7	1.6
2005 Q4	4.0	4.1	4.1	4.1	-1.0	2.0	2.0	2.0	2.1
2006 Q1	4.4	4.6	4.4	4.6	1.2	2.4	2.4	1.9	2.1
2006 Q2	4.7	4.6	4.6	4.6	1.4	2.8	2.7	1.9	1.8
2006 Q3	5.9	6.1	5.9	6.1	3.4	2.8	2.8	3.1	3.1
2006 Q4	5.5	5.3	5.4	5.3		2.9	2.9	2.5	2.3

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 For index number series, these are derived from the rounded figures shown in the table.

Gross domestic product: by category of expenditure

Last updated: 23/02/07

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

	Domestic expenditure on goods and services at market prices											Gross domestic at product market prices
	Final consumption expenditure			Gross capital formation				Exports of goods and services	Gross final expenditure	less imports of goods and services	Statistical discrepancy (expenditure)	
	Households	Non-profit institutions ¹	General government	Gross fixed capital formation	Changes in inventories ²	Acquisitions less disposals of valuables	Total					
	ABJR	HAYO	NMRY	NPQT	CAFU	NPJR	YBIM	IKBK	ABMG	IKBL	GIXS	ABMI
2001	653,326	27,155	217,359	171,639	5,577	342	1,075,760	277,694	1,353,632	294,449	0	1,059,648
2002	676,833	27,130	224,868	178,066	2,289	183	1,109,596	280,593	1,390,217	308,706	0	1,081,469
2003	697,160	27,185	232,699	178,751	3,983	-37	1,139,741	285,397	1,425,138	314,842	0	1,110,296
2004	721,434	27,327	240,129	189,492	4,597	-42	1,182,937	299,289	1,482,225	335,703	0	1,146,523
2005	730,994	28,132	247,489	195,913	3,611	-354	1,205,785	322,792	1,528,577	359,179	-685	1,168,713
2006	745,424	29,882	252,239	207,598	5,634	68	1,240,845	359,020	1,599,865	400,626	1,451	1,200,689
2001 Q1	161,204	6,873	53,609	42,555	1,643	-26	265,928	71,295	337,389	73,841	0	263,631
2001 Q2	162,333	6,788	53,894	43,242	1,802	202	268,431	69,333	337,813	73,937	0	263,935
2001 Q3	164,239	6,762	54,600	43,357	1,743	30	270,836	67,921	338,708	73,327	0	265,519
2001 Q4	165,550	6,732	55,256	42,485	389	136	270,565	69,145	339,722	73,344	0	266,563
2002 Q1	167,588	6,762	55,756	42,927	1,047	66	274,166	69,440	343,608	75,709	0	267,948
2002 Q2	168,803	6,756	56,288	43,981	385	48	276,273	71,533	347,850	78,367	0	269,392
2002 Q3	169,715	6,793	56,429	44,765	511	62	278,337	71,056	349,422	78,006	0	271,368
2002 Q4	170,727	6,819	56,395	46,393	346	7	280,820	68,564	349,337	76,624	0	272,761
2003 Q1	171,828	6,843	57,099	44,934	-571	-8	280,285	72,662	352,958	78,836	0	274,119
2003 Q2	174,146	6,779	57,684	44,161	-644	94	282,367	70,611	352,971	77,283	0	275,712
2003 Q3	175,140	6,790	58,445	43,924	2,264	-68	286,503	70,334	356,830	78,089	0	278,748
2003 Q4	176,046	6,773	59,471	45,732	2,934	-55	290,586	71,790	362,379	80,634	0	281,717
2004 Q1	178,197	6,830	59,969	47,256	-381	112	291,983	73,389	365,373	81,648	0	283,725
2004 Q2	180,362	6,805	59,530	47,102	1,050	-90	294,759	74,861	369,620	83,313	0	286,307
2004 Q3	181,032	6,826	60,002	47,813	1,025	-96	296,603	75,097	371,700	84,300	0	287,400
2004 Q4	181,843	6,866	60,628	47,321	2,903	32	299,592	75,942	375,532	86,442	0	289,091
2005 Q1	182,294	7,040	60,974	48,171	1,754	-158	300,076	75,931	376,007	85,846	-218	289,943
2005 Q2	182,222	7,013	61,737	48,162	177	86	299,397	80,048	379,445	87,949	-217	291,280
2005 Q3	182,723	7,028	62,232	49,663	835	-201	302,280	82,027	384,307	91,383	-171	292,753
2005 Q4	183,755	7,051	62,546	49,917	845	-81	304,032	84,786	388,818	94,001	-79	294,737
2006 Q1	184,194	7,334	62,582	50,745	1,582	-127	306,310	93,502	399,812	103,116	241	296,937
2006 Q2	185,948	7,414	62,869	51,190	2,557	233	310,211	95,972	406,183	107,373	344	299,154
2006 Q3	186,709	7,508	63,274	52,176	1,059	-29	310,697	85,203	395,900	95,167	414	301,147
2006 Q4	188,573	7,626	63,514	53,487	436	-9	313,627	84,343	397,970	94,970	452	303,451

Percentage change, quarter on corresponding quarter of previous year

2001 Q1	2.1	3.9	1.8	3.0			2.8	9.7	4.3	9.0		2.9
2001 Q2	2.9	0.6	1.6	5.4			3.2	3.0	3.1	6.1		2.2
2001 Q3	3.4	-1.6	2.8	3.6			3.0	1.0	2.6	3.6		2.3
2001 Q4	4.0	-3.0	3.3	-1.8			2.7	-1.6	1.7	0.7		2.0
2002 Q1	4.0	-1.6	4.0	0.9			3.1	-2.6	1.8	2.5		1.6
2002 Q2	4.0	-0.5	4.4	1.7			2.9	3.2	3.0	6.0		2.1
2002 Q3	3.3	0.5	3.3	3.2			2.8	4.6	3.2	6.4		2.2
2002 Q4	3.1	1.3	2.1	9.2			3.8	-0.8	2.8	4.5		2.3
2003 Q1	2.5	1.2	2.4	4.7			2.2	4.6	2.7	4.1		2.3
2003 Q2	3.2	0.3	2.5	0.4			2.2	-1.3	1.5	-1.4		2.3
2003 Q3	3.2	0.0	3.6	-1.9			2.9	-1.0	2.1	0.1		2.7
2003 Q4	3.1	-0.7	5.5	-1.4			3.5	4.7	3.7	5.2		3.3
2004 Q1	3.7	-0.2	5.0	5.2			4.2	1.0	3.5	3.6		3.5
2004 Q2	3.6	0.4	3.2	6.7			4.4	6.0	4.7	7.8		3.8
2004 Q3	3.4	0.5	2.7	8.9			3.5	6.8	4.2	8.0		3.1
2004 Q4	3.3	1.4	1.9	3.5			3.1	5.8	3.6	7.2		2.6
2005 Q1	2.3	3.1	1.7	1.9			2.8	3.5	2.9	5.1		2.2
2005 Q2	1.0	3.1	3.7	2.3			1.6	6.9	2.7	5.6		1.7
2005 Q3	0.9	3.0	3.7	3.9			1.9	9.2	3.4	8.4		1.9
2005 Q4	1.1	2.7	3.2	5.5			1.5	11.6	3.5	8.7		2.0
2006 Q1	1.0	4.2	2.6	5.3			2.1	23.1	6.3	20.1		2.4
2006 Q2	2.0	5.7	1.8	6.3			3.6	19.9	7.0	22.1		2.7
2006 Q3	2.2	6.8	1.7	5.1			2.8	3.9	3.0	4.1		2.9
2006 Q4	2.6	8.2	1.5	7.2			3.2	-0.5	2.4	1.0		3.0

Notes

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

Source: Office for National Statistics

Labour market summary

Last updated: 14/02/07

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 2004	47,547	30,008	28,597	1,411	17,538	63.1	60.1	4.7	36.9
Oct-Dec 2005	47,946	30,312	28,758	1,554	17,634	63.2	60.0	5.1	36.8
Jan-Mar 2006	48,038	30,486	28,887	1,599	17,552	63.5	60.1	5.2	36.5
Apr-Jun 2006	48,131	30,613	28,930	1,683	17,518	63.6	60.1	5.5	36.4
Jul-Sep 2006	48,224	30,696	28,986	1,711	17,527	63.7	60.1	5.6	36.3
Oct-Dec 2006	48,316	30,723	29,036	1,687	17,593	63.6	60.1	5.5	36.4
Male	MGSM	MMSG	MGSA	MGSD	MGSJ	MGWH	MGSS	MGSY	YBTD
Oct-Dec 2004	23,033	16,275	15,446	829	6,758	70.7	67.1	5.1	29.3
Oct-Dec 2005	23,251	16,431	15,515	916	6,820	70.7	66.7	5.6	29.3
Jan-Mar 2006	23,302	16,471	15,539	932	6,831	70.7	66.7	5.7	29.3
Apr-Jun 2006	23,353	16,553	15,578	975	6,800	70.9	66.7	5.9	29.1
Jul-Sep 2006	23,404	16,636	15,642	994	6,768	71.1	66.8	6.0	28.9
Oct-Dec 2006	23,457	16,625	15,661	964	6,832	70.9	66.8	5.8	29.1
Female	MGSN	MGSH	MGSB	MGSE	MGSK	MGWI	MGST	MGSZ	YBTE
Oct-Dec 2004	24,514	13,734	13,151	583	10,780	56.0	53.6	4.2	44.0
Oct-Dec 2005	24,694	13,881	13,243	638	10,813	56.2	53.6	4.6	43.8
Jan-Mar 2006	24,736	14,015	13,348	667	10,721	56.7	54.0	4.8	43.3
Apr-Jun 2006	24,778	14,061	13,352	708	10,717	56.7	53.9	5.0	43.3
Jul-Sep 2006	24,819	14,060	13,344	716	10,759	56.6	53.8	5.1	43.4
Oct-Dec 2006	24,859	14,099	13,375	723	10,761	56.7	53.8	5.1	43.3

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 2004	36,833	28,981	27,588	1,393	7,852	78.7	74.9	4.8	21.3
Oct-Dec 2005	37,120	29,173	27,640	1,532	7,948	78.6	74.5	5.3	21.4
Jan-Mar 2006	37,186	29,326	27,754	1,572	7,860	78.9	74.6	5.4	21.1
Apr-Jun 2006	37,252	29,430	27,775	1,656	7,822	79.0	74.6	5.6	21.0
Jul-Sep 2006	37,310	29,475	27,794	1,681	7,835	79.0	74.5	5.7	21.0
Oct-Dec 2006	37,351	29,497	27,832	1,665	7,854	79.0	74.5	5.6	21.0
Male	YBTG	YBSL	YBSF	YBSI	YBSO	MGSP	MGSV	YBTJ	YBTM
Oct-Dec 2004	19,037	15,922	15,103	819	3,116	83.6	79.3	5.1	16.4
Oct-Dec 2005	19,210	16,038	15,133	905	3,172	83.5	78.8	5.6	16.5
Jan-Mar 2006	19,252	16,080	15,158	922	3,172	83.5	78.7	5.7	16.5
Apr-Jun 2006	19,294	16,149	15,186	963	3,145	83.7	78.7	6.0	16.3
Jul-Sep 2006	19,334	16,221	15,241	980	3,114	83.9	78.8	6.0	16.1
Oct-Dec 2006	19,373	16,217	15,260	957	3,156	83.7	78.8	5.9	16.3
Female	YBTH	YBSM	YBSG	YBSJ	YBSP	MGSQ	MGSW	YBTK	YBTN
Oct-Dec 2004	17,796	13,059	12,485	574	4,736	73.4	70.2	4.4	26.6
Oct-Dec 2005	17,910	13,134	12,507	627	4,776	73.3	69.8	4.8	26.7
Jan-Mar 2006	17,934	13,246	12,596	650	4,688	73.9	70.2	4.9	26.1
Apr-Jun 2006	17,958	13,281	12,589	692	4,677	74.0	70.1	5.2	26.0
Jul-Sep 2006	17,975	13,254	12,553	701	4,722	73.7	69.8	5.3	26.3
Oct-Dec 2006	17,978	13,280	12,572	708	4,698	73.9	69.9	5.3	26.1

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: 020 7533 6094

Prices

Last updated: 13/02/07

Percentage change over 12 months

	Consumer prices						Not seasonally adjusted, except for series PLLW, RNPE and RNPF			
	Consumer prices			Retail prices index (RPI)			Producer prices		Input 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	PLLW ³	RNPE ³	RNPF ³
2003 Jan	1.3			2.9	2.7	2.9	1.3	0.9	1.7	-2.2
2003 Feb	1.6			3.2	3.0	3.1	1.5	1.1	2.5	-2.0
2003 Mar	1.5			3.1	3.0	3.2	2.1	1.3	0.8	-1.5
2003 Apr	1.4			3.1	3.0	2.9	1.6	1.3	-1.3	-0.6
2003 May	1.3			3.0	2.9	2.7	1.1	1.2	-0.1	-0.2
2003 Jun	1.1			2.9	2.8	2.7	1.1	1.2	0.0	-1.2
2003 Jul	1.3			3.1	2.9	2.8	1.3	1.3	0.6	-0.5
2003 Aug	1.4			2.9	2.9	2.7	1.5	1.2	1.9	0.0
2003 Sep	1.4			2.8	2.8	2.7	1.4	1.4	1.3	1.0
2003 Oct	1.4			2.6	2.7	2.4	1.5	1.3	2.5	1.2
2003 Nov	1.3			2.5	2.5	2.1	1.7	1.4	4.6	1.7
2003 Dec	1.3	1.1	1.1	2.8	2.6	2.2	1.8	1.5	2.0	0.4
2004 Jan	1.4	1.5	1.3	2.6	2.4	2.0	1.6	1.4	-0.3	0.0
2004 Feb	1.3	1.3	1.1	2.5	2.3	1.9	1.6	1.5	-1.3	-0.5
2004 Mar	1.1	1.1	1.0	2.6	2.1	1.7	1.4	1.5	0.9	-0.1
2004 Apr	1.1	1.1	1.0	2.5	2.0	1.8	1.8	1.3	2.9	-0.2
2004 May	1.5	1.4	1.3	2.8	2.3	2.2	2.5	1.4	5.6	0.7
2004 Jun	1.6	1.5	1.4	3.0	2.3	2.3	2.6	1.4	3.7	1.3
2004 Jul	1.4	1.4	1.2	3.0	2.2	2.0	2.6	1.7	3.7	1.4
2004 Aug	1.3	1.3	1.1	3.2	2.2	2.0	2.8	2.2	4.6	2.3
2004 Sep	1.1	1.0	0.9	3.1	1.9	1.7	3.1	2.3	8.1	3.8
2004 Oct	1.2	1.2	1.1	3.3	2.1	2.0	3.5	2.9	9.2	4.8
2004 Nov	1.5	1.4	1.4	3.4	2.2	2.2	3.5	2.9	6.7	4.6
2004 Dec	1.7	1.7	1.6	3.5	2.5	2.5	2.9	2.5	4.4	4.2
2005 Jan	1.6	1.7	1.5	3.2	2.1	2.0	2.6	2.5	9.6	7.5
2005 Feb	1.7	1.7	1.6	3.2	2.1	2.0	2.7	2.5	11.0	8.2
2005 Mar	1.9	2.0	1.8	3.2	2.4	2.3	2.9	2.4	11.1	7.4
2005 Apr	1.9	2.0	1.9	3.2	2.3	2.3	3.3	2.6	10.0	7.0
2005 May	1.9	2.0	1.8	2.9	2.1	2.2	2.7	2.5	7.6	6.5
2005 Jun	2.0	2.2	1.9	2.9	2.2	2.2	2.5	2.3	12.0	7.4
2005 Jul	2.3	2.5	2.3	2.9	2.4	2.5	3.1	2.2	13.9	8.6
2005 Aug	2.4	2.6	2.3	2.8	2.3	2.3	3.0	1.9	12.8	7.5
2005 Sep	2.5	2.6	2.4	2.7	2.5	2.5	3.3	2.1	10.5	5.7
2005 Oct	2.3	2.5	2.3	2.5	2.4	2.3	2.6	1.4	8.9	7.0
2005 Nov	2.1	2.3	2.1	2.4	2.3	2.3	2.3	1.3	13.6	9.6
2005 Dec	1.9	2.1	1.8	2.2	2.0	2.0	2.4	1.7	17.9	12.1
2006 Jan	1.9	2.1	1.9	2.4	2.3	2.3	2.9	1.8	15.8	10.3
2006 Feb	2.0	2.1	2.0	2.4	2.3	2.3	2.9	1.8	15.0	10.5
2006 Mar	1.8	1.9	1.7	2.4	2.1	2.2	2.5	1.9	13.0	10.0
2006 Apr	2.0	2.1	2.0	2.6	2.4	2.3	2.5	2.3	15.2	10.0
2006 May	2.2	2.3	2.2	3.0	2.9	2.8	3.1	2.5	13.6	8.6
2006 Jun	2.5	2.6	2.4	3.3	3.1	3.2	3.4	2.9	11.1	8.7
2006 Jul	2.4	2.4	2.3	3.3	3.1	3.2	2.9	2.5	10.5	8.2
2006 Aug	2.5	2.6	2.4	3.4	3.3	3.4	2.7	2.3	8.0	7.8
2006 Sep	2.4	2.6	2.3	3.6	3.2	3.3	1.9	2.1	5.1	7.0
2006 Oct	2.4	2.7	2.3	3.7	3.2	3.3	1.6	2.5	4.6	6.2
2006 Nov	2.7	3.0	2.6	3.9	3.4	3.6	1.8	2.5	3.2	4.5
2006 Dec	3.0	3.2	2.9	4.4	3.8	3.9	2.2	2.4	2.0	2.8
2007 Jan	2.7	2.9	2.6	4.2	3.5	3.7	2.1	2.3	-1.7	1.9

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.

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 who:

- were not in employment during the reference week, and
- reported that they had been made redundant in the month of, or the two calendar months prior to, the reference week

plus the number of people who:

- were in employment during the reference week, and
- started their job in the same calendar month as, or the two calendar months prior to, the reference week, and
- reported that they had been made redundant in the month of, or the two calendar months prior to, the reference week

Unit wage costs

A measure of the cost of wages and salaries per unit of output.

Vacancies

The statistics are based on ONS's Vacancy Survey of businesses. The survey is designed to provide comprehensive estimates of the stock of vacancies across the economy, excluding those in agriculture, forestry and fishing. Vacancies are defined as positions for which employers are actively seeking recruits from outside their business or organisation. More information on labour market concepts, sources and methods is available in the *Guide to Labour Market Statistics* at www.statistics.gov.uk/about/data/guides/LabourMarket/default.asp

Directory of online tables

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 old *Economic Trends* tables and 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.

Weblink: www.statistics.gov.uk/elmr_tables

Title	Frequency of update	Updated since last month
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	Q	.
1.14 Private non-financial corporations: secondary distribution of income account and capital account	Q	.
1.15 Balance of payments: current account	M	✓
1.16 Trade in goods (on a balance of payments basis)	M	✓
1.17 Measures of variability of selected economic series	Q	.

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_tables

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	M	✓
4.04	Indicators of fixed investment in dwellings	M	✓
4.05	Number of property transactions	M	✓
4.06	Change in inventories	Q	✓
4.07	Inventory ratios	Q	.
4.08	Retail sales, new registrations of cars and credit business	M	✓
4.09	Inland energy consumption: primary fuel input basis	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	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	Q	✓
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	✓

Weblink: www.statistics.gov.uk/elmr_tables

6.12	Average Earnings Index by industry: excluding and including bonuses	M	✓
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

A Annually
B Biannually
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

☎ 020 7533 5866
✉ rpi@ons.gsi.gov.uk

Labour Market Statistics Helpline

☎ 020 7533 6094
✉ 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

DfES Public Enquiry Unit

☎ 0870 000 2288

For statistical information on

Average Earnings Index (monthly)

☎ 01633 819024

Claimant count

☎ 020 7533 6094

Consumer Prices Index

☎ 020 7533 5874

Earnings

Annual Survey of Hours and Earnings

☎ 01633 819024

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

☎ 020 7533 6094
✉ labour.market@ons.gsi.gov.uk

Economic activity and inactivity

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Employment

Labour Force Survey

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Employee jobs by industry

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Total workforce hours worked per week

☎ 01633 812766
✉ productivity@ons.gsi.gov.uk

Workforce jobs series – short-term estimates

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✉ workforce.jobs@ons.gsi.gov.uk

Labour costs

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Labour disputes

☎ 01633 819205

Labour Force Survey

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✉ labour.market@ons.gsi.gov.uk

Labour Force Survey Data Service

☎ 01633 655732
✉ lfs.dataservice@ons.gsi.gov.uk

New Deal

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Productivity and unit wage costs

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Redundancy statistics

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Retail Prices Index

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✉ rpi@ons.gsi.gov.uk

Skills (DfES)

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Skill needs surveys and research into skill shortages
☎ 0114 259 4407

Small firms (DTI)

Small Business Service (SBS)
☎ 0114 279 4439

Subregional estimates

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Annual employment statistics

✉ annual.employment.figures@ons.gsi.gov.uk

Annual Population Survey, local area statistics

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LFS Subnational Data Service

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✉ snds@ons.gsi.gov.uk

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2007 edition. Palgrave Macmillan, ISBN 1-4039-9783-7. Price £45.

www.statistics.gov.uk/products/p4861.asp

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www.statistics.gov.uk/products/p9614.asp

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www.statistics.gov.uk/products/p7640.asp

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United Kingdom Balance of Payments (Pink Book)

2006 edition. Palgrave Macmillan, ISBN 1-4039-9387-4. Price £45.

www.statistics.gov.uk/products/p1140.asp

United Kingdom National Accounts (Blue Book)

2006 edition. Palgrave Macmillan, ISBN 1-4039-9388-2. Price £45.

www.statistics.gov.uk/products/p1143.asp

First releases

- Annual survey of hours and earnings
- Business enterprise research and development
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- UK trade in services
- Work and worklessness among households

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2006 quarter 3

www.statistics.gov.uk/products/p242.asp

United Kingdom Economic Accounts

2006 quarter 3. Palgrave Macmillan, ISBN 978-0-230-52616-7. Price £32.

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UK trade in goods analysed in terms of industry (MQ10)

2006 quarter 4

www.statistics.gov.uk/products/p731.asp

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- GDP preliminary estimate
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- Investment by insurance companies, pension funds and trusts
- Productivity
- Profitability of UK companies
- Public sector employment
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- UK output, income and expenditure

MONTHLY

Financial Statistics

February 2007. Palgrave Macmillan, ISBN 978-0-230-52585-6. Price £45.

www.statistics.gov.uk/products/p376.asp

Focus on Consumer Price Indices

January 2007

www.statistics.gov.uk/products/p867.asp

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Labour Market Review

2006 edition. Palgrave Macmillan, ISBN 1-4039-9735-7. Price £40.

www.statistics.gov.uk/products/p4315.asp

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www.statistics.gov.uk/products/p1144.asp

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www.statistics.gov.uk/products/p7163.asp

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