Labour Force Survey: reweighting and seasonal adjustment review 2008

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SUMMARY

On 14 May 2008, the Office for National Statistics published national and regional Labour Force Survey (LFS) aggregate estimates that are consistent with reweighted LFS microdata. This article explains the revisions to the LFS aggregate estimates for 1992 to 2007 arising from the reweighting exercise and the annual seasonal adjustment review. The tables and charts in this article compare the differences between the LFS aggregate estimates and LFS microdata followed by a summary of how the reweighting and seasonal adjustment recommendations impacted on the headline labour market indicators. Analysis is also provided of the revisions to the population estimates and headline labour market indicators by Government Office Region.

On 14 May 2008, the Office for National Statistics (ONS) published the regular monthly Labour Market Statistics First Release which contained Labour Force Survey (LFS) aggregate estimates that are consistent with reweighted LFS microdata. The reweighting means both the published LFS aggregate estimates and the LFS microdata, used for detailed analyses, are in line with the most recently published official population estimates and projections.

In order to put the latest reweighted data into context, this article provides:

- definitions of the LFS aggregate estimates and LFS microdata
- a description of the methodological changes made at the same time as the reweighting
- a summary of the revisions to the previously published LFS national and regional aggregate estimates and microdata
- details of the 2008 seasonal adjustment review recommendations, and
- a timetable for the release of the remaining reweighted LFS outputs and plans for future LFS reweighting

Defining the LFS aggregate estimates and microdata

The LFS aggregate estimates in the UK and regional Labour Market Statistics First Release are key labour market indicators, for example, the levels and rates of employment, unemployment and economic inactivity. They are derived from the LFS

microdata and are calculated for any period of three consecutive months. These are referred to as three-month rolling averages – averages for January to March, February to April, and so on. The aggregate estimates are seasonally adjusted.

LFS microdata are quarterly data sets containing all survey questions. They are made publicly available as databases to enable external users to access and produce their own analyses. They enable more detailed analysis but are published for calendar quarters only (quarter one refers to January to March, quarter two to April to June, and so on), and are not seasonally adjusted.

Since 2003, the LFS aggregate estimates or results have been 'interim-reweighted' every year. Interim-reweighting applies adjustments to the aggregate results to reflect how the latest available official population estimates compare with those used for weighting the microdata. This has amounted to an approximation of the effect that a full reweighting of the microdata would have. The aggregates were last interim-reweighted in December 2007 and reflect the current population estimates and projections.

The previous LFS microdata sets were weighted using population estimates published in 2003. Regular updates to these estimates meant that the LFS microdata had become increasingly out of date. This also meant that the published aggregates were not consistent with the LFS microdata used for more detailed analysis. **Table 1** compares the levels and rates for the

previously published aggregate estimates (interim-reweighted but not seasonally adjusted) with the equivalent estimates derived from the previous LFS microdata (pre-reweighting). The table shows that, in April to June 2007 for example, the total number of people in employment calculated from the microdata was around 600,000, or 2.3 per cent, lower than the equivalent aggregate estimate.

Reweighting of the microdata using the latest population estimates for all calendar quarters back to 1992 is now complete. As of 14 May 2008, the reweighted microdata are feeding through directly to the published LFS aggregate results; that is, the published aggregate estimates are based on, and consistent with, the reweighted LFS microdata. Interim-reweighting will not be required until the population estimates are next updated in summer 2008.

Methodological developments
Some small methodological enhancements have been made at the same time as the reweighting: a new calibration tool and a change to the population weighting method. This section will describe these changes and how they affect the published figures.

New calibration tool
Since the LFS is a continuous UK household sample survey, the responses reflect only a sample of the total population. These responses are weighted or calibrated to give estimates for the entire household population. Previously weighted LFS

estimates were produced using a three-stage population-weighting procedure. Full details are given in section 10 of the LFS User Guide Volume 1.[1] To summarise briefly, each stage of the procedure corrected for a different cause of non-response: stage one corrected for non-response at a local authority level; stage two for non-response by age group and sex; and stage three for non-response by region, age group and sex. Each individual in the sample was assigned a weight via a complex iterative process that ensured the weighted estimates were in line (as much as is possible) with the official population estimates used for each of the three stages.

As part of the reweighting project, the statistical tool for carrying out the weighting has been replaced with

Table 1
Differences between estimates obtained from LFS microdata (pre–reweighting) and LFS aggregate estimates interim–reweighted (previously published)

United Kingdom

Thousands, not seasonally adjusted, except where indicated

	All aged 16 and over	Economically active	In employment	Unemployed	Economically inactive	Economic activity rate (%)	Employment rate (%)	Unemployment rate (%)	Economic inactivity rate (%)
LFS microdata[1] (pre–reweighting)									
Apr–Jun 1997	45,379	28,369	26,356	2,013	17,009	62.5	58.1	7.1	37.5
Apr–Jun 1999	45,679	28,571	26,876	1,695	17,108	62.5	58.8	5.9	37.5
Apr–Jun 2001	46,183	28,846	27,438	1,408	17,337	62.5	59.4	4.9	37.5
Apr–Jun 2002	46,438	29,073	27,617	1,456	17,365	62.6	59.5	5.0	37.4
Apr–Jun 2003	46,664	29,264	27,863	1,401	17,400	62.7	59.7	4.8	37.3
Apr–Jun 2004	46,912	29,393	28,024	1,368	17,519	62.7	59.7	4.7	37.3
Apr–Jun 2005	47,157	29,557	28,193	1,364	17,600	62.7	59.8	4.6	37.3
Apr–Jun 2006	47,409	29,942	28,339	1,604	17,466	63.2	59.8	5.4	36.8
Apr–Jun 2007	47,727	30,006	28,434	1,573	17,721	62.9	59.6	5.2	37.1
LFS aggregates interim–reweighted (previously published)									
Apr–Jun 1997	45,509	28,468	26,443	2,024	17,042	62.6	58.1	7.1	37.4
Apr–Jun 1999	45,880	28,726	27,017	1,709	17,154	62.6	58.9	5.9	37.4
Apr–Jun 2001	46,441	29,057	27,636	1,420	17,384	62.6	59.5	4.9	37.4
Apr–Jun 2002	46,727	29,317	27,849	1,468	17,410	62.7	59.6	5.0	37.3
Apr–Jun 2003	47,016	29,551	28,134	1,417	17,466	62.9	59.8	4.8	37.1
Apr–Jun 2004	47,361	29,751	28,361	1,390	17,610	62.8	59.9	4.7	37.2
Apr–Jun 2005	47,787	30,055	28,659	1,395	17,732	62.9	60.0	4.6	37.1
Apr–Jun 2006	48,185	30,559	28,910	1,649	17,626	63.4	60.0	5.4	36.6
Apr–Jun 2007	48,590	30,705	29,083	1,622	17,886	63.2	59.9	5.3	36.8
Difference between results as shown[2]									
Apr–Jun 1997	130	99	87	11	33	0.1	–	–	−0.1
Apr–Jun 1999	201	155	141	14	46	0.1	0.1	–	−0.1
Apr–Jun 2001	258	211	198	12	47	0.1	0.1	–	−0.1
Apr–Jun 2002	289	244	232	12	45	0.1	0.1	–	−0.1
Apr–Jun 2003	352	287	271	16	66	0.2	0.1	–	−0.2
Apr–Jun 2004	449	358	337	22	91	0.1	0.2	–	−0.1
Apr–Jun 2005	630	498	466	31	132	0.2	0.2	–	−0.2
Apr–Jun 2006	776	617	571	45	160	0.2	0.2	–	−0.2
Apr–Jun 2007	863	699	649	49	165	0.3	0.3	0.1	−0.3

Notes:
1 Comparable data are not available for 1998 and 2000.
2 Levels are rounded to the nearest thousand and rates are rounded to one decimal place.
– difference is zero

something more robust and efficient. This is known as the Generalised Estimation System (GES) tool and was initially developed by Statistics Canada. The methodology employed by the GES tool is different from that used previously, in that it calibrates the data in a single process rather than numerous iterations over three stages. The two methodologies are asymptotically equivalent. In other words, they produce the same outcome providing the sample is sufficiently large, which, for the LFS, it invariably is. Consequently the impact on the LFS estimates caused by implementing the new weighting tool is very small. This outcome was also borne out by some testing using extracts of LFS data. In addition to providing improved statistical processing, the tool also provides diagnostic information to help assess data quality.

Population weighting changes

The LFS microdata have been reweighted using the latest mid-year population estimates for all calendar quarters back to 1992. In order to remain consistent with the LFS sample, the population estimates are adjusted to exclude those outside the coverage of the LFS. Consequently,

communal establishments, apart from people living in National Health Service accommodation and students living in halls of residence who have a UK-resident parent, are excluded from the LFS household population estimates.

Although the same set of population estimates had been used for the interim-reweighting of the aggregate results as for the reweighting of the microdata, they had been applied differently. Under interim-reweighting, the mid-year population estimate referred to the June to August three-month period. For the reweighting of the microdata, the May to July period was used. The LFS aggregates and microdata are now consistent with each other in this respect and use May to July as the period that relates to the mid-year population estimates. This methodological change has contributed to the revisions to the LFS aggregates published on 14 May 2008.

This change in the population weighting has meant that the population estimates used for the previously published aggregate estimates have been brought forward a month in relation to the LFS data. In other words, the population estimates that were used under interim-reweighting

for weighting the LFS data for June to August 2007 are now being used for weighting the LFS data for May to July 2007. Consequently, at the UK level, this results in upward revisions to the total population aged 16 and over, which are published alongside the LFS aggregates in the Labour Market Statistics First Release. **Figure 1** shows the population aged 16 and over used for weighting the interim-reweighted series (previously published) and the population estimates used for reweighting the microdata. The lines represent the population levels and the bars in **Figure 2** represent the revisions to the LFS population aged 16 and over.

As the closeness of the two lines suggests, the revisions to total LFS population aged 16 and over are small. These revisions reflect the change in the population weighting and affect all rolling three-monthly periods back to 1992. All are upwards since June to August 1994. The revisions are mostly in the region of 15,000 to 35,000; the largest are in July to September 2007 at 37,000, or 0.1 per cent.

Revisions to LFS national and regional aggregates

The newly published LFS national and regional aggregate results have been subject to the following sources of revision:

- reweighted LFS microdata, using the latest population estimates
- change in population weighting method
- new calibration tool (GES), and
- recommendations from the review of seasonal adjustment

The first three sources of revision were applied simultaneously in producing a new aggregate time series. It was not possible to quantify the impacts of the three changes individually due to time and resource limitations. As mentioned earlier, the impact of the new calibration tool is neutral for the aggregate results.

The comparisons contained in this article are summarised in **Box 1**.

Table 1 was referred to earlier in the section that defines the LFS aggregate estimates and the microdata. It helps set the context of the LFS reweighting project and underlines the importance of regular reweighting of the LFS microdata.

Table 2 compares the aggregates derived from the reweighted LFS microdata and the previously published interim-reweighted aggregate estimates, before seasonal adjustment. The revisions to the reweighted NSA aggregates result from the reweighted
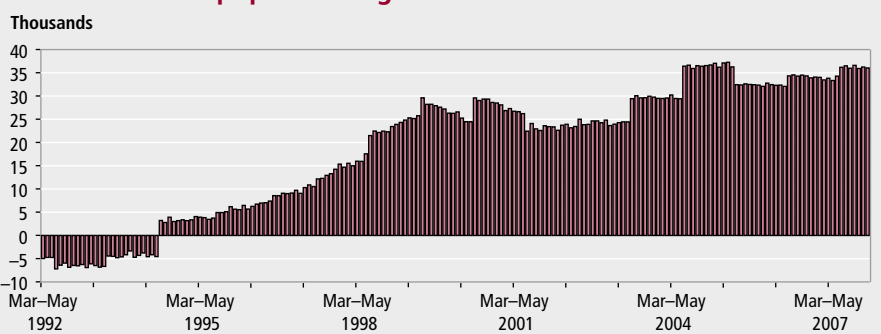
Figure 1
LFS population aged 16 and over: previously published and revised estimates[1]

Note:

1   Dates represent rolling three-monthly periods.

Figure 2
Revisions to LFS population aged 16 and over[1]

Note:

1   Dates represent rolling three-monthly periods.

Box 1

Assessment of the impact of revisions to the previously published LFS national and regional aggregate estimates and microdata

Table no.	Series x	Series y	Assessment
1	Aggregate estimates derived from LFS microdata, prior to reweighting (NSA[1])	Interim-reweighted aggregate estimates, (previously published), NSA	The scale of the previous discrepancy between LFS microdata and interim-reweighted estimates
2	Reweighted[2] aggregate estimates derived from LFS microdata, NSA	Interim-reweighted aggregate estimates (previously published), NSA	The impact of reweighting on published NSA aggregate estimates, separate from any seasonal adjustment effects
3	**Reweighted aggregate estimates, SA,[3] after seasonal adjustment review (published 14 May).**	**Interim reweighted aggregate estimates, SA, (previously published)**	**The overall effect on the published aggregates, incorporating all sources of revision**
4	Regional total population used to reweight microdata	Regional total population figures used in interim-reweighting (previously published)	The extent of the changes in the population estimates, by region
5	**Regional reweighted aggregate estimates, SA, after seasonal adjustment review (published 14 May)**	**Regional aggregate estimates under interim-reweighting (previously published)**	**The overall effect on the published aggregates for each region, incorporating all sources of revision**

Notes:

1 Not seasonally adjusted.
2 Estimates derived from reweighted LFS microdata.
3 Seasonally adjusted.

LFS microdata feeding through directly and also from the population weighting changes. The figures shown are for the three-month period ending June each year, back to 1992. All the headline economically active, inactive, unemployment and employment levels are showing revisions to the whole time series and are discussed in more detail below. Generally, since the population changes are included in both the numerator and denominator for the rate calculations, the revisions to the rates are small, ranging between –0.2 and +0.2 percentage points and, in many cases, zero. Any revisions that feed through to the rates at the UK level relate to changes caused by the reweighting of the microdata at the local authority level.

The LFS estimate of the number of people aged 16 and over who are economically active is the sum of those who are in employment and those who are unemployed. The revisions to this series are small, no greater than 0.1 per cent. The largest revisions are in November 2004 to January 2005 and November 2006 to January 2007 at about +20,000, or 0.1 per cent. For the economically inactive series, the revisions are all upwards from 1996 onwards. There are small revisions to the unemployment levels, no greater than +/–0.2 per cent. There are downward revisions in the more recent periods which are the result of the reweighted microdata. The revisions to the employment levels are all small, no greater than 0.1 per cent. The largest revisions are in December 2006 to

February 2007 at about +22,000, or 0.1 per cent.

The comparison shown in Table 2 was repeated on a seasonally adjusted basis, that is, taking account of the revised time series plus the historical effects of previous changes to the LFS seasonal adjustment parameters, which, until now, had not been applied to the whole time series. The differences arising from this comparison are very similar to the figures in Table 2. This means that the updated seasonal adjustment, as described above, did not change the figures significantly. In other words, the revisions to the interim-reweighted aggregate estimates (seasonally adjusted) prior to the seasonal adjustment review were primarily due to the reweighting of the microdata, in particular the change to the population weighting method.

Impact of seasonal adjustment review

For all series, except those measuring average hours worked and reasons for working part-time, the seasonal adjustment review recommended no changes to the current methods. Consequently, the differences between the reweighted LFS aggregates, before and after the seasonal adjustment review, are negligible. The changes made to the seasonal adjustment of the average hours worked, and reasons for working part-time series, are described in the section which follows titled 'Summary of LFS seasonal adjustment review 2008'.

Table 3 summarises the impact on

the published UK level estimates. These aggregates have been subject to all four revision sources noted earlier in this article. The differences in this table are very similar to the differences noted in Table 2. This confirms that the reweighted microdata category (incorporating the population weighting changes) is the main contributor to the revisions to the LFS aggregates. The seasonal adjustment review is described in more detail below.

Table 4 summarises the impact of the reweighting and population weighting changes on the published Government Office Region population aged 16 and over. The figures shown are for the three-month period ending June each year, back to 1992. The revisions affect all rolling three-monthly periods back to 1992, and are all upwards since October to December 1997. None of the regions is affected particularly significantly by the revisions, with London and the South East showing the largest in terms of levels.

Table 5 summarises the differences between the interim-reweighted (previously published) estimates and the reweighted microdata, after implementation of the seasonal adjustment review recommendations, for the three-month period ending June 2007. The largest percentage change between the newly and previously published aggregates is for the number of people in employment for Yorkshire and The Humber: –1.4 per cent for April to June 2007. Overall, the impact of the reweighted microdata and seasonal

Table 2
Differences between LFS aggregate estimates, interim-reweighted (previously published) and reweighted LFS microdata (not seasonally adjusted)

United Kingdom   Thousands, not seasonally adjusted, except where indicated

| | All people aged 16 and over | | | | | | | | |
	All aged 16 and over	Economically active	In employment	Unemployed	Economically inactive	Economic activity rate (%)	Employment rate (%)	Unemployment rate (%)	Economic inactivity rate (%)
LFS aggregate estimates: reweighted LFS microdata[1]									
Apr–Jun 1992	44,996	28,297	25,554	2,743	16,699	63.1	56.9	9.8	36.9
Apr–Jun 1993	45,022	28,138	25,241	2,898	16,884	62.5	56.1	10.3	37.5
Apr–Jun 1994	45,072	28,103	25,397	2,705	16,969	62.4	56.3	9.6	37.6
Apr–Jun 1995	45,205	28,129	25,711	2,418	17,076	62.2	56.9	8.6	37.8
Apr–Jun 1996	45,361	28,261	25,945	2,315	17,101	62.3	57.2	8.2	37.7
Apr–Jun 1997	45,520	28,470	26,444	2,026	17,050	62.5	58.1	7.1	37.5
Apr–Jun 1998	45,691	28,405	26,642	1,764	17,285	62.2	58.3	6.2	37.8
Apr–Jun 1999	45,905	28,733	27,023	1,710	17,172	62.6	58.9	6.0	37.4
Apr–Jun 2000	46,152	28,958	27,399	1,559	17,195	62.7	59.4	5.4	37.3
Apr–Jun 2001	46,467	29,066	27,643	1,423	17,402	62.6	59.5	4.9	37.5
Apr–Jun 2002	46,750	29,324	27,852	1,472	17,426	62.7	59.6	5.0	37.3
Apr–Jun 2003	47,041	29,552	28,132	1,420	17,489	62.8	59.8	4.8	37.2
Apr–Jun 2004	47,391	29,759	28,365	1,394	17,632	62.8	59.9	4.7	37.2
Apr–Jun 2005	47,824	30,062	28,665	1,397	17,761	62.9	59.9	4.6	37.1
Apr–Jun 2006	48,217	30,575	28,926	1,649	17,642	63.4	60.0	5.4	36.6
Apr–Jun 2007	48,624	30,721	29,100	1,621	17,903	63.2	59.8	5.3	36.8
LFS aggregate estimates: interim-reweighted (previously published)									
Apr–Jun 1992	45,001	28,294	25,549	2,744	16,707	62.9	56.8	9.7	37.1
Apr–Jun 1993	45,029	28,136	25,236	2,900	16,893	62.5	56.0	10.3	37.5
Apr–Jun 1994	45,076	28,100	25,394	2,706	16,976	62.3	56.3	9.6	37.7
Apr–Jun 1995	45,201	28,125	25,710	2,415	17,076	62.2	56.9	8.6	37.8
Apr–Jun 1996	45,355	28,258	25,945	2,313	17,097	62.3	57.2	8.2	37.7
Apr–Jun 1997	45,509	28,468	26,443	2,024	17,042	62.6	58.1	7.1	37.4
Apr–Jun 1998	45,675	28,409	26,648	1,761	17,266	62.2	58.3	6.2	37.8
Apr–Jun 1999	45,880	28,726	27,017	1,709	17,154	62.6	58.9	5.9	37.4
Apr–Jun 2000	46,128	28,950	27,394	1,556	17,178	62.8	59.4	5.4	37.2
Apr–Jun 2001	46,441	29,057	27,636	1,420	17,384	62.6	59.5	4.9	37.4
Apr–Jun 2002	46,727	29,317	27,849	1,468	17,410	62.7	59.6	5.0	37.3
Apr–Jun 2003	47,016	29,551	28,134	1,417	17,466	62.9	59.8	4.8	37.1
Apr–Jun 2004	47,361	29,751	28,361	1,390	17,610	62.8	59.9	4.7	37.2
Apr–Jun 2005	47,787	30,055	28,659	1,395	17,732	62.9	60.0	4.6	37.1
Apr–Jun 2006	48,185	30,559	28,910	1,649	17,626	63.4	60.0	5.4	36.6
Apr–Jun 2007	48,590	30,705	29,083	1,622	17,886	63.2	59.9	5.3	36.8
Difference between results as shown[2]									
Apr–Jun 1992	–5	3	5	–1	–8	0.2	0.1	0.1	–0.2
Apr–Jun 1993	–7	2	5	–2	–9	–	0.1	–	–
Apr–Jun 1994	–4	3	3	–1	–7	0.1	–	–	–0.1
Apr–Jun 1995	4	4	1	3	–	–	–	–	–
Apr–Jun 1996	6	3	–	2	4	–	–	–	–
Apr–Jun 1997	11	2	1	2	8	–0.1	–	–	0.1
Apr–Jun 1998	16	–4	–6	3	19	–	–	–	–
Apr–Jun 1999	25	7	6	1	18	–	–	0.1	–
Apr–Jun 2000	24	8	5	3	17	–0.1	–	–	0.1
Apr–Jun 2001	26	9	7	3	18	–	–	–	0.1
Apr–Jun 2002	23	7	3	4	16	–	–	–	–
Apr–Jun 2003	25	1	–2	3	23	–0.1	–	–	0.1
Apr–Jun 2004	30	8	4	4	22	–	–	–	–
Apr–Jun 2005	37	7	6	2	29	–	–0.1	–	–
Apr–Jun 2006	32	16	16	–	16	–	–	–	–
Apr–Jun 2007	34	16	17	–1	17	–	–0.1	–	–

Notes:

1 Estimates derived from reweighted microdata.

2 Levels are rounded to the nearest thousand and rates are rounded to one decimal place.

– difference is zero

Table 3

Differences between LFS aggregate estimates, interim-reweighted (previously published) and reweighted LFS microdata, after seasonal adjustment review

United Kingdom   Thousands, seasonally adjusted, except where indicated

					All people aged 16 and over				
	All aged 16 and over	Economically active	In employment	Unemployed	Economically inactive	Economic activity rate (%)	Employment rate (%)	Unemployment rate (%)	Economic inactivity rate (%)
LFS aggregate estimates: reweighted LFS microdata,[1] after seasonal adjustment review									
Apr–Jun 1992	44,996	28,379	25,601	2,778	16,617	63.1	56.9	9.8	36.9
Apr–Jun 1993	45,022	28,220	25,288	2,932	16,802	62.7	56.2	10.4	37.3
Apr–Jun 1994	45,072	28,184	25,448	2,736	16,888	62.5	56.5	9.7	37.5
Apr–Jun 1995	45,205	28,212	25,768	2,444	16,992	62.4	57.0	8.7	37.6
Apr–Jun 1996	45,361	28,348	26,009	2,339	17,013	62.5	57.3	8.3	37.5
Apr–Jun 1997	45,520	28,564	26,514	2,050	16,956	62.7	58.2	7.2	37.3
Apr–Jun 1998	45,691	28,506	26,715	1,791	17,185	62.4	58.5	6.3	37.6
Apr–Jun 1999	45,905	28,840	27,097	1,743	17,065	62.8	59.0	6.0	37.2
Apr–Jun 2000	46,152	29,069	27,469	1,600	17,084	63.0	59.5	5.5	37.0
Apr–Jun 2001	46,467	29,176	27,706	1,470	17,291	62.8	59.6	5.0	37.2
Apr–Jun 2002	46,750	29,433	27,911	1,521	17,317	63.0	59.7	5.2	37.0
Apr–Jun 2003	47,041	29,659	28,191	1,468	17,382	63.0	59.9	5.0	37.0
Apr–Jun 2004	47,391	29,867	28,428	1,439	17,524	63.0	60.0	4.8	37.0
Apr–Jun 2005	47,824	30,170	28,732	1,438	17,653	63.1	60.1	4.8	36.9
Apr–Jun 2006	48,217	30,686	28,998	1,687	17,531	63.6	60.1	5.5	36.4
Apr–Jun 2007	48,624	30,832	29,174	1,658	17,792	63.4	60.0	5.4	36.6
LFS aggregates interim-reweighted (previously published)									
Apr–Jun 1992	45,001	28,376	25,597	2,780	16,624	63.1	56.9	9.8	36.9
Apr–Jun 1993	45,029	28,218	25,284	2,934	16,811	62.7	56.2	10.4	37.3
Apr–Jun 1994	45,076	28,181	25,445	2,737	16,895	62.5	56.4	9.7	37.5
Apr–Jun 1995	45,201	28,208	25,767	2,441	16,993	62.4	57.0	8.7	37.6
Apr–Jun 1996	45,355	28,345	26,009	2,336	17,010	62.5	57.3	8.2	37.5
Apr–Jun 1997	45,509	28,561	26,513	2,048	16,949	62.8	58.3	7.2	37.2
Apr–Jun 1998	45,675	28,509	26,721	1,788	17,166	62.4	58.5	6.3	37.6
Apr–Jun 1999	45,880	28,833	27,090	1,743	17,047	62.8	59.0	6.0	37.2
Apr–Jun 2000	46,128	29,061	27,461	1,599	17,067	63.0	59.5	5.5	37.0
Apr–Jun 2001	46,441	29,167	27,694	1,472	17,274	62.8	59.6	5.0	37.2
Apr–Jun 2002	46,727	29,422	27,906	1,516	17,305	63.0	59.7	5.2	37.0
Apr–Jun 2003	47,016	29,656	28,192	1,464	17,361	63.1	60.0	4.9	36.9
Apr–Jun 2004	47,361	29,857	28,423	1,434	17,504	63.0	60.0	4.8	37.0
Apr–Jun 2005	47,787	30,163	28,727	1,435	17,624	63.1	60.1	4.8	36.9
Apr–Jun 2006	48,185	30,670	28,983	1,687	17,515	63.7	60.2	5.5	36.3
Apr–Jun 2007	48,590	30,814	29,153	1,661	17,776	63.4	60.0	5.4	36.6
Difference between results as shown[2]									
Apr–Jun 1992	–5	3	4	–2	–7	–	–	–	–
Apr–Jun 1993	–7	2	4	–2	–9	–	–	–	–
Apr–Jun 1994	–4	3	3	–1	–7	–	0.1	–	–
Apr–Jun 1995	4	4	1	3	–1	–	–	–	–
Apr–Jun 1996	6	3	–	3	3	–	–	0.1	–
Apr–Jun 1997	11	3	1	2	7	–0.1	–0.1	–	0.1
Apr–Jun 1998	16	–3	–6	3	19	–	–	–	–
Apr–Jun 1999	25	7	7	–	18	–	–	–	–
Apr–Jun 2000	24	8	8	1	17	–	–	–	–
Apr–Jun 2001	26	9	12	–2	17	–	–	–	–
Apr–Jun 2002	23	11	5	5	12	–	–	–	–
Apr–Jun 2003	25	3	–1	4	21	–0.1	–0.1	0.1	0.1
Apr–Jun 2004	30	10	5	5	20	–	–	–	–
Apr–Jun 2005	37	7	5	3	29	–	–	–	–
Apr–Jun 2006	32	16	15	–	16	–0.1	–0.1	–	0.1
Apr–Jun 2007	34	18	21	–3	16	–	–	–	–

Notes:

1 Estimates derived from reweighted LFS microdata.

2 Levels are rounded to the nearest thousand and rates are rounded to one decimal place.

– difference is zero

Table 4

Differences between LFS regional population estimates, interim-reweighted (previously published) and reweighted LFS microdata

United Kingdom   **Thousands**

	North East	North West	Yorkshire and The Humber	East Midlands	West Midlands	East	London	South East	South West	Wales	Scotland	Northern Ireland
All people aged 16 and over												
LFS estimates: reweighted LFS microdata[1]												
Apr–Jun 1992	2,025	5,308	3,868	3,164	4,083	4,032	5,389	5,993	3,716	2,250	3,990	1,177
Apr–Jun 1993	2,023	5,301	3,863	3,175	4,081	4,038	5,382	5,999	3,728	2,251	3,993	1,190
Apr–Jun 1994	2,017	5,288	3,859	3,183	4,076	4,049	5,389	6,022	3,741	2,251	3,998	1,199
Apr–Jun 1995	2,014	5,281	3,858	3,198	4,081	4,072	5,412	6,061	3,762	2,253	4,005	1,207
Apr–Jun 1996	2,013	5,274	3,861	3,215	4,090	4,096	5,455	6,097	3,776	2,259	4,005	1,220
Apr–Jun 1997	2,010	5,267	3,860	3,228	4,092	4,127	5,487	6,143	3,805	2,264	4,006	1,232
Apr–Jun 1998	2,008	5,273	3,862	3,241	4,100	4,158	5,525	6,177	3,826	2,271	4,009	1,241
Apr–Jun 1999	2,004	5,266	3,864	3,257	4,105	4,184	5,609	6,228	3,853	2,275	4,012	1,247
Apr–Jun 2000	2,003	5,277	3,872	3,273	4,108	4,217	5,697	6,265	3,887	2,283	4,015	1,256
Apr–Jun 2001	2,007	5,293	3,896	3,296	4,127	4,247	5,795	6,303	3,915	2,291	4,029	1,268
Apr–Jun 2002	2,015	5,314	3,927	3,329	4,148	4,279	5,842	6,330	3,945	2,305	4,036	1,280
Apr–Jun 2003	2,022	5,348	3,960	3,363	4,171	4,319	5,851	6,369	3,977	2,321	4,050	1,291
Apr–Jun 2004	2,029	5,381	4,001	3,404	4,194	4,356	5,880	6,409	4,016	2,340	4,078	1,303
Apr–Jun 2005	2,041	5,415	4,050	3,444	4,223	4,407	5,941	6,470	4,064	2,354	4,100	1,318
Apr–Jun 2006	2,051	5,441	4,091	3,484	4,246	4,451	5,992	6,523	4,105	2,370	4,127	1,336
Apr–Jun 2007	2,062	5,469	4,134	3,523	4,266	4,499	6,043	6,582	4,151	2,385	4,155	1,356
LFS aggregate estimates: interim-reweighted (previously published)												
Apr–Jun 1992	2,025	5,309	3,868	3,163	4,083	4,029	5,390	5,992	3,718	2,249	3,992	1,177
Apr–Jun 1993	2,023	5,303	3,864	3,174	4,081	4,037	5,381	5,999	3,730	2,250	3,994	1,190
Apr–Jun 1994	2,017	5,290	3,859	3,182	4,075	4,048	5,386	6,019	3,745	2,251	4,000	1,199
Apr–Jun 1995	2,014	5,283	3,858	3,196	4,079	4,069	5,409	6,056	3,765	2,253	4,006	1,207
Apr–Jun 1996	2,013	5,276	3,860	3,213	4,087	4,094	5,450	6,093	3,779	2,259	4,006	1,220
Apr–Jun 1997	2,010	5,268	3,859	3,226	4,090	4,124	5,483	6,138	3,804	2,264	4,007	1,231
Apr–Jun 1998	2,008	5,271	3,861	3,239	4,099	4,155	5,520	6,172	3,824	2,270	4,009	1,241
Apr–Jun 1999	2,004	5,265	3,863	3,254	4,103	4,181	5,600	6,221	3,849	2,274	4,012	1,247
Apr–Jun 2000	2,003	5,276	3,871	3,271	4,107	4,213	5,689	6,260	3,883	2,282	4,014	1,256
Apr–Jun 2001	2,006	5,292	3,894	3,294	4,125	4,244	5,787	6,299	3,912	2,291	4,028	1,268
Apr–Jun 2002	2,014	5,312	3,924	3,326	4,146	4,276	5,838	6,328	3,943	2,304	4,036	1,279
Apr–Jun 2003	2,021	5,345	3,957	3,360	4,169	4,315	5,850	6,365	3,974	2,320	4,049	1,290
Apr–Jun 2004	2,028	5,379	3,998	3,400	4,192	4,353	5,877	6,406	4,013	2,339	4,075	1,302
Apr–Jun 2005	2,040	5,412	4,045	3,440	4,220	4,402	5,935	6,464	4,060	2,353	4,098	1,317
Apr–Jun 2006	2,050	5,439	4,088	3,480	4,244	4,447	5,988	6,519	4,102	2,369	4,125	1,334
Apr–Jun 2007	2,061	5,467	4,130	3,520	4,264	4,495	6,039	6,577	4,147	2,384	4,153	1,354
Difference between results as shown[2]												
Apr–Jun 1992	–	–1	–	1	–	3	–1	1	–2	1	–2	–
Apr–Jun 1993	–	–2	–1	1	–	1	1	–	–2	1	–1	–
Apr–Jun 1994	–	–2	–	1	1	1	3	3	–4	–	–2	–
Apr–Jun 1995	–	–2	–	2	2	3	3	5	–3	–	–1	–
Apr–Jun 1996	–	–2	1	2	3	2	5	4	–3	–	–1	–
Apr–Jun 1997	–	–1	1	2	2	3	4	5	1	–	–1	1
Apr–Jun 1998	–	2	1	2	1	3	5	5	2	1	–	–
Apr–Jun 1999	–	1	1	3	2	3	9	7	4	1	–	–
Apr–Jun 2000	–	1	1	2	1	4	8	5	4	1	1	–
Apr–Jun 2001	1	1	2	2	2	3	8	4	3	–	1	–
Apr–Jun 2002	1	2	3	3	2	3	4	2	2	1	–	1
Apr–Jun 2003	1	3	3	3	2	4	1	4	3	1	1	1
Apr–Jun 2004	1	2	3	4	2	3	3	3	3	1	3	1
Apr–Jun 2005	1	3	5	4	3	5	6	6	4	1	2	1
Apr–Jun 2006	1	2	3	4	2	4	4	4	3	1	2	2
Apr–Jun 2007	1	2	4	3	2	4	4	5	4	1	2	2

Notes:

1 Estimates derived from reweighted LFS microdata.

2 Levels are rounded to the nearest thousand.

– difference is zero

adjustment on the LFS regional published aggregates is small.

Summary of LFS seasonal adjustment review 2008

A comprehensive review of the seasonal adjustment of all aggregate results published in the monthly national and regional Labour Market Statistics First Releases was carried out in March 2008. This included an examination of any changes in seasonality and the identification of any reasons for unusual patterns. The settings for the seasonal adjustment process were also reviewed, for example, the choice of model and the types of moving averages used for estimating the trend and seasonal components. The time period covered was 1992 to 2007 inclusive.

LFS seasonal adjustment has been carried out in the past using the standard international tool X-11 Arima. Following this review, the latest version of this tool, X-12 Arima, has now been embedded into the production process for the LFS aggregate results. This has led to improved efficiency and greater flexibility when producing the seasonally adjusted figures. The implementation of the new tool itself has not caused any revisions to the LFS results.

For all series except those measuring average hours worked and reasons for

Table 5
Differences between LFS regional aggregate estimates, interim-reweighted (previously published) and reweighted LFS microdata, after seasonal adjustment review, April to June 2007

United Kingdom   Thousands, seasonally adjusted, except where indicated

	All aged 16 and over	Economically active	In employment	Unemployed	Economically inactive	Economic activity rate (%)	Employment rate (%)	Unemployment rate (%)	Economic inactivity rate (%)
LFS aggregate estimates: reweighted LFS microdata,[1] after seasonal adjustment review									
North East	2,062	1,237	1,158	79	824	60.0	56.2	6.4	40.0
North West	5,469	3,381	3,183	198	2,088	61.8	58.2	5.8	38.2
Yorkshire and The Humber	4,134	2,567	2,423	143	1,567	62.1	58.6	5.6	37.9
East Midlands	3,523	2,251	2,138	112	1,272	63.9	60.7	5.0	36.1
West Midlands	4,266	2,663	2,482	181	1,603	62.4	58.2	6.8	37.6
East	4,499	2,905	2,771	133	1,594	64.6	61.6	4.6	35.4
London	6,043	3,930	3,639	291	2,113	65.0	60.2	7.4	35.0
South East	6,582	4,345	4,161	184	2,237	66.0	63.2	4.2	34.0
South West	4,151	2,623	2,518	105	1,528	63.2	60.7	4.0	36.8
Wales	2,385	1,435	1,356	79	950	60.2	56.9	5.5	39.8
Scotland	4,155	2,677	2,556	122	1,478	64.4	61.5	4.5	35.6
Northern Ireland	1,356	819	788	31	537	60.4	58.1	3.8	39.6
LFS aggregate estimates: interim-reweighted (previously published)									
North East	2,061	1,237	1,157	80	824	60.0	56.1	6.5	40.0
North West	5,467	3,381	3,185	197	2,086	61.9	58.3	5.8	38.1
Yorkshire and The Humber	4,130	2,561	2,416	145	1,569	62.0	58.5	5.7	38.0
East Midlands	3,520	2,249	2,136	113	1,271	63.9	60.7	5.0	36.1
West Midlands	4,264	2,665	2,483	182	1,600	62.5	58.2	6.8	37.5
East	4,495	2,901	2,767	134	1,594	64.5	61.6	4.6	35.5
London	6,039	3,935	3,644	291	2,104	65.2	60.3	7.4	34.8
South East	6,577	4,334	4,152	182	2,243	65.9	63.1	4.2	34.1
South West	4,147	2,618	2,513	105	1,529	63.1	60.6	4.0	36.9
Wales	2,384	1,437	1,357	80	948	60.3	56.9	5.6	39.7
Scotland	4,153	2,679	2,558	121	1,474	64.5	61.6	4.5	35.5
Northern Ireland	1,354	817	787	31	537	60.4	58.1	3.7	39.6
Difference between results as shown[2]									
North East	1	–	1	–1	–	–	0.1	–0.1	–
North West	2	–	–2	1	2	–0.1	–0.1	–	0.1
Yorkshire and The Humber	4	6	7	–2	–2	0.1	0.1	–0.1	–0.1
East Midlands	3	2	2	–1	1	–	–	–	–
West Midlands	2	–2	–1	–1	3	–0.1	–	–	0.1
East	4	4	4	–1	–	0.1	–	–	–0.1
London	4	–5	–5	–	9	–0.2	–0.1	–	0.2
South East	5	11	9	2	–6	0.1	0.1	–	–0.1
South West	4	5	5	–	–1	0.1	0.1	–	–0.1
Wales	1	–2	–1	–1	2	–0.1	–	–0.1	0.1
Scotland	2	–2	–2	1	4	–0.1	–0.1	–	0.1
Northern Ireland	2	2	1	–	–	–	–	0.1	–

Notes:

1 Estimates derived from reweighted LFS microdata.
2 Levels are rounded to the nearest thousand and rates are rounded to one decimal place.

– difference is zero

part-time work, the review recommended no changes to the method of seasonal adjustment. Consequently, any revisions arising from this review are mostly very small and are the result of more, and updated, data feeding into the seasonal adjustment. In addition, though, the opening up of the time series back to 1992 for revisions has meant that some recommendations from previous reviews of LFS seasonal adjustment have now fed through to published results. At previous reviews, only the three latest years were opened up to revision. These additional historical revisions are also mostly very small.

The revisions resulting from the seasonal adjustment review generally have very little impact on the headline LFS series, as indicated in the previous section. The series that require comment are discussed in more detail below.

Reasons for working part-time

Reasons for working part-time (Table 3 of the Labour Market Statistics First Release) classifies those who are employed part-time by the reasons they give for not working full-time. The published breakdowns consist of 'could not find full-time job', 'did not want full-time job', 'ill or disabled' and 'student or at school'.

Historically, all the above published seasonally adjusted figures have been constrained to the total of part-time workers by reason. However, this calculation did not include the answer 'no reason given', which although unpublished, has been used to derive the total before seasonal adjustment. As a result, each reason has been scaled up or down by slightly more than it should have been.

Changing the constraining methodology to include the 'no reason given' series

means that additivity appears to be lost when comparing the published series with the total (the 'no reason given' category is neither published nor seasonally adjusted as it is regarded as too small to do so). The overall effect is minimal and it now means that the seasonally adjusted estimates for each reason are fully consistent with the not seasonally adjusted estimates, which are also publicly available.

Average hours worked

Changes to the seasonal adjustment method were recommended for the series in Table 7 of the Labour Market Statistics First Release, that is, the average actual weekly hours of work. These statistics measure the number of hours actually worked by respondents during the week surveyed. They are affected directly by changes in the number of hours individuals work, in particular those caused by time off due to holidays. A number of 'calendar effects' related to holiday periods can cause distortions to the seasonal adjustment of the actual hours worked series. These are:

- late May bank holiday – which falls in either the May or June survey period
- August bank holiday – which falls in either the August or September survey period
- Easter – which usually falls in either March or April, and sometimes affects the May survey period
- Christmas – which falls in either the December or January survey period, or sometimes straddles both

LFS historical data are used to model the impact of the calendar effects. Permanent prior adjustments are then derived from that analysis and are used to remove the calendar effects during the seasonal

adjustment process.

Another potential calendar effect can result from the shifting of the survey reference periods by one or two days each year, called the 'phase shift' effect. For example, the survey period for January to March 2008 covered the period 24 December 2007 to 23 March 2008, whereas that for the previous year covered 25 December 2006 to 24 March 2007. This is because questions in the LFS refer to the respondents' situation in the previous week, covering the period Monday to Sunday inclusive. A one-week survey break is needed to bring the survey calendar back into line with the real calendar. The next one will be in October 2008.

The phase shift effect has been included for all the actual hours worked component series in recent years; that is, all those shown in Table 7 of the Labour Market Statistics First Release. However, the latest review has indicated that, in most cases, the phase shift effect is closely correlated with the calendar effects associated with holiday periods. Consequently, adjustments for the phase shift effect have been removed from most of the component series. There are also some changes as to which calendar effects are adjusted for. The impact of the revised seasonal adjustment settings for the average actual weekly hours for all workers is illustrated in **Figure 3**.

As can be seen, most of the revisions to the previously published statistics are very small and are no bigger then 0.2 hours. The revised average hours figures feed into the estimates of total weekly hours worked, also shown in Table 7 of the Labour Market Statistics First Release. The revisions to that series are smaller than those of the average hours worked.

Reweighting of other LFS outputs

All reweighted LFS microdata for the period 1997 onwards at a national and regional level were published on 14 May 2008. These include quarterly databases from January to March 1997 through to January to March 2008. Following this, quarterly household microdata for the period 1997 to 2008 will be published in June to coincide with the annual release on work and worklessness among households. Later in the summer, the remaining microdata will be published. This includes the five-quarter longitudinal microdata for the period from 1992, the annual data sets and quarterly microdata between 1992 and 1996.

Figure 3
Average actual weekly hours, all persons in employment, seasonally adjusted[1]

Hours

| | Previously published | Revised |
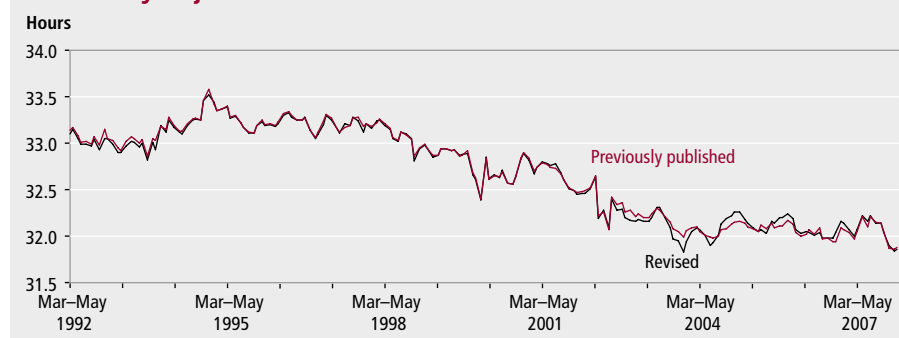
Note:

1   Dates represent rolling three-monthly periods.

Conclusions and next steps

This article has presented analysis on the impact of full reweighting and the implementation of recommendations from the latest seasonal adjustment review on the LFS aggregates and microdata. The revisions to the national and regional levels are mostly less than 0.1 per cent and the revisions to the rates are mostly zero, with just a few at 0.1 percentage points. The results show that the LFS aggregates are not affected significantly by the revisions. This also shows that the interim-reweighting of the LFS aggregate estimates has been effective at approximating the impact of fully reweighted microdata.

ONS aims to ensure that its published LFS estimates continue to be kept closely in line with the latest published population estimates. Future revised population estimates will be incorporated into the revised LFS series using the interim LFS adjustment procedure as appropriate. Full reweighting for future years will depend on the extent of revisions to official population estimates and availability of resources.

Notes

1 See www.statistics.gov.uk/downloads/ theme_labour/lfsug_vol1_2007.pdf

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