



Department  
for Work &  
Pensions

# Income-Related Benefits: Estimates of Take-up - Financial Year 2013/14 (experimental)

## Technical Report

June 2015

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# 1 Introduction

## 1.1 Overview

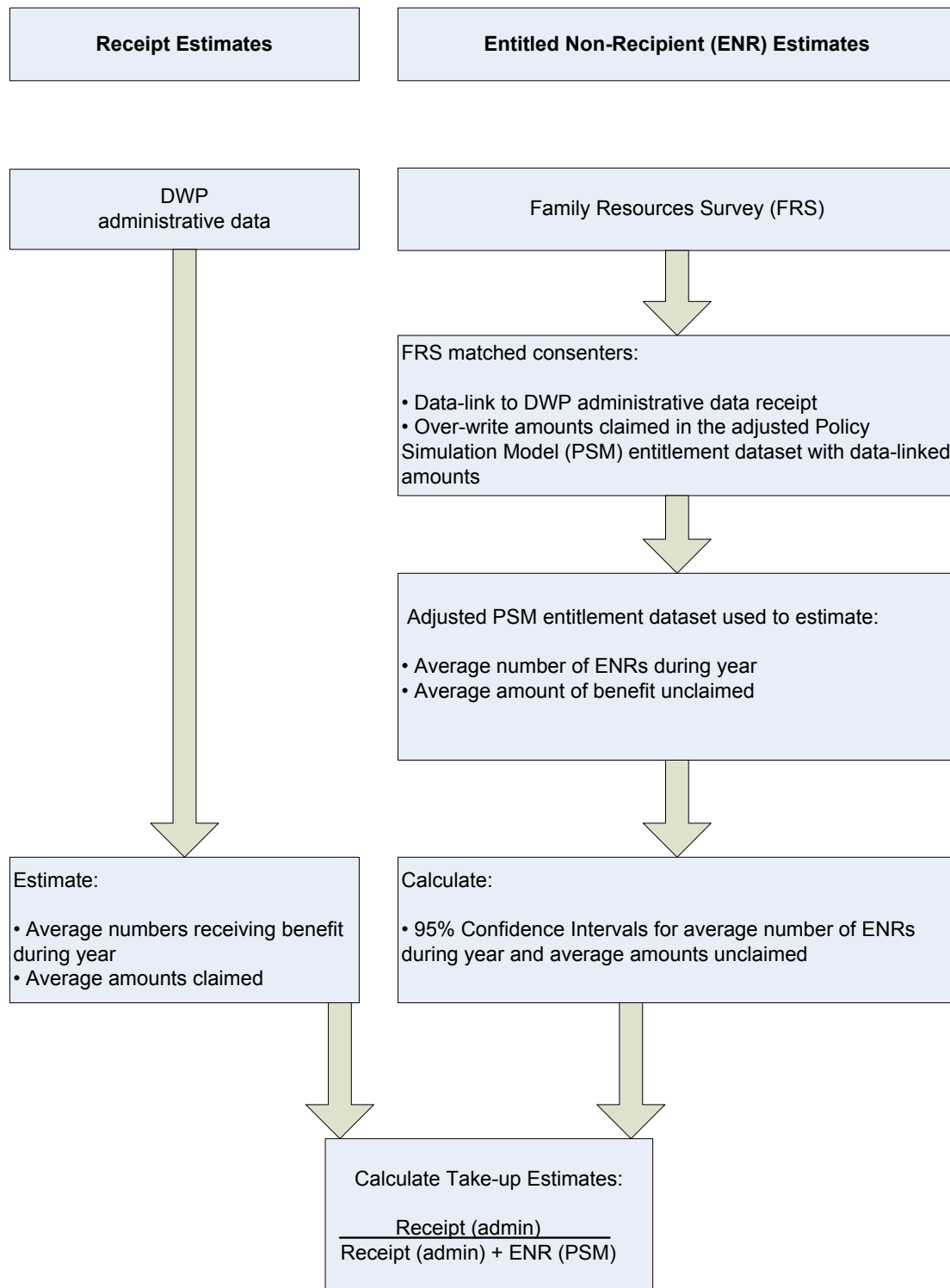
To produce the take-up estimates, information can be taken from DWP administrative data sources to present the average number of those in receipt of the benefit along with the average amount claimed. However, in the absence of an official benefit entitlement dataset which provides information of those who are entitled but not receiving (ENRs), estimates of the ENR caseload and unclaimed amounts are required. There is the further constraint of known data issues in the FRS and also the inability to link to administrative data for over half the FRS population due to non-consent or inability to match data. Therefore, the methodology aims to provide the best estimate based on the evidence available.

This report presents the new methodology, which is strongly focussed on using evidence to produce the take-up estimates. The use of arbitrary assumptions and non-evidence-based (theoretical) adjustments has been avoided.

The flow diagram in section 1.2 illustrates how the methodology works.

## 1.2 Flow diagram

### Take-Up Estimates Process Flow Diagram



# 2 Data sources

## 2.1 Overview

The take-up estimates are derived using information taken directly from data sources along with a small number of evidence-based adjustments where necessary (rather than relying on theoretical assumptions).

For receipt estimates of PC and IS/ESA (IR), the Work and Pensions Longitudinal Study (WPLS) is the main data source. The Quarterly Statistical Enquiry (QSE) data are used for JSA (IB) receipt estimates and to adjust the receipt estimates for PC, IS/ESA (IR) and JSA (IB) to exclude any non-private households (to be consistent with the ENR estimates, which are for private households only). For HB, Single Housing Benefit Extract (SHBE) data are used. HB is only available to private households so no adjustment to remove non-private households is needed.

For ENR estimates, a combination of an adjusted entitlement dataset from the Policy Simulation Model (PSM) and reported receipt from the Family Resources Survey (FRS) are used. In the production of the adjusted PSM entitlement dataset, certain benefit units are linked to their administrative records on the WPLS for estimating ENRs of PC, IS / ESA (IR), and JSA (IB), and SHBE for HB to use actual amounts paid rather than reported FRS amounts.

## 2.2 Work and Pensions Longitudinal Study (WPLS)

The WPLS links DWP benefit and programme data on customers with their employment records from Her Majesty's Revenue and Customs (HMRC).

The WPLS is used to produce receipt estimates for PC and IS/ESA (IR) as it provides 100 percent DWP administrative records for all those receiving the benefits. The datasets are available quarterly across the financial year in May, August, November and February.

## 2.3 Quarterly Statistical Enquiry (QSE)

The QSE is a quarterly electronic scan of 5 percent of DWP administrative records of all those receiving benefit. The scans are taken at the end of May, August, November and February of each financial year.

JSA (IB) receipt estimates are derived using the QSE data, as the WPLS does not provide information on which type of JSA the recipient is receiving. Therefore, those receiving JSA (C) only cannot be excluded from the estimates.

The other key use of the QSE data is to identify the proportion of benefit units that are private households in the receipt estimates for PC, IS/ESA (IR) and JSA (IB). It is applied to the initial average numbers receiving each benefit. This adjustment ensures the estimate of the average numbers receiving benefit is consistent with the estimate of the average number of ENRs, which are for private households only (as one of the key data sources is the FRS – see section 2.5 below).

## 2.4 Single Housing Benefit Extract (SHBE)

SHBE is a monthly electronic scan taken directly from local authority computer systems and provided to DWP for analysis.

The data are used as they provide 100 percent administrative records for all those receiving HB. As only private households can receive HB, no adjustment is needed to remove non-private households for the receipt estimates. SHBE is also used to data-link with FRS matched consenters for the ENR estimates.

## 2.5 Family Resources Survey (FRS)

The FRS is an annual survey, collecting information on around 20,000 private households in the United Kingdom. The primary function is to collect information on household income claimed from all sources, including wages and salaries, state benefits, payable Tax Credits, private (occupational and personal) pension schemes, and investments. The information allows analysis at an individual level, benefit unit level and household level. The survey is sponsored by the Department for Work and Pensions.

As well as being the main data source for the PSM (see section 2.6 below), information is taken directly from the FRS to identify reported receipt of the income-related benefits, where data-linking was not possible.



## 2.6 Policy Simulation Model (PSM)

The DWP's PSM is a static microsimulation model of the UK tax and benefit system. It takes reported information from the FRS on benefit units and then simulates (or models) what the benefit unit might be entitled to or earn based on the tax and benefit rules in the FRS year. The model estimates what a similar benefit unit, with those same characteristics, might be entitled to or earn for some future financial years, based on the tax and benefit rules in that future year. The PSM is used extensively by DWP analysts for policy evaluation and costing of policy options.

The PSM is used in the derivation of the ENR estimates, as it provides a readily-available entitlement dataset for the income-related benefits being presented in this report. Some important adjustments are made to the entitlement dataset, such as excluding Northern Ireland benefit units to be consistent with the GB receipt estimates. Additionally, some modelling improvements, such as data-linking to administrative data on the WPLS (see section 2.2), are carried out to provide more precise initial estimates of ENRs and their average weekly amounts unclaimed.

A combination of information from the adjusted PSM entitlement dataset and reported benefit receipt in the FRS is used to identify the final estimates of ENRs and average weekly amounts unclaimed for each year. Further information is provided in the 'Estimating ENRs' section of this report.

# 3 Estimating receipt

## 3.1 Overview

For receipt estimates of PC and IS/ESA (IR), the Work and Pensions Longitudinal Study (WPLS) is the main data source. The Quarterly Statistical Enquiry (QSE) data are used for JSA (IB) receipt estimates and, for HB, data are taken from the Single Housing Benefit Extract (SHBE).

To be consistent with the ENR estimates, which are only available for private households, adjustments are made to the PC, IS/ESA (IR) and JSA (IB) numbers in receipt using proportions estimated from the QSE data. Estimates of average amounts claimed are not adjusted, as the proportion of private households are around 95 percent of all households receiving each of these specific benefits. So it is assumed that the average amounts claimed estimated from the WPLS data remain representative of private household average amounts claimed. An adjustment is not needed for HB, as HB is only available to people living in private households.

## 3.2 Pension Credit

The WPLS is used to estimate the average number of those receiving PC and average amounts claimed for the financial year. Data are taken at the end of each quarter of the financial year (May, August, November and February) and the average number of those receiving PC and average amount claimed are estimated from the information available.

The average number of those receiving PC needs to be consistent with the PC ENR estimates, which only include private households. PC QSE data is taken from each quarter of the financial year (May, August, November and February) and the average proportion of private and non-private households is estimated as the information is available in this data. Estimates are produced for type of PC claimed (whether Guarantee Credit and/or Savings Credit) and by family type.

The average number of those receiving PC estimated from the WPLS is adjusted using the proportion of private households of all households. This removes around 5 percent of those in receipt of PC from the estimate. The average amounts estimated from the WPLS are not adjusted as it is assumed that these amounts remain representative of the private households, which account for 95 percent of all households.

### 3.3 Income Support, and Income-related Employment and Support Allowance (IS / ESA (IR))

The WPLS provides enough information to estimate the average number of those receiving IS/ESA (IR) and average amounts claimed for the financial year. IS and ESA (IR) are recorded separately on the WPLS. So for each benefit, data are taken at the end of each quarter of the financial year (May, August, November and February) and the average number of those receiving and average amount claimed are estimated from the information available.

As this report presents combined IS and ESA (IR) take-up estimates, estimates for the overall average number of those receiving IS or ESA (IR) and the overall average amount of IS or ESA (IR) claimed are needed.

To produce the estimate of the overall average number of benefit units receiving IS/ESA (IR), the average numbers for each benefit are added together:

Overall average number of benefit units receiving IS/ESA (IR):

$$\text{Average number of benefit units receiving IS in the year} + \text{average number of benefit units receiving ESA (IR) in the year}$$

To produce the estimate of overall average amounts claimed for IS/ESA (IR), the average total weekly expenditure for IS and for ESA (IR) are added together and then divided by the overall average numbers of benefit units receiving IS or ESA (IR):

$$\frac{\text{Average number of benefit units receiving IS in the year} * \text{Average amount of IS claimed} + \text{Average number of benefit units receiving ESA (IR) in the year} * \text{Average amount of ESA (IR)}}{\text{Average number of benefit units receiving IS/ESA (IR) in the year}}$$

The average number of those receiving IS/ESA (IR) needs to be consistent with the IS/ESA (IR) ENR estimates, which only include private households. IS QSE data are taken from each quarter of the financial year (May, August, November and February) and the average number of private and non-private households is estimated as the information is available in the QSE data. Note, a QSE is not produced for ESA (IR). So, in the absence of another data source to identify the proportion of private households of all households for ESA (IR), it is assumed that the proportion of private households is the same as for IS private households.

The average number of those receiving IS/ESA (IR) estimated from the WPLS is adjusted using the proportion of private households of all households receiving the benefit estimated from the IS QSE. The adjustment removes around 1 percent of benefit units receiving IS/ESA (IR).

The average amounts estimated from the WPLS are not adjusted as it is assumed that these amounts remain representative of the private households, which account for 99 percent of all households.

### 3.4 Income-based Jobseeker's Allowance (JSA (IB))

The WPLS only provides overall JSA receipt so it is impossible to identify those receiving JSA (IB) from those receiving JSA (C). As this publication presents take-up estimates for JSA (IB), the estimates need to exclude those in receipt of JSA (C) only and amounts of JSA (C) only claimed. The estimates do include those benefit units who are in receipt of JSA (IB) and JSA (C) at the same time.

Therefore, only the JSA QSE is used, as there is information available on the type of JSA being claimed. However, it cannot be identified how much of the JSA amount paid is JSA (C) and how much is JSA (IB), where a claimant is receiving both. Those in receipt of JSA (IB) and JSA (C) represent around 1-2 percent of JSA recipients in the QSE data. In the absence of other data sources to specifically identify just JSA (IB) amounts, the overall JSA payment is assumed to be JSA (IB) as JSA (IB) amounts represent approximately 99 percent of all recorded JSA amounts. Data are taken from the JSA QSE at the end of each quarter of the financial year (May, August, November and February) and the average number of those receiving JSA (IB) and average amount claimed is estimated.

It would be possible to estimate proportions of families with and without children of all those receiving JSA (IB) from the QSE data and apply them to the WPLS data of overall JSA. However, this would introduce a level of uncertainty as the benefit units captured in the WPLS data could actually be receiving JSA (C). The average amounts claimed from these benefit units would be JSA (C) only amounts. So, the estimated average amounts of JSA (IB) claimed from the JSA QSE would still need to be retained and applied to possible JSA (C) benefit units. As a result, with the certainty that JSA (IB) benefit units and their average amounts of JSA (IB) claimed are being estimated from the JSA QSE data, only the QSE data are used.

The proportion of private households of all households receiving JSA (IB) is applied to the total number of those receiving JSA (IB) so that the estimate is for private households only and consistent with the estimate of total ENRs. The adjustment removes around 5 percent of benefit units receiving JSA (IB). There is no adjustment made to the average amounts claimed as it is assumed that these amounts remain representative of the private households, which account for 95 percent of all households.

Estimates are produced for families with children, families without children, and an overall total. Other breakdowns are not presented as JSA (IB) ENR sample sizes are too small to calculate robust take-up estimates.

### 3.5 Housing Benefit

SHBE datasets from each month of the financial year are combined and a 12 month average estimated for the number of those receiving HB and average amounts of HB claimed. No private household adjustment is necessary for HB as HB is only available to people living in private households.

Estimates are produced for family types, type of tenure and employment status. Other breakdowns are not presented as HB ENR sample sizes are too small to calculate robust take-up estimates. For the 2012/13 and 2013/14 receipt estimates, the information needed to identify the required breakdowns were readily available. However for 2009/10, bespoke SHBE datasets were produced by the Take-up Statistics Team for months April 2009 to November 2009 to capture the necessary information for the breakdowns. These bespoke datasets were combined with the December 2009 to March 2010 datasets and a 12 month average number of those receiving HB and average amounts of HB claimed were estimated.

### 3.6 Comparisons with published DWP estimates

As the take-up receipt estimates for PC, IS/ESA (IR) and JSA (IB) focus on private households only, these are lower than published DWP estimates, which include all households. For HB, where an adjustment for private households is not necessary, the take-up receipt estimates for 2012/13 and 2013/14 are similar to published DWP estimates. However, for 2009/10, the take-up receipt estimates are slightly lower due to the method used in this year to produce the required HB breakdowns (see section 3.5).

# 4 Estimating Entitled-Non Recipients (ENRs)

## 4.1 Overview

The DWP administrative data sources do not record information on those entitled to a benefit but not receiving it (ENRs). Therefore, a combination of an adjusted entitlement dataset from the DWP's Policy Simulation Model (PSM), which includes some linking to WPLS administrative data, and reported receipt data from the Family Resources Survey (FRS) are used to produce the average number of ENRs and average amounts unclaimed.

In order to produce the ENR estimates, some bespoke adjustments are made to the PSM entitlement dataset (see section 4.3).

FRS matched consenters are benefit units where consent was given by both the 'head' of the benefit unit and any partner interviewed in the FRS to link to their administrative record and it was possible from the data provided to accurately match to administrative data.

For benefit units that are non-consenters or did not fit the criteria to be data-linked, modelled PSM entitlement for the benefit is compared to FRS reported receipt of the benefit.

Each benefit unit is categorised into one of the following groups:

- Entitled not receiving (ENRs);
- Entitled receiving (ERs); or
- Not entitled, not receiving (NENRs).

From this, the average numbers of ENRs and the average amounts unclaimed are estimated, along with 95 percent confidence intervals to reflect uncertainty (see chapter 6). These estimates are combined with the receipt estimates to produce the lower range, central and upper range take-up estimates.

## 4.2 The PSM entitlement dataset

For each financial year, the PSM produces a UK-based entitlement dataset. Key characteristics are taken from the FRS and the PSM models entitlement to each of the income-related benefits by applying the tax and benefit system rules to each benefit unit. The dataset retains reported FRS characteristics such as family type, age, marital status, tenure type and employment status, but the modelled entitlement amount of income-related benefit is used and this might differ from the reported FRS amount.

Where a benefit unit has a member aged over the PC qualifying age but under State Pension age, or one member is above PC qualifying age and one member below (a mixed age couple), the PSM models entitlement to PC only. This is a simplification of the benefit rules, as these benefit units can choose to claim PC or one of JSA (IB), IS or ESA (IR). However, analysis of DWP administrative data shows that the vast majority of these benefit units would choose to claim PC. Figures from February 2010 (at which point the qualifying age for PC was 60), show that there were 432,000 recipients of PC aged 60 to 64, compared with 25,000 recipients of Employment and Support Allowance and 17,000 recipients of Jobseeker's Allowance (figures were derived from the DWP Tabtool). Therefore, this simplification is reasonable.

## 4.3 Adjusting the PSM entitlement dataset

The bespoke adjustments made to the PSM entitlements are:

- Exclusion of Northern Ireland benefit units;
- Removal of National Minimum Wage adjustment;
- Modelling of work search activity for JSA (IB) entitlement and entitlement group allocation for JSA (IB) and IS/ESA (IR);
- Grossing-up to Great Britain control totals;
- Data-linking to DWP administrative receipt records for FRS matched consenters; and
- Inclusion of FRS reported receipt and awaiting the outcome of a claim information for each income-related benefit.

### 4.3.1 Exclusion of Northern Ireland benefit units

The take-up estimates are only provided for Great Britain. Therefore, the UK-based PSM entitlement dataset is adjusted to remove any Northern Ireland benefit units, so that the average number of ENRs and average amounts unclaimed are on the same basis as the receipt estimates.

### 4.3.2 Removal of National Minimum Wage adjustment

In the PSM, hourly pay is modelled by dividing reported pay by reported hours worked. For some people, modelled hourly pay is less than the National Minimum Wage (NMW). Therefore, the PSM adjusts the modelled hourly pay to equal the NMW level - in keeping with legislation – and then multiplies back up by reported hours worked. Therefore, the PSM NMW adjustment has the effect of increasing reported pay for some people.

Following exhaustive analysis in 2014 by the PSM Team, there is no clear evidence either way whether it is better to have the adjustment or not. In addition, the FRS publication and publications based on the FRS do not use

such an adjustment. Therefore, this adjustment was not included in the PSM entitlement datasets used for the Take-up Statistics i.e. no adjustment is made to the earnings data reported in the FRS

#### **4.3.3 Modelling of work search activity for JSA (IB) entitlement and entitlement group allocation for JSA (IB) and IS/ESA (IR)**

The PSM initially models entitlement to JSA (IB) or IS or ESA (IR) together, as the overall entitlement criteria for these 'out of work' benefits are similar. Then benefit units are categorised into the relevant benefit groups based on further specific criteria distinct to each benefit. This allocation is reliant on the accuracy of information for the benefit unit to be able to assess them against the distinct criteria.

To receive JSA (IB), a benefit unit has to sign on and indicate their willingness to work. While the PSM currently captures information on whether a benefit unit is signing on, further modelling was included to capture a benefit unit's willingness to work, using the following FRS questions:

- 'Have you been looking for work in the last four weeks?'
- 'Are you available to start work in the next two weeks?'

Additionally, benefit units in work were modelled as entitled to JSA (IB), as long as claimants fulfilled the criteria around income and hours.

This bespoke modelling of work search activity provides more precise information to allocate benefit units correctly to the JSA (IB) group, by not only identifying benefit units that are actually signing on, but also benefit units that are willing to work and meet other criteria to receive JSA (IB) while in work.

#### **4.3.4 Grossing-up to Great Britain control totals**

As the FRS only collects information on a sample of UK benefit units, grossing factors are applied to each of the benefit units in the sample data so that they yield estimates for the overall population in a process known as grossing-up.

The system used to calculate grossing factors for the FRS divides the sample into different groups. The groups are designed to reflect differences in response rates among different types of benefit units. The population estimates for these groups, obtained from official data sources, provide control variables. The grossing factors are then calculated by a process which ensures the FRS produces population estimates that are the same as the control variables. A software package called CALMAR, provided by the French National Statistics Institute, is used to reconcile control totals at different levels and estimate their joint population. This software makes the final weighted sample distributions match the population distributions through a process known as calibration weighting.



The process used to gross-up the PSM entitlement dataset to the Great Britain (GB) population is different to the FRS grossing regime. The bespoke grossing control variables, in addition to population grossing control variables, along with their breakdowns and data sources are:

<b>Grossing Control Variable</b>	<b>Breakdowns used</b>	<b>Data Source</b>
Household numbers	Country and region	Housing statistics - Department for Communities and Local Government (DCLG)
Housing tenure (household level)	None –GB level only	Housing statistics - DCLG
Council Tax bands (household level)	None –GB level only	Council Tax statistics - DCLG, Scottish Government and Welsh Assembly
Employment (individual level)	Age and gender	Economic assumptions - Office for Budget Responsibility
Caseloads for non-income related benefits (individual or benefit unit level)	Age and gender	Administrative data for AA, DLA/PIP, IB/SDA and Contributory ESA - DWP

Whilst the grossing process very effectively produces GB-level aggregate totals, it obviously introduces a further source of uncertainty surrounding the ENR estimates, as it is assumed that many of the characteristics of the ENR sample are representative of all GB benefit units (see chapter 5).

#### **4.3.5 Data-linking to DWP administrative receipt records for FRS matched consenters**

There is a known issue of under-reporting benefit receipt in the FRS. Therefore, to improve the accuracy of identifying the number of ENRs estimated in the PSM entitlement dataset, data-linking allows recorded benefit amounts in DWP administrative data to replace reported FRS receipt or modelled PSM receipt in the PSM entitlement dataset.

FRS respondents are asked for consent to link their records to DWP administrative data. Data-linking is only applied where:

- Consent was given by both the ‘head’ of the benefit unit and any partner.
- It was possible to match an individual’s record to administrative data.

To do this matching, various combinations of seven variables that exist on both the FRS consenter and WPLS datasets are used. The seven variables are:

- Date of Birth
- Initial of Forename
- Full Forename
- Surname
- Gender
- Postcode sector (i.e. the first half plus first digit of second half)
- Full Postcode

Given that it may not be possible to match on all seven of these variables for an individual – e.g. the full forename may be written differently or missing comparing the FRS consenter and WPLS data – a matching hierarchy is used to define which combinations of variables are required to produce a good enough match.

Hence, just under half of the FRS respondents met the above criteria to be data-linked for 2009/10, 2012/13 and 2013/14. Benefit units in this group were categorised as FRS matched consenters and the remaining benefit units were categorised as non-consenting/unmatched in the PSM entitlement dataset.

For FRS matched consenters, benefit units were data-linked to SHBE data for HB and WPLS data for:

- State Pension (SP)
- Pension Credit (PC)
- Disability Living Allowance care component (DLA (Care))
- Attendance Allowance (AA)
- Income Support (IS)
- Income-related Employment Support Allowance (ESA (IR))
- Jobseeker's Allowance – income-based (JSA-IB)

The amount from the administrative data over-writes the amount in the PSM entitlement dataset for each data-linked benefit. This gives a more precise amount of benefit receipt and entitlement for the income-related benefits for identifying the numbers of ENRs.

Note, in addition to PC, data-linking to SP was carried out as these two payments are commonly confused by pensioners. By having a more accurate amount for SP, the PSM can then model entitlement to PC more accurately. Data-linking to DLA (Care) and AA were carried out as amounts for these benefits are commonly under-reported in the FRS. Accurate amounts for these benefits helps to improve the accuracy of the PC entitlement modelling as receipt of these benefits can indicate that an additional amount should be added to the appropriate minimum guarantee level in PC.

Statistical tests were carried out to determine whether characteristics of FRS matched consenters had changed over the time period. It was concluded that the characteristics were not statistically different across the years. Therefore, any changes seen in the number of ENRs between 2009/10 and 2013/14 could not be attributed to changes in the characteristics of the proportion of FRS matched consenters of all the benefit units.

Similar tests were carried out on the non-consenting/unmatched group. It was concluded that applying any assumptions to the non-consenting/unmatched group based on information seen in the FRS matched consenters group would not be statistically valid and would increase uncertainty surrounding the ENR estimates.

#### **4.3.6 Inclusion of FRS reported receipt and awaiting the outcome of a claim information for each income-related benefit**

The final adjustment made to the PSM entitlement dataset is to include some additional information from the FRS:

- Reported receipt of benefit: This information will be used along with PSM modelled entitlement to identify which benefit units are modelled to be entitled but not receiving.
- Awaiting an outcome of a claim: If at the point of the FRS interview, a benefit unit is awaiting an outcome of claim, the PSM models them to be an ENR as they are not reporting receipt. Any subsequent receipt of the benefit following the outcome could be picked up if the benefit unit is a FRS matched consenter and they would be modelled as an entitled recipient. However, for non-consenting/unmatched cases, they could remain an ENR. Therefore, it is assumed that if the benefit unit reports they are awaiting an outcome of a claim and the PSM models them as entitled, it is likely that they would have gone on to receive the benefit and are categorised as ERs.

## **4.4 Identifying ENRs**

Following the adjustments to the PSM dataset, each benefit unit is categorised into one of the following groups:

- Entitled Not Receiving (ENRs)
- Entitled Receiving (ERs)
- Not entitled, not receiving (NENRs)

FRS matched consenters who are shown to be receiving benefit according to the data-linking to administrative data are automatically allocated to the ER group. FRS matched consenters who are *not* receiving benefit according to the data-linking to administrative data are classed as either ENRs or NENRs depending on whether they are modelled as entitled according to the PSM.

For benefit units that are non-consenting/unmatched, modelled PSM entitlement to the benefit is compared to FRS reported receipt of the benefit to determine whether they are an ER, ENR or NENR. If the benefit unit reports they are awaiting an outcome of a claim and the PSM models them as entitled to the benefit, it is assumed that the benefit unit is an ER.

Finally, the average numbers of ENRs and the average amounts unclaimed are estimated by specific types and breakdowns for each income-related benefit. However, due to small sample sizes for certain characteristics, further detailed breakdowns have not been possible.

# 5 Uncertainty in the receipt and ENR Estimates

## 5.1 Overview

The receipt and ENR estimates are fully reliant on the accuracy of the data used and any subsequent adjustments, evidence-based assumptions and modelling. Any errors in the data or these processes will impact uncertainty around the estimates.

Uncertainty in the receipt estimates is assumed to be marginal due to the processes in place to produce accurate DWP administrative data.

For the ENR estimates, the level of uncertainty is much higher as they are heavily reliant on the reported information from the FRS sample data and the subsequent modelling of entitlement in the PSM. Therefore the estimates inherit known areas of uncertainty surrounding survey results and using a model to estimate ENRs. While processes are in place to limit this uncertainty, such as the data-cleaning of FRS responses to produce the published FRS dataset and continuously developing the PSM methodology, confidence intervals are used to present the uncertainty in the final take-up estimates.

## 5.2 Areas of uncertainty

### 5.2.1 Use of administrative data

It is assumed that DWP administrative data are an accurate record of benefit receipt. However, the data are subject to error at all stages of the process of data collection: from recipients giving inaccurate information, to input error, to data cleaning and analysis. DWP publishes Fraud and Error Statistics which provide estimates that measure the level of fraud and error in the benefit system.

Adjusting the PC, IS/ESA (IR) and JSA (IB) receipt estimates to remove any non-private households introduces a small element of uncertainty. This is because it is assumed that the proportions of private households of all households for the 5 percent scan of the benefit recipients are representative of all the benefit recipients.

## 5.2.2 Use of survey data

The size of the FRS sample and the way in which the sample is selected is carefully designed to ensure that it is representative of the UK as whole, whilst bearing in mind practical considerations like time and cost constraints.

Survey results are always estimates, not precise figures. This means that they are subject to a level of uncertainty which can affect how changes, especially over the short term, should be interpreted.

The FRS is subject to the nuances of using a survey, including:

- Sampling error: Two different random samples from one population are unlikely to give exactly the same survey results, which are likely to differ again from the results that would be obtained if the whole population was surveyed. This level of sampling error varies to a greater or lesser extent depending on the level of breakdowns at which results are presented.
- Non-response error: The FRS response rate in 2013/14 was 60 per cent. In an attempt to correct for differential non-response, estimates are weighted using population totals. Note FRS grossing is not used for the ENR estimates – see section 4.3.4.
- Survey coverage: The FRS covers private households in the United Kingdom. Therefore individuals in nursing or retirement homes, for example, will not be included. This means that figures relating to the most elderly individuals may not be representative of the United Kingdom population, as many of those at this age will have moved into homes where they can receive more frequent help.
- Survey design: The FRS uses a clustered sample designed to produce robust estimates at former government office region (GOR) level. The FRS is therefore not suitable for analysis below this level.
- Sample size: Although the FRS has a relatively large sample size for a household survey, small sample sizes may require several years of data to be combined. From April 2011, the target achieved GB sample size for the FRS was reduced by 5,000 households, resulting in an overall achieved sample size for the UK of around 20,000 households for 2011/12 onwards.

## 5.2.3 Under-reporting receipt and benefit confusion in the FRS

There is a known issue of benefit under-reporting in the FRS. Sometimes the FRS respondents confuse which benefit they are receiving. For example, there is often confusion over State Pension (SP) and PC payments. So a benefit unit may not realise they are receiving PC and report the overall payment they receive as SP. Therefore, there is an over-reporting of the SP amount paid and under-reporting of the PC amount paid. Processes are in place for the FRS interviewer to check these responses against other questions, if there is a discrepancy. Further data-cleaning is carried out once the survey is completed to check whether responses from the benefit unit taken across the questionnaire are consistent. However, even with these

processes in place, there remains scope for uncertainty and remaining under-reporting of receipt.

As a result, it is possible that the PSM incorrectly categorises a benefit unit into the wrong group because of under-reported receipt. In the example above, the benefit unit could be modelled as an ENR, despite receiving PC as they did not report receipt or give an amount in the FRS interview. In other situations, the benefit unit might not report important information which is used to identify which group they should be allocated to, such as work search activity for JSA (IB) or receiving Attendance Allowance for the estimation of PC entitlement.

To reduce under-reporting and benefit confusion, data-linking allows recorded benefit amounts in DWP administrative data to replace reported FRS receipt or modelled PSM receipt in the PSM entitlement dataset. However, this is only possible for a group of benefit units (see section 5.2.4 below).

#### **5.2.4 Data-linking for FRS matched consenters only**

Only a partial sample of benefit units is data-linked in the PSM entitlement dataset. It was concluded that applying any assumptions to the non-consenting/unmatched group based on information seen in the FRS matched consenters group would not be statistically valid and would increase uncertainty surrounding the ENR estimates.

As a result, this adjustment only partially corrects for under-reporting and confusion of benefit receipt in the FRS. Where a benefit unit might have been modelled as an ENR but data-linking indicated that they were receiving a payment, the benefit unit would be categorised as an entitled recipient (ER) and the average numbers of ENRs reduced as a result. However, where benefit units are non-consenters/unmatched, it is possible for it to remain an ENR but actually receive the benefit. This is known as a hidden recipient.

Additionally, there isn't enough information on the FRS to identify whether the benefit unit is being sanctioned while receiving JSA (IB) or ESA (IR). In this instance, a benefit unit could report zero payment of JSA (IB) but the PSM model them as entitled, resulting in them being categorised as an ENR. Data-linking would overcome this if the benefit unit was a FRS matched conserter, as the recorded benefit payment would be used and the benefit unit would be categorised as an ER. However, if the benefit unit was in the non-consenting/unmatched group, they would remain as an ENR.

### **5.2.5 Incorrect modelling of entitlement**

Incorrectly modelling of the tax and benefit system rules in the PSM could result in:

- Over-statement of entitlement: where the benefit unit is incorrectly modelled to be entitled and/or the modelled amount is too high.
- Under-statement of entitlement: where the benefit is incorrectly modelled to not be entitled and/or the modelled amount is too low.

Processes are in place to regularly review and develop the modelling to ensure the PSM accurately represents the tax and benefit system rules for each year. However, as it is heavily reliant on reported information in the FRS, the PSM inherits the areas of uncertainty of the FRS.

### **5.2.6 Inaccurate grossing-up to the GB population**

The sample FRS cases are grossed-up to represent the GB population – see section 4.3.4.

The PSM grossing regime contains many control variables to ensure that various detailed characteristics of the benefit units are considered in deriving the grossing factor. And while grossing-up also attempts to correct for non-response errors in the FRS, uncertainty will remain as it assumes that many of the characteristics of the FRS sample represent the GB population.

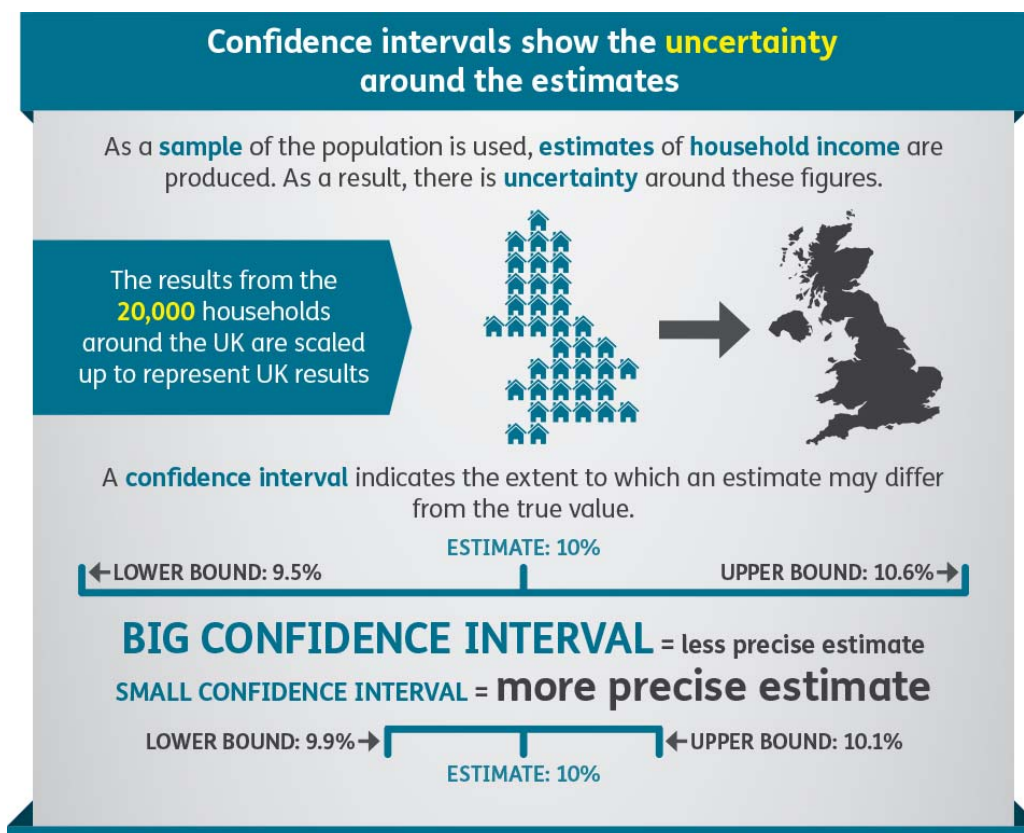


# 6 Confidence intervals for the ENR Estimates

## 6.1 Overview

As the ENR estimates are heavily reliant on the FRS sample, the level of uncertainty can be estimated by exploring how that estimate would change if many survey samples were drawn for the same time period instead of just one. From this, a range around the estimate can be defined, known as a confidence interval. This indicates how likely it is that the real value that the survey is trying to measure lies within that range. Confidence intervals are typically set up to be 95 percent certain that the true value lies within the range, known as a “95 percent confidence interval”.

The following infographic summarises the purpose of confidence intervals.



## 6.2 Method

The 'variance estimation based on sample design' method was used to produce confidence intervals for the take-up estimates as:

- The sampling frame of the FRS is taken into consideration in this method.
- It is appropriate when calculating the prevalence of a characteristic in a population, such as those entitled not receiving.

The use of the 'bootstrapping' method, used for the Family Resources and Households Below Average Income publication, will be explored in future development of the Take-up Estimates.

The ENR estimates are derived from the adjusted PSM entitlement dataset rather than the published FRS dataset. However, this shouldn't affect the sampling error, as this occurs at the stage of the sampling, and therefore any modelling of FRS sample benefit units in the PSM should not affect the confidence intervals.

The confidence intervals are estimated in SAS, a statistical programming language. This provides a lower and upper range for the average number of ENRs and the average amount unclaimed. These estimates, along with the central estimates are incorporated into the take-up formulae.

# 7 Estimating take-up rates

## 7.1 Overview

The take-up rates are based on the following definition:

$$\frac{\text{In Receipt}}{\text{In Receipt} + \text{Entitled Not in Receipt}}$$

where the take-up rate is defined as the proportion receiving the benefit of all those entitled (those receiving the benefit and those who are entitled but not receiving the benefit).

Caseload and expenditure take-up rates are estimated. A central estimate is calculated. The lower and upper bound estimates of those not in receipt are also used to estimate lower and upper take-up bounds.

## 7.2 Caseload formulae

The formulae for lower range, central estimate and upper range are:

	<b>Caseload formula</b>
Lower Bound	Average number of benefit units receiving benefit
	Average number of benefit units receiving benefit + <b>Upper</b> average number of benefit units ENRs
Central Estimate	Average number of benefit units receiving benefit
	Average number of benefit units receiving benefit + <b>Central</b> average number of benefit units ENRs
Upper Bound	Average number of benefit units receiving benefit
	Average number of benefit units receiving benefit + <b>Lower</b> average number of benefit units ENRs

## 7.3 Expenditure formulae

For the expenditure formulae, the average weekly amounts claimed (received) and unclaimed (not received) are converted to yearly amounts. The conversion is produced by multiplying the overall average weekly amounts by 52.14, which is the number of weeks in 2009/10, 2012/13, and 2013/14 (non-leap years).

The expenditure take-up formulae are:

	<b>Expenditure formula</b>
Lower Bound	$\frac{\text{Total amount of benefit received}}{\text{Total amount of benefit received} + \text{Upper total amount of benefit not received}}$
Central Estimate	$\frac{\text{Total amount of benefit received}}{\text{Total amount of benefit received} + \text{Central total amount of benefit not received}}$
Upper Bound	$\frac{\text{Total amount of benefit received}}{\text{Total amount of benefit received} + \text{Lower total amount of benefit not received}}$

The formulae for the total amount of benefit received and not received are:

	<b>Total amount of benefit received formula</b>	<b>Total amount of benefit not received formula</b>
Lower Bound	$\text{Average number of benefit units receiving benefit} * \text{Average amount of benefit received} * \text{Week to Year Factor (52.14)}$	$\text{Upper total} = \text{Upper average number of benefit units ENRs} * \text{Upper average amount not received} * \text{Week to Year Factor (52.14)}$
Central Estimate	$\text{Average number of benefit units receiving benefit} * \text{Average amount of benefit received} * \text{Week to Year Factor (52.14)}$	$\text{Central total} = \text{Central average number of benefit units ENRs} * \text{Central average amount not received} * \text{Week to Year Factor (52.14)}$
Upper Bound	$\text{Average number of benefit units receiving benefit} * \text{Average amount of benefit received} * \text{Week to Year Factor (52.14)}$	$\text{Lower total} = \text{Lower average number of benefit units ENRs} * \text{Lower average amount not received} * \text{Week to Year Factor (52.14)}$



**Income-Related Benefits:  
Estimates of Take-up - Financial  
Year 2013/14 (experimental)  
Technical Report**

The Income-Related Benefits:  
Estimates of Take-up Technical  
Report provides technical details  
underlying the caseload and  
expenditure estimates of take-up  
for Income Support, Employment  
and Support Allowance (Income-  
Related), Pension Credit, Housing  
Benefit, and Jobseeker's Allowance  
(Income-Based) presented in  
Income-Related Benefits:  
Estimates of Take-up - Financial  
Year 2013/14 (experimental).

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This publication can be accessed  
online at

<https://www.gov.uk/government/collections/income-related-benefits-estimates-of-take-up--2>

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