

## **Labour Market Statistics Methodology Article, June 2015**

### **Review of the Reconciliation of ONS Estimates of Jobs 2015**

#### **Executive summary**

The data sources and methodology used for the reconciliation of ONS estimates of jobs have been reviewed and, where possible, have been updated. The revisions to the adjustments are as follows:

1. Temporary foreign workers: previously the time lag between the latest International Passenger Survey (IPS) and the quarterly reconciliation was filled by applying the annual growth in National Insurance Number registrations (NINo's) to the most recent IPS based estimate of short-term migrants. The NINo registrations are no longer regarded as a reliable forward indicator of changes in the number of temporary foreign workers. Therefore, the latest IPS estimate for short term migrants in employment will be carried forward until the next IPS based estimate is available.
2. Workers living in communal establishments were adjusted for using pilot survey data from 2000. 2011 Census data has now replaced this pilot survey source.
3. The adjustment for response bias on the LFS has been removed from the reconciliation following the results of the 2011 Census non-response bias project.
4. Estimation of the over counting of self-employed jobs now incorporates data relating to second jobs as well as main jobs.
5. The adjustments were recalculated using the LFS data reweighted to take account of 2011 Census-based population estimates.
6. The adjustments were calculated on the three month rolling quarter basis as opposed to the calendar quarter as they had been previously. This change meant that the components and adjustments were calculated on the same basis.

#### **Impact**

In the period November to January 2015, the adjusted LFS estimate of total UK jobs using the old method is 623,000 lower than the adjusted WFJ estimate. For the same period, the updated reconciliation results in an adjusted estimate of total UK jobs from the LFS is 798,000 lower than the adjusted WFJ estimate. Therefore the gap between the two estimates has been widened by 175,000.

The removal of the LFS non-response bias adjustment has had the greatest overall impact on the adjusted estimates. However, the non-response bias was included as a constant so although the level was relatively high it did not impact on the comparisons of the quarterly or annual movements in the reconciliation.

## Background

The concept of employment (measured by the LFS as the number of people in work) differs from the concept of jobs, since a person can have more than one job, and some jobs may be shared by more than one person. The LFS, which collects information mainly from residents of private households, is the preferred source of statistics on employment.

The LFS can also be used to produce estimates of the total number of jobs in the UK, by adding together the headline employment figures (which are equivalent to main jobs) and those for workers with a second job. The LFS does not collect information on third and subsequent jobs. The WFJ series, which is compiled mainly from surveys of businesses, such as the Short-Term Employment Survey (STES) and Business Register Employment Survey (BRES), and is the preferred source of statistics on jobs by industry, since it provides a more reliable industry breakdown than the LFS. WFJ is benchmarked to BRES and uses the Inter-Departmental Business Register as the sample frame.

Every quarter ONS publishes a report on the reconciliation of LFS and WFJ estimates of jobs, for the November to January 2015 report, see [the latest WFJ article here](#).

## Introduction

The 1.373 million difference which exists between the unadjusted LFS and WFJ estimates of jobs for November to January 2014 is partly due to the two published series not being entirely consistent in terms of their coverage. A number of differences exist because the coverage of the LFS excludes groups which are included in the WFJ series. There are also groups which are omitted from the WFJ but are included in the LFS.

Both LFS and WFJ series have recently been subject to significant revisions. In autumn 2014, the LFS was reweighted to population estimates based on the 2011 Census (for more detail see [Revisions to Labour Force Survey estimates due to re-weighting to the Census 2011 population](#)) and WFJ was benchmarked to the 2013 Business Register Employment Survey ([see reweighting and benchmarking articles here](#)).

In addition to the above revisions, the methods and sources used to reconcile the series have been reviewed. This paper outlines the changes that have been made. These updates are discussed in three groupings – employment not covered by the LFS, employment not covered by the WFJ, and adjustments due to unclear boundaries and coverage.

Some reconciliation adjustments are made using LFS microdata, others have been made from non-LFS survey sources, such as the 2011 Census or administrative sources. Not all sources used will have National Statistics status. In addition, it should be noted that these alternative sources include some definitional and methodological differences. (For instance the frequency of data collection). Consequently, the adjustments will be subject to a margin of error.

In the period November to January 2015, the adjusted LFS estimate of total UK jobs using the old method is 623,000 lower than the adjusted WFJ estimate. For the same period, using the reviewed adjustments, the resulting adjusted estimate of total UK jobs is 798,000 lower than the adjusted WFJ estimate. Hence the ‘gap’ between the two series has widened by

175,000 as a result of the adjustments review. This is primarily because of the removal of the non-response bias adjustment of 230,000 from the LFS estimate of jobs. The reasons for the removal of this adjustment and the other changes in methods and sources are detailed below.

## **1. Jobs not covered by the LFS**

There are a number of other known differences that can be estimated from other sources. The following are known to be excluded from the LFS estimates of jobs, but are covered by WFJ:

- armed forces personnel not living in private households,
- people living in communal establishments, such as lodging houses and hostels, who are in employment,
- people with third and subsequent jobs,
- temporary visitors to the UK, who have undertaken work.
- jobs not identified due to proxy responses on the LFS

### **1.1 Armed forces not in private households**

The LFS includes members of the armed forces living in private households but not those resident on armed forces bases. The WFJ series includes all armed forces regardless of where they reside. Those excluded from the LFS are estimated by subtracting the LFS estimates for all HM Forces personnel living in private accommodation from the Public Sector Employment figures of total Armed Force members.

MoD data from the Continuous Attitude Survey were considered as a possible alternative source for the number of Armed Forces Personnel living in private accommodation. However the MoD statistic for the proportion of Armed Force personnel living in private accommodation is much lower than the LFS equivalent microdata estimate, leading to the conclusion that the LFS sampling methodology is including more Armed Forces Personnel than just those as defined by the military as living in private accommodation.

Consequently the currently used method for estimating armed forces personnel not living in private households has been retained.

### **1.2 Workers living in communal establishments**

The LFS includes students who live in halls of residence who have UK resident parents plus nurses who live in NHS staff accommodation. All other communal establishments such as hostels, lodging houses, business premises (eg hotels), where adults who are in employment may be in residence are excluded. Some of these, such as nursing and residential care homes, are unlikely to have many residents who are in employment. In autumn 2000, the ONS undertook a pilot survey of adults living in communal establishments to investigate the feasibility of extending the LFS to cover other communal establishments (Pilot Survey of Communal Establishments, 2000). The pilot survey reported that, excluding students and nurses, 80,000 adults who were living in communal establishments were in employment in Great Britain but that the estimate was subject to a very large margin of error. Up until now, this source was used to provide the adjustment to LFS. However, 2011 Census data is now available and includes an estimate of employed people living in communal establishments.

There are some small definitional differences between the Census and the LFS on the term 'employed', however, despite these differences, it remains a more appropriate adjustment to apply given that it is 11 years more up to date than the 2000 pilot survey and that the Census will have a much far greater response than a pilot survey. The Census estimate is 110,000.

### **1.3 Third and subsequent jobs**

If people have three jobs or more, their third and subsequent jobs are not included in the LFS estimates because the LFS restricts its questionnaire to main and second jobs only. These jobs will be included in the WFJ estimates though. Third and subsequent jobs can be estimated from the Family Resources Survey (FRS). No quarterly estimates are available and it is expected that the estimate will vary around this level over the year due to seasonal effects. LFS and FRS estimates of first and second jobs are in reasonable agreement, which gives confidence in the use of the FRS estimates of third and subsequent jobs. No alternative source has been identified as being an improvement on the FRS, so the adjustment has been updated with the latest estimate (i.e. that for 2012) which remains unchanged at 100,000 jobs.

### **1.4 Temporary foreign workers**

The UK population estimates relate to the 'usually resident' population. The migration estimates collected from the International Passenger Survey define a migrant as someone who is intending to stay for at least 12 months. Therefore, people who come to the UK for less than 12 months are excluded from the population estimates to which the LFS is weighted. Also temporary residents are normally excluded from the LFS.

The estimates used to produce an adjustment to LFS to account for short-term migrants come from IPS table 'Stocks and Mean Lengths of Stay by Main Reason for Migration, Mid-2004-Mid 2012'. This estimate is carried forward since the last available data point in 2012, see: [this migration release](#).

At present, there is no data source to estimate reliably the number of temporary foreign workers in the UK. The International Passenger Survey (IPS) is a continuous annual survey of all UK and foreign nationals who are either entering or leaving the country at all UK airports and ports. Analysis of the 2012 IPS results provides an estimate of 75,000 overseas visitors who find paid work while living as temporary residents in the UK.

The National Insurance number (NINo) statistics represent a flow measure of new registrations by non-UK nationals registering for a National Insurance Number. Prior to this review the growth in the NINo data was used as a proxy for the growth in temporary foreign workers and was added to the latest IPS figures because of the time lag of approximately 2 years between IPS data collection and publication. However, when compared with the IPS data once available, the NINo's growth does not appear to be a reliable proxy for the IPS (see table below).

Year	growth rate IPS	Growth rate NiNo's
Mid 2005	20%	26%
Mid 2006	13%	31%
Mid 2007	-11%	14%
Mid 2008	-19%	1%
Mid 2009	-14%	-15%
Mid 2010	-4%	-4%
Mid 2011	-4%	14%
Mid 2012	5%	14%

Among the possible reasons for the lack of comparability of these two sources is the fact that registrations can be a period of weeks, months or years after arrival in the UK meaning that the NiNo statistics will include both short-term as well as long-term (1 year+) flows.

## 2. Employment not covered by WFJ

It is known that the WFJ omits a number of jobs that may be included in the LFS. These include:

- workers in small businesses not registered for VAT/PAYE,
- some temporary or casual workers,
- some workers on unpaid leave or temporarily absent.

### 2.1 Workers in small businesses not registered for VAT/PAYE

According to the Department of Business Innovation and Skills, there were an estimated 5.2 million businesses in the UK at the start of 2014 ([see this BIS data release](#)). The vast majority of these (75.3%) of private sector businesses do not employ anyone besides the business owners. The Inter-Departmental Business Register (IDBR) holds details of around 2.25 million firms; (it is a comprehensive list of UK business that is used by Government for statistical purposes). Therefore ONS estimates there are 2.95 million small firms not registered for VAT or PAYE and not therefore on the IDBR. The majority of these are sole traders without employees or with contract staff who are self-employed. It is not possible to estimate the number of such employees who earn below the tax threshold but it is likely that the number will be negligible. It is desirable however that further work is undertaken to estimate the number of employees in this group who are not included in the IDBR/BRES and also the extent to which they are accounted for by the LFS-based estimates of self-employment jobs.

## 3. Completion and response

### 3.1 Self-employment/Employee boundary

Self-employment in the LFS is defined by the respondent and it is recognised that some people who state that they are self-employed are actually employees due to the way in which they are paid. This may arise because they work on a casual basis as employees or are employed through an agency, or because the status of their business classifies them as employees.

LFS self-employment (excluding sole directors) is added to the total WFJ series. Any other

LFS respondents who report themselves to be self-employed but pay tax under a PAYE scheme may be double counted in the WFJ series.

An LFS question (SELF) asks those who categorise themselves as self-employed whether they are:

- *Paid a salary or wage by an agency.*
- *Sole director of own limited business.*
- *Running a business or professional practice.*
- *Partner in a business or professional practice.*
- *Working for self.*
- *Sub-contractor*
- *Doing free-lance work.*
- *None of the above.*

An additional question (NITax) was added to the LFS in Q1 2007 which asks self employed people in their main jobs and employees not paid a wage or salary by an employer who it is that pays their National Insurance and Income Tax.

*Do you pay your own National Insurance and Tax or is this usually deducted by the organisation(s) you work(s) for, for example, your client, employer, agency etc.*

- *Pay your own National Insurance and Tax*
- *Pay your own National Insurance or Tax but not both*
- *National Insurance and tax deducted by the organisation(s) you work for, for example, your client, employer, agency, etc*

The answers to these questions are not used to refine the categorisation of self-employment because the respondents' view on their type of employment takes precedence for LFS results purposes. These data could, however, be used to correct the classification of self-employed people using the following methodology:

A respondent is classified as self-employed if:

- They answer that they pay their own National Insurance or Income Tax
- They do not give an answer to the question about who pays their National Insurance or Income Tax and they don't give an answer to who pays their salary or wage.

Prior to 2013, the double counting of self-employed included sole directors of limited liability companies. Many of these people classify themselves as self-employed on the LFS. Up until 2012, such people were treated on BRES as 'working owners' which was consistent with them being included in the self-employed component of the WFJ series. From 2013 onwards sole directors of limited companies have been classified as employees and are therefore removed from the self-employed jobs estimates. Therefore the need to adjust for this specific category of the self-employed over count has no longer been necessary.

The shaded cells in the tables below show how the totals have been calculated for the adjustment since the change in 2013. The total of the shaded cells from Table 2 (number of people wrongly classified as employees) is subtracted from the total of the shaded cells in

Table 1 (number of people wrongly classified as self-employed) to give a total of the self employed over count.

Table 1: Main Jobs, Self-Employed Reclassified as Employees – September 2014

SELF \ NITAX	SELF					Total
	unknown	both agency and sole director	paid by agency	sole director	neither sole director nor agency	
Unknown	1,831	0	0	0	0	1,831
Unknown	1,432	0	664	2,936	25,183	30,215
Pay your own National Insurance and Tax	662	11,529	33,307	408,121	3,598,600	4,052,219
Pay your own National Insurance or Tax but not both	0	0	4,504	14,667	276,156	295,327
National Insurance and tax deducted by your own organisation	0	2,174	16,226	22,321	123,646	164,367
<b>Total</b>	<b>3,925</b>	<b>13,703</b>	<b>54,701</b>	<b>448,045</b>	<b>4,023,585</b>	<b>4,543,959</b>

Total of shaded cells: 140,536

Table 2: Main Jobs, Employees Reclassified as Self-Employed – September 2014

SELF \ NITAX	SELF					Total
	unknown	both agency and sole director	paid by agency	sole director	neither sole director nor agency	
Unknown	0	0	0	0	0	0
Unknown	0	0	0	811	3,063	3,874
Pay own NI and Tax	0	0	24,651	6,015	11,170	41,836
Pay own NI or Tax but not both	0	0	1,742	0	594	2,336
NI and Tax are deducted by organisation	1,415	0	293,962	3,120	78,243	376,740
<b>Total</b>	<b>1,415</b>	<b>0</b>	<b>320,355</b>	<b>9,946</b>	<b>93,070</b>	<b>424,786</b>

Total of shaded cells: 41,220

Net total of self-employed over-count (main jobs): 99,316

In 2012 the NITAX2 and SELF2 questions were added to the LFS, so the self-employed over count for second jobs (using the same method) can now be added to that of main jobs to get a more accurate estimate of the total over count. For the August to October 2014 period, this has added around 19,000 more jobs to the estimate. No data for the second job over count

exists prior to 2012, so the proportion of over counting in second jobs was taken as a proportion of over counting in main jobs and this proportion was added to the main jobs prior to 2012.

Table 3: Second Jobs, Self-Employed Reclassified as Employees – September 2014

SELF NITAX	unknown	both agency and sole director	paid by agency	sole director	neither sole director nor agency	Total
	Unknown	562	0	0	0	0
Unknown	0	0	0	0	11,649	11,649
Pay your own National Insurance and Tax	0	607	4,668	23,504	386,812	415,591
Pay your own National Insurance or Tax but not both	0	0	0	692	31,904	32,596
National Insurance and tax deducted by your own organisation	0	0	3,431	3,200	19,757	26,388
Total	562	607	8,099	27,396	450,122	486,786

Total of shaded cells: 23,188

Table 4: Second Jobs, Employees Reclassified as Self-employed – September 2014

SELF NITAX	unknown	both agency and sole director	paid by agency	sole director	neither sole director nor agency	Total
	Unknown	0	0	0	0	0
Unknown	0	0	686	0	0	686
Pay your own National Insurance and Tax	0	0	2,673	0	635	3,308
Pay your own National Insurance or Tax but not both	0	0	831	0	0	831
National Insurance and tax deducted by your own organisation	0	0	20,014	0	6,255	26,269
Total	0	0	24,204	0	6,890	31,094

Total of shaded cells: 4,139

Net total of self-employed over-count (second jobs): 19,049

Net total of self-employed over-count (main jobs + second jobs): 118,365



### 3.2 LFS proxy response

In the LFS, interviewers can accept information by proxy for those household members not available when the interview takes place. In November 2014 34% of responses were provided by proxy respondents. The benefit of this practice is to maximise response while reducing the number of costly recall interviews, but the drawback is that proxy respondents' knowledge may be inaccurate or incomplete. Earlier studies (for example Dawe F & Knight I, A study of proxy response on the Labour Force Survey) show that such a compromise has a greater effect on some variables than on others. Simple demographic variables like age and sex were not a problem, but there were more discrepancies among less straightforward variables such as hours, income, occupation and industry. Economic activity status was closer to the simple than the complex variables, with fairly good knowledge on the part of proxy respondents. The scale of the effect can be seen from Table 5 of the study, which estimates the effect of proxy error on the economic activity rates for the proxy responses, and which is reproduced here:

	Unweighted LFS results <u>unadjusted</u> for proxy error (%)	Unweighted LFS results <u>adjusted</u> for proxy error (%)
Employees	57.5	58.1
Self-employed	8.3	8.3
ILO unemployed	5.7	6.0
Economically inactive	28.6	27.6

This indicates that proxy respondents slightly under-report employee jobs. Applying this degree of under-reporting of employees to the proxy responses to the LFS in winter 2005 gives an estimate of up to 150,000 employee first jobs missed from LFS because of proxy response. However, this estimate should be treated with caution, since it is based on a small study of 376 pairs of interviews.

As well as economic status, it is possible that proxy respondents under-report the number of second jobs held. In 2005, proxy respondents reported that 2.9% of people in employment had a second job, whereas personal respondents reported 4.0%. Both factors (proxy response and second job) are associated with age and sex: proxy response is more likely for men and the under 25s, and women in employment are more likely to have a second job than men are, and there is also an age effect. Applying the age/sex specific second job rate for personal respondents to the age/sex breakdown for proxy responses suggests there may be up to 90,000 second jobs missing from the LFS because of proxy response bias. These estimates assume that the proxy responses and personal responses relate to similar types of people after allowing for age/sex differences, and do not correct for any more complex interactions between proxy response and other variables such as industry, occupation, education, or other relevant factors not measured on the LFS. These proxy response adjustments are still being made using the same methodology, the latest estimates for December 2014 are 160,000 for main job and 100,000 for second job.

### 3.4 LFS Non-Response Bias

Non-response is a feature of all voluntary surveys, and a major concern for users of survey

data is that respondents and non-respondents may differ in important respects (economic activity in the case of the LFS), and hence that survey estimates may be biased. ONS completed a study of non-response in household surveys based on linking survey samples to the 2011 Census (Non-Response Weights for the UK Labour Force Survey? Results from the Census Non-Response Link Study).

The results of the 2011 census non-response link study (CNRLS) show limited evidence for non-response bias on the LFS. In general, the adjusting for non-response based on CNRLS data made little difference to the estimates obtained using the current weighting procedures. On the basis of these findings it is assumed that non-response bias exists on the LFS, but that it is either negligible or very difficult to quantify, hence for the purposes of the current Work Force Jobs, Labour Force Survey reconciliation, no attempt will be made to account for it. This is different to the conclusion drawn from a similar exercise using 2001 Census. It is important to note that the CNRLS does not consider the effect of attrition (people who responded to the LFS originally but who drop out at subsequent waves).

#### **4. Other possible differences**

It is known that there are other differences that have not been quantified. A follow-up survey reported that only 60 per cent of WFJ respondents indicated that the payroll system was used as the data source. Where personnel and other systems are being used, it may be possible that some vacancies are being counted if the records are not updated by the survey date.

Annex 1 lists a full range of possible reasons (around 30) for the difference between LFS and WFJ estimates. It is not known how much these other issues due to vacancies, non-response in the workforce jobs series and the other issues discussed in Annex 1 will impact on the outstanding difference.

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**Annex 1 – List of possible reasons for differences between LFS and WFJ estimates of jobs.**

<u>Employment not covered by the LFS</u>	Is this adjusted for in the WFJ/LFS reconciliation?	Was this reviewed in 2014?	Was the estimate changed as a result of the review?
1. Armed forces personnel not in private accommodation,	YES	YES	NO
2. Communal establishments such as lodging house and hostels are known to include a number of residents who are in employment,	YES	YES	YES
3. Third and subsequent jobs,	YES	YES	NO
4. Temporary foreign workers/Short-term migrants (excluded from population weighting)	YES	YES	YES
5. Underestimate of jobs due to proxy response on the LFS	YES	NO	NO
<u>Employment not covered by the WFJ</u>			
6. Jobs in extra-territorial organisations	YES	NO	NO
7. Unpaid family workers	YES	NO	NO
8. Jobs in small businesses not registered for VAT/PAYE	NO	NO	NO
9. Jobs in Managed Service Companies excluded from business survey sample frame	YES	YES	YES
10. Some workers on unpaid leave or temporarily absent.	NO	NO	NO
<u>Completion and response issues</u>			
11. Self-employment/employee boundary issues – e.g. over-reporting of self-employed on the LFS	YES	YES	YES
12. WFJ relies on the quality of the IDBR since IDBR is used as the sampling frame and IDBR is used as auxiliary variable in estimation process.	NO	NO	NO
14. Timing differences: WFJ is point in time each quarter whereas LFS is a three-month average	NO	NO	NO
17. LFS respondent bias: proxy responses	YES	YES	NO
18. Non-response bias on LFS	YES	YES	YES (removed)
<u>Other issues</u>			

20. LFS and WFJ demonstrate different seasonal patterns, related to the timing differences	NO	NO	NO
21. LFS grosses to the population estimates projections which are 2 years behind real time.	NO	NO - to be reviewed in 2015	NO
22. Bias in recent estimates: the use of matched pairs estimation produces statistics of lesser quality than would ratio estimation	NO	NO	NO
23. LFS wave and interview mode effects	NO	NO	NO
24. Respondent bias: personal response	NO	NO	NO
25. Government supported trainees: LFS asks respondents (or their proxies) if they are GSTs; numbers differ when compared to administrative returns from DWP	NO	NO	NO
26. If new firms (births) are added to the IDBR more quickly than old (dead) firms are removed, bias will be introduced.	NO	NO	NO
27. Progressive improvements to the IDBR and its coverage would bias the growth estimates upwards.	NO	NO	NO
28. Those working without valid visas may or may not be included on the LFS, likewise they may or may not be included on the Work Force Jobs.	NO	NO	NO

**Annex 2 - Table showing the reconciliation adjustments November to January 2015 comparing old and new methods**

	Dec-14 old method	Dec-14 new method	Difference
<b>LFS</b>			
<b>Estimate before adjustment</b>	<b>32,140</b>	<b>32,140</b>	<b>0</b>
Temporary foreign workers	80	75	-5
Armed forces not living in private accommodation	70	70	0
Workers living in communal establishments	80	110	30
3rd and subsequent employee jobs	100	100	0
LFS proxy response error (main jobs)	160	160	0
LFS proxy response error (2nd jobs)	100	90	-10
LFS non-response bias	230	...	-230
<b>Total adjustment</b>	<b>820</b>	<b>605</b>	<b>-215</b>
<b>Adjusted estimate of total LFS UK jobs</b>	<b>32,960</b>	<b>32,745</b>	<b>-215</b>
Difference: LFS-WFJ ('000s)	-623	-798	-175
% Difference: LFS-WFJ as % of LFS	-1.9	-2.4	-0.5
<b>WFJ</b>			
<b>Estimate before adjustment</b>	<b>33,513</b>	<b>33,513</b>	<b>0</b>
Extra-territorial organisations	30	30	0
Unpaid family workers	110	110	0
Employment in Managed Service Companies excluded from business survey sample frame	20	10	-10
Double-counting due to over-reporting of self-employment	-90	-120	-30
<b>Total adjustment</b>	<b>70</b>	<b>30</b>	<b>-40</b>
<b>Adjusted estimate of total WFJ UK jobs</b>	<b>33,583</b>	<b>33,543</b>	<b>-40</b>