Universal Credit Full Service employment impact evaluation

Summary

This response contains further details on the latest evaluation of the short-term impacts of UC on labour market outcomes. Three previous publications focused on the employment impacts of UC live service and concluded that UC had a positive impact on labour market outcomes for unemployed single claimants without children. Of these three reports, the last report was published in September 2017[1].

In this fourth evaluation we continue to examine the labour market outcomes of unemployed single claimants without children but move the analysis forward in a number of ways. Firstly, it examines the employment impact of UC full service, which began to rollout nationally in 2016. Secondly, it expands the coverage of the analysis to Jobcentres across the whole of Great Britain[2]. Finally, the analysis is based on more UC claims, made more recently – 70,000 claims made between January and April 2018.

As already highlighted in Table 4 of the 'Completing the Move to UC' publication, the analysis shows that UC claimants are two percentage points more likely to have been in employment at any point within six months of starting their claim than a matched sample of JSA claimants. This result is robust to several sensitivity checks and compares with four percentage points in the September 2017 publication. Although this evaluation uses the same methodology, there are several important differences which may explain the changes in results since 2017.

The analysis also shows that the employment impacts of UC appear to be slightly more pronounced in the early months of the claim, which is broadly consistent with the findings in the September 2017 publication.

The analysis has so far only been conducted for unemployed single claimants without children and therefore the results here may not be reflective of the impact of UC on other groups of claimants such as lone parents or those in couples.

This response provides further details on the employment impact results shown in the main Move to UC publication, including: the methodology used, key assumptions, and the details of several robustness checks.

Introduction

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[1] Universal Credit employment impact analysis: update - GOV.UK (www.gov.uk)
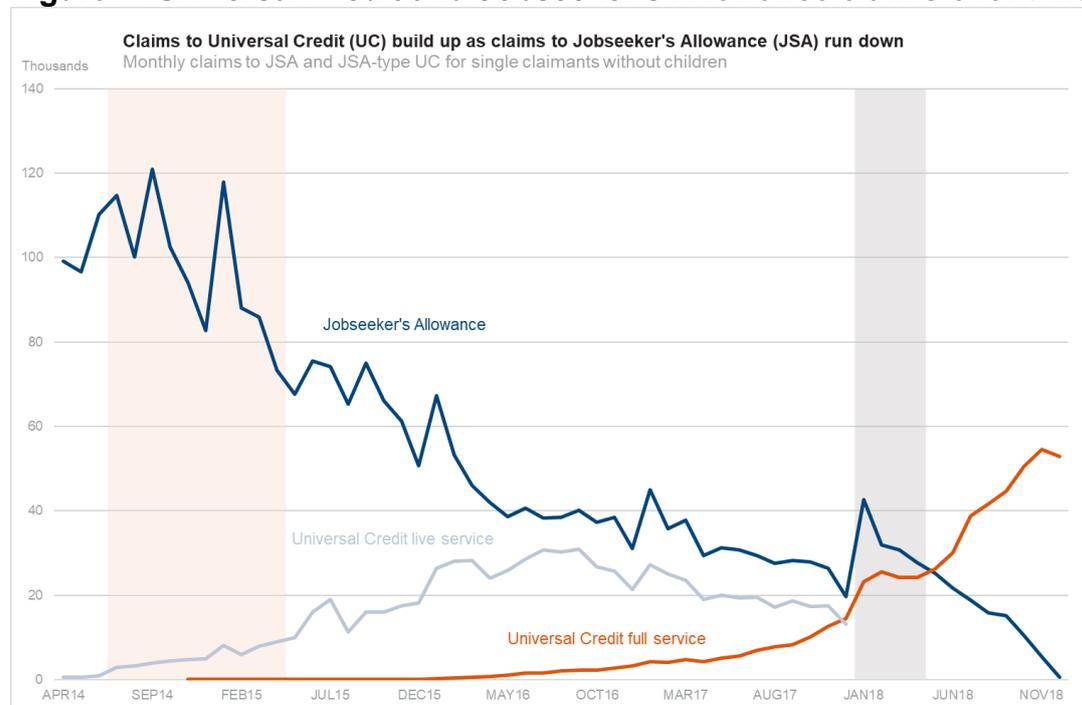
[2] The previous reports were based on analysis of claims made in Jobcentres that were predominantly in the North West of England.

Previous published analysis

This analysis is the fourth in the series of UC employment impact evaluations. The first three publications focused on the employment impacts of UC live service. The last of these was published in 2017[3] and concluded that UC claimants were 4 percentage points more likely to have been in work at some point in the 6 months following their claim than a matched sample of JSA claimants.

These earlier publications focused on assessing the employment impacts of UC live service for out of work single claimants without children. The 2017 publication examined claims made in Jobcentres that rolled out to UC live service prior to the start of the national rollout of live service. This is illustrated as the pink shaded area in Figure 1.

Figure 1: Universal Credit and Jobseeker's Allowance claims over time

Claims to Universal Credit (UC) build up as claims to Jobseeker's Allowance (JSA) run down
Monthly claims to JSA and JSA-type UC for single claimants without children

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[3]https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/644541/universal-credit-employment-impact-analysis-update.pdf

This evaluation builds on the previous work by extending the analysis to look at the employment impact of UC full service for JSA type claimants. Data is drawn from the early months of 2018 when the UC live service gateway had closed and the Jobcentres not yet open to UC full service began to take JSA claims again. This is illustrated in Figure 1 as the light grey shaded area. These events were crucial for this evaluation because it opened up the possibility of directly comparing the employment outcomes JSA and UC full service claims without the presence of UC live service which could have introduced bias into the comparison.

We draw heavily on the methodology used in the earlier publications, making changes only where this is necessary to fit the scope of this evaluation. Table 1 summarises the main changes between the current analysis and the September 2017 publication. These changes may explain the relatively small differences in results found between the two analyses.

Table 1: Primary changes between current analysis and September 2017 publication

Current Analysis	September 2017 Publication
UC Full-Service Claims	UC Live Service Claims
169 Jobcentres	94 Jobcentres
Claims made Jan-Apr 2018	Claims made in 2014-2015
Jobcentres throughout Great Britain	Predominantly Jobcentres in North-West of England
74,000 UC claims	27,000 UC claims
Workless childless singles	Workless childless singles

Evaluation methodology

Background

The methodology used in this analysis is very heavily based on that the propensity score matching (PSM) approach used in earlier publications[4], so where the methodology remains unchanged, we provide a high level overview only. Where aspects of the methodology have changed these will be described more fully.

The Department has invited a high degree of scrutiny and independent peer review of the methods used in its evaluations of UC employment impacts to give confidence in the validity and objectivity of the findings:

- Evaluation plans were updated and published in July 2014 following a peer review by the IFS;
- This approach was applied to produce the preliminary estimates which were peer reviewed by NIESR and published in February 2015;
- Updates to the methodology and the resulting updated analysis published in December 2015 were peer reviewed by NIESR;
- Advice and challenge was obtained from a panel of experts who formed the UC Expert Advisory Group[5]
- The updated analysis of 2017 was peer reviewed by NIESR;
- Advice on aspects of the methodology employed in this publication has been received by a range of experts both inside and outside of government.

The evaluation question

The key to a reliable assessment of what difference UC makes to the employment outcomes of new claimants is knowing what outcomes they would have achieved if they had claimed the equivalent legacy benefit (JSA in this case) instead of UC. This is known as their counterfactual outcome. We cannot observe this counterfactual outcome so we have to estimate it. We estimate the counterfactual using the outcomes of a comparison group of equivalent new claims made by similar people, at the same time, in similar areas of the country, but who claimed JSA because UC full service was not yet available in their local Jobcentre.

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[4] See in particular Section 5 of "Estimating the early labour market impacts of Universal Credit: Early analysis", February 2015; Section 2 of "Estimating the Early Labour Market Impacts of Universal Credit: Updated Analysis", December 2015; and Section 7 of "Universal Credit Employment Impact Analysis: Update", September 2017.
[5] This group was disbanded in 2017

Our assessment of impact will be robust if the UC claim group (known as the 'treatment group') and the JSA claim group (known as the 'comparison group') are the same in all relevant respects, save the benefit they have claimed. Relevant aspects are those that affect expected outcomes, in this case, employment.

We expect employment outcomes to vary over time, between areas and between individuals and the rollout of UC full service cut across all of these factors. As a result, any systematic differences between the UC and JSA claim groups across these factors will bias our estimates of impact. Our methodology focuses on minimising these differences by only comparing the outcomes of UC and JSA claims made at the same time, in the same areas by similar people.

The data

In common with the previous UC labour market impact evaluations we have built two data sets to support the analysis – a data set of JSA claims made between 1 April 2014 and 31 December 2018 and a data set of "JSA type" UC claims made between 1 April 2016 and 31 December 2018. Each data set contains one record per claimant per claim.

The starting point for the creation of these data sets is the JSA and UC full service administrative systems. Both of these systems contain key information about the claim such as the start and end dates, plus some basic demographic information about the claimants such as age and sex. For the fuller picture of claimants required for matching on characteristics that determine employment outcomes, we supplement the claim data by merging in data from other administrative sources.

From Her Majesty's Revenue and Customs' (HMRC) Real Time Information (RTI) system[6] we bring in detailed employment history and outcome information[7]. The National Benefits Database (NBD) and administrative data on UC live service provide us with detailed benefit claim histories in particular for JSA, Employment and Support Allowance (ESA) and UC live service. The employment and benefit histories data form the backbone of our PSM model, but we also use administrative data on past employment programme participation and JSA sanctions histories to refine it further.

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[6] See
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/3881 03/RTI-TIIN.pdf
[7] For claims made prior to April 2016 we have supplemented the RTI employment history data with employment history from the Work and Pensions Longitudinal Study.

Table 2 summarises the claim volumes in the final versions of our JSA and UC claim data sets.

Table 2: Evaluation data set claim volumes summary

|	JSA claims	"JSA type" UC claims
April 2014 – December 2018	2,949,000	544,000
April 2016 – December 2018	960,000	542,000
January - December 2018	246,000	436,000
January – April 2018	133,000	97,000

Note: claims rounded to the nearest 1,000

We focus our analysis on claims made between January and April 2018 for several reasons:

- UC full service has rolled out across a good range of Jobcentres of different sizes across Great Britain by this time so we can be more confident of picking up on variations in impact across the country;
- UC live service gateway closed in December 2017, opening up the possibility of making a cleaner comparison of UC full service claims with JSA claims, the only alternative benefit available at this time for JSA type single claimants without children;
- We need to ensure that the Jobcentres in which the comparison JSA claims are made do not roll out to UC during the employment outcome tracking period (more on this later).

Figure 2 shows that the number of new claims to JSA runs down as the number of new claims to JSA-type UC claims builds up over time. Following the closure of the JSA claim gateway at the end of December 2018, there are no new claims to JSA.
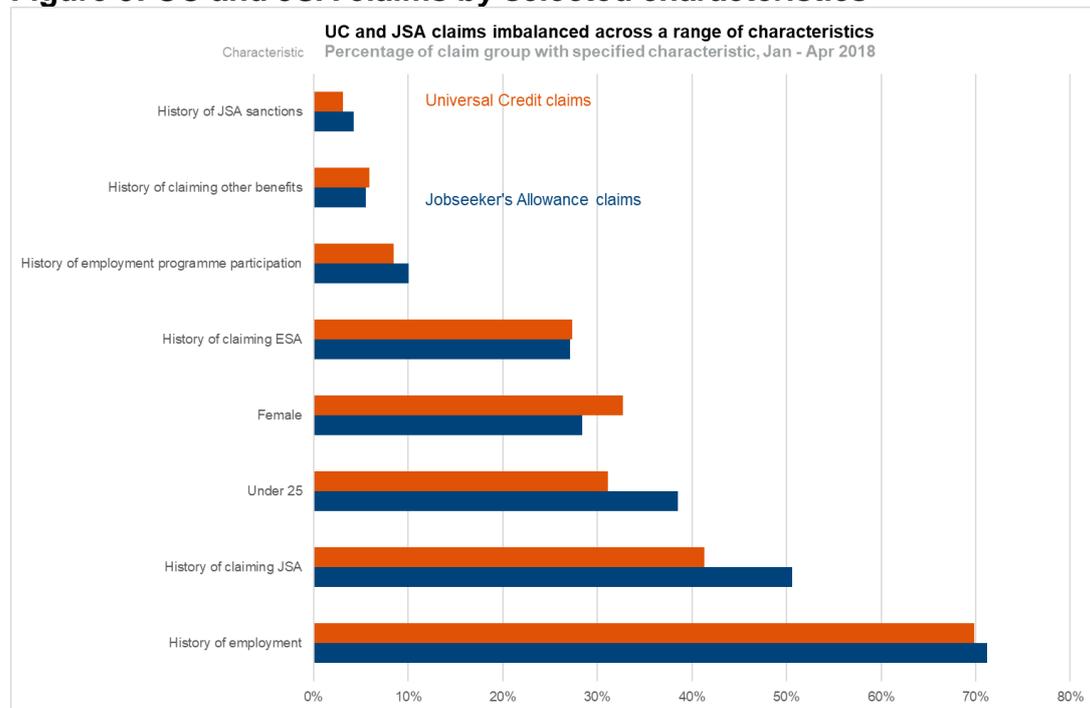
Figure 2: UC and JSA claim volumes over time
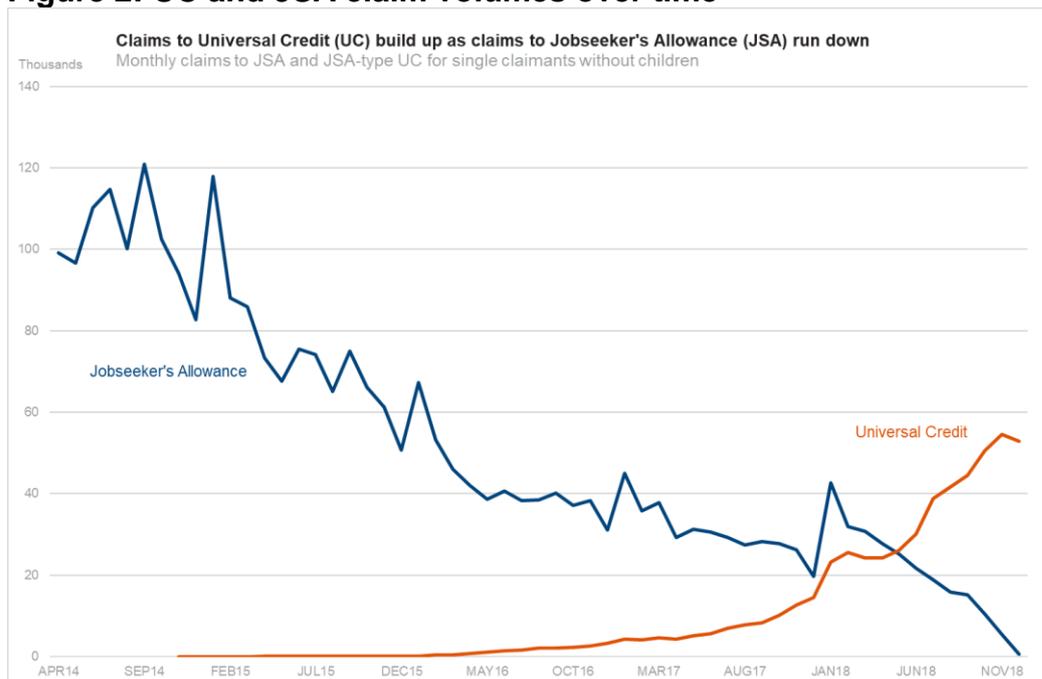
Description of the final sample data

Figure 3 shows the percentage of the UC and JSA claim groups by selected demographic characteristics and histories[8] for all claims made by single claimants without children between January and April 2018 inclusive. Figure 11 in the supplementary detail section presents the same analysis after matching.

Figure 3: UC and JSA claims by selected characteristics

UC and JSA claims imbalanced across a range of characteristics
Percentage of claim group with specified characteristic, Jan - Apr 2018

At this level of detail, the main imbalances between the claim groups are in JSA claim histories, age and gender.

Time

As already explained, we take advantage of the period of the rollout of UC full service in 2018 when the UC live service new claim gateway has closed and only UC full service and legacy JSA can be claimed depending on the area the claimant lives. Specifically, we compare JSA and UC claims made between January and April 2018.

We allow UC claims made at any point in this period to be matched with JSA claims made at any point in this period, although the month of claim is controlled for, so claims made in the same month are more likely to be matched than claims in made in different months.

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[8] All the history variables cover the two-year period immediately prior to the claim.

Geography

We select the comparison group from areas that are similar to our UC areas. In this way we hope to factor out geographical variations such that a given type of individual making a new JSA claim at a given time would have the same expected outcome whether they made their claim in a comparison Jobcentre or one of our UC Jobcentres.

Before assessing the similarity of Jobcentres, we first filter out many Jobcentres from the list of possible comparison areas because they rollout to UC full service at a time that could introduce bias into the analysis:

- No Jobcentre that is already rolled out to UC full service before January 2018 can be used as a comparison Jobcentre;
- No Jobcentre that rolls out during the tracking period of the outcome measure can be used as a comparison Jobcentre[9].

Figure 4 illustrates how the UC rollout and the length of outcome measure tracking period interact to inform decisions over the choice of comparison Jobcentres.

Figure 4: UC full service rollout and outcome tracking period
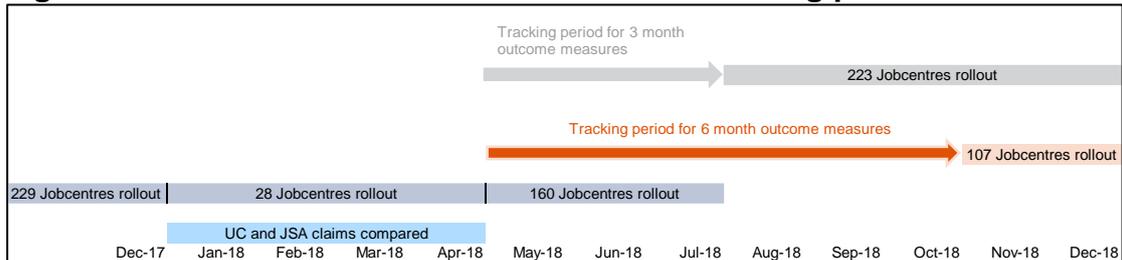
The 229 Jobcentres that rolled out to UC full service in the period up to and including December 2017 form the core of our potential treatment group. Given that our methodology allows for matches across different months of the period January – April 2018, when we apply the employment outcome tracking period filter, we start counting from April 2018. This rules out the small number of Jobcentres rolling out in the January – April period from being potential comparison areas.

For outcome measures that examine employment over the first six months following the claim, none of the Jobcentres that rollout between May and October 2018 can be used as comparison Jobcentres. That leaves a pool of 107 Jobcentres from which to select those that are similar to the available 229 UC Jobcentres. Given that UC Jobcentres outnumber the available comparison Jobcentres, it is likely that some comparison Jobcentres will be selected more than once and be used as comparison areas by more than one UC Jobcentre.

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[9] This assumption is relaxed in the case of the nine-month outcome measures.

The shorter tracking period required for the three-month outcome measures makes more than 100 additional Jobcentres available for use as potential comparison areas, which increases the chances of making good quality matches, when compared to the other outcome measures we use.

One of the consequences of the choices we have made over the time period covered by the data used in the analysis and the UC full service rollout profile is that the number of Jobcentres available for use as comparison areas is severely restricted for any outcome measure covering more than six months after the claim.

For such longer-term outcome measures we took the decision to relax the tracking period filter so that comparison Jobcentres are chosen from the same list of 107 used when selecting comparison areas for the six-month outcome measures. This represents a departure from the approach taken in the previous UC employment impact evaluations where a strict application of the outcome measure tracking period filter was used. This change of approach should be kept in mind when interpreting the results for outcome measures cover a longer period than six months after the claim.

We determine similarity of Jobcentres predominantly by analysing past trends in employment outcomes for new JSA claims. In addition, we take into account the size and composition of new claims in each Jobcentre. We use the JSA and UC claim data from April 2014 to March 2016 for this analysis.

The 20 most similar Jobcentres not yet rolled out to UC full service are selected for each UC Jobcentre in turn. This is a departure from the approach used in the previous evaluations of UC live service, where the 10 most similar Jobcentres were selected.

We select 20 comparison Jobcentres because:
- we want to ensure we have sufficient comparison claims to achieve good matches with the UC claims;
- choosing more Jobcentres helps mitigate the risk that comparison Jobcentres and UC Jobcentres may become dissimilar over time;
- no two Jobcentres will ever be exactly alike so any single comparison Jobcentre is likely to be an imperfect match for any single UC Jobcentre.

The consequences of choosing different numbers of comparison Jobcentres is explored in Test 1 of the sensitivity analysis.

Individuals

UC claims are matched with JSA claims from the comparison Jobcentres using propensity score matching so that the two groups being compared are the same on all relevant observable characteristics.

We use propensity score matching because it:

- overcomes the dimensionality[10] problem whereby it becomes difficult to identify matches when matching on many factors;
- enables us to restrict the analysis to only those UC claimants for whom we can identify suitable matches;
- is semi-parametric, so we are not required to make restrictive assumptions about how observable characteristics affect impacts.

The characteristics controlled for in the propensity score regression are largely the same as those used in the employment impact evaluations of live service, nevertheless there are some differences required by the nature of this evaluation. These differences are described in detailed data procession part of the supplementary detail section.

Estimation of employment impact

Once we have selected our matched UC and JSA claims, we simply compare the employment outcomes to derive an estimate of the employment impact of UC for each Jobcentre that rolled out to UC full service prior to 2018. If employment outcomes of the matched UC claims in a Jobcentre, are on average higher than those of the matched JSA claims from the comparison Jobcentres, then we can assume that UC is having a positive employment impact in that Jobcentre.

Aggregation across Jobcentres

For some Jobcentres there are insufficient UC claims made in the period January to April 2018 for the propensity score matching model to estimate an impact.

For other Jobcentres, we get an estimate but it won't necessarily be robust enough to use, so we check each estimate for matching quality before using them in our final analysis. Our primary criteria for deciding whether a Jobcentre level impact estimate is of sufficient quality is whether the average post-match mean absolute standardised bias (across all covariates included in the propensity score model) is less than 5 per cent[11].

The choice of a 5 per cent cut-off for average post- bias, is to a certain extent arbitrary. However, in the supplementary detail section we explore the sensitivity of the results to this choice and find that the results are relatively insensitive to it.

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[10] Rosenbaum and Rubin, 1993 showed that matching on a single index representing the probability of treatment given the observed variables could achieve consistent estimates in the same way as if we matched on all variables.

[11] Where bias is measured as the percentage difference of the group means in the treatment (UC claims) and comparison (JSA claims) groups as a percentage of the square root of the average of the group variances in the treatment and comparison groups.

In order to get Great Britain level estimates, jobcentre level impact estimates that are deemed to be of sufficient quality by this measure are aggregated by taking a weighted average of their respective impact estimates, using the number of matched UC claims in each Jobcentre as weights.

Results

In this section we present results for a range of labour market outcome measures that cover the period up to 9 months after the start of a claim. We use two complimentary sets of measures, one that examines employment outcomes within a period of time following the claim and one that looks at employment outcomes at a fixed point in time after the claim. Table 3 summarises the outcome measures used in this report and their definitions in terms of the time periods covered.

Table 3: definition of employment outcome measures

Employment outcome	Definition
Within 3 months	Evidence of employment in at least one week of the first 13 following the claim
Within 6 months	Evidence of employment in at least one week of the first 26 following the claim
Within 9 months	Evidence of employment in at least one week of the first 39 following the claim
At 3 months	Evidence of employment in at least one week of weeks 12 – 14 following the claim
At 6 months	Evidence of employment in at least one week of weeks 25 – 27 following the claim
At 9 months	Evidence of employment in at least one week of weeks 38 – 40 following the claim

Employment impact estimates are presented covering UC Jobcentres from across Great Britain.

Employment impact of UC across Great Britain

We estimate that UC claimants (54 per cent) are two percentage points more likely to have been in employment at any point in the six months following the start of their claim than a matched sample of JSA claimants (52 per cent). At the six-month point following the claim, UC claimants (47%) are two percentage points more likely to be in employment than a matched sample of JSA claimants (45%).

Table 4 shows that there is some evidence that the employment impact of UC decreases slightly over the first nine months of the claim. All estimates are statistically significant at the 1 per cent level.

Table 4: UC employment impact estimates, GB

Outcome measure	UC Claims in employment	JSA claims in employment	Impact of UC
Employed within 3 months	42%	39%	3%
Employed within 6 months	54%	52%	2%
Employed within 9 months	60%	59%	2%
Employed at 3 months	39%	36%	3%
Employed at 6 months	47%	45%	2%
Employed at 9 months	50%	48%	2%

Estimates rounded to nearest 1 percentage point

Supplementary Detail on Impact Evaluation

Detailed data processing

This section describes in more detail how we process the key data used in the creation of the UC and JSA claim data sets.

UC claim data

UC claim data is drawn from the UC full service data base via an analytical data base called the UC Production data base. This is an extremely rich source of data containing information about a wide range of aspects of UC claims. The data base contains one record per assessment period per UC claim per individual.

The starting point in building the UC evaluation claim data set is to identify claims on the UC Production data base with a valid national insurance number and claim start date. If either one of these fields are missing it is not possible to merge key contextual data, such as employment histories and outcomes data from the RTI, onto the claim records. It is also vital that Jobcentre name is recorded against the claim because we require geographical identifiers so that we can control for area level differences in the analysis.

It should be noted that only claims that have at least one statement record are retained in the data base and so in practice this means our "claims" are actually equivalent to awards. The term "claims" is used throughout this publication when referring to claims that reach a first award.

We use the start date of the first assessment period recorded against each claim to determine when the claim started and to filter out claims that lie outside the date range we require for this analysis[12].

Claims made by single claimants without children are identified by making use of a derived variable that classifies family type based on the UC standard allowance. This variable is set in each assessment period, but for the purposes of this evaluation, family type recorded in the first assessment period is used.

UC claims are excluded if they are identified as transfers direct from a UC live service claim because rather than being new claims, they are just continuations of pre-existing claims. This removes around three per cent of all UC claim records made between April 2016 and December 2018.

In this evaluation we are aiming to compare the employment outcomes of UC full service claims that would have been JSA claims in the absence of UC with equivalent JSA claims so we need a way to identify "JSA type" UC claims.

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[12] We exclude all UC claim records with a first assessment period date of 1 January 2019 or later for example.

For the purposes of refining UC expenditure forecasts, DWP developed a model to indicate the "legacy alike" status of each UC claim in each assessment period over the life of the claim. Each UC claim is assigned to one of the following categories based on the circumstances recorded on their claim:

- Jobseekers' Allowance alike
- Income Support alike
- Employment and Support Allowance alike
- Working Tax Credit and Child Tax Credit alike
- Child Tax Credit only alike
- Working Tax Credit only alike
- Housing Benefit only alike

This model is used as a starting point in the identification of "JSA type" UC claims. On its own however, this is not enough to reliably identify "JSA type" claims for evaluation purposes so we make some adjustments, which are described later on.

JSA claim data

JSA claim data is drawn from the JSAPS Atomic Data Store (JSAPS – ADS) data base. This contains a wide range of information about the claim and the events that take place during the life of the claim.

As with the UC claim data, the starting point for building the JSA claim evaluation data set is to identify JSA claims with a valid national insurance number, claim start date and Jobcentre name.

There are a number of dates associated with the claim process recorded on the data base[13], although not all of them are populated for all claim records. We use a field called the "claim start date" to define the start point of JSA claims.

Our UC claim data only includes claims that reach a first payment[14]. JSAPS – ADS includes all claims regardless of whether the claim results in an award. It is possible to identify which claims reach a first award though, so we exclude those claims that don't reach that stage. This exclusion removes around 1.8% of the total volume of JSA claims made between April 2014 and December 2018.

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[13] Registered date, cleared date, onflow date and claim start date.

[14] Strictly speaking claims with at least one statement. This will include some claims with a null payment because the individual claimant is earning enough to not receive an actual payment of UC.

UC full service does not replace contributions based JSA claims, so following UC full service rollout Jobcentres may receive claims for UC only, contributions based JSA only or both. Contributions based JSA claims made in these circumstances are known as "new style" JSA claims.

Payment of any "new style" JSA award is made through the Jobseekers' Allowance Payments System (JSAPS), although they appear on the system as "Contributory only" claims.

In order to make a valid comparison group for UC claims, JSA claims must be income based, so all "Contributions only" and "new style" JSA claims are excluded from the JSA claim data set as there are no equivalent UC claims. JSAPS – ADS records the type of JSA claim being made, so it is straightforward to make this exclusion.

When it comes to the identification of claims made by single individuals without children, JSAPS – ADS has a marital status, field so we can easily identify whether a claim is made by a single person or a couple, but it does not have any fields that enable us to identify the presence of children in the household. Child Benefit data is used to determine whether any children were present at the point of the JSA claim. The combination of marital status and child benefit data enables us to identify those individuals who are single and have no children at the point they make their claim.

There is a small group of JSA claims (around 1.5% of all claims made between April 2014 and December 2018 inclusive) for which there is no RTI data because the details of the individuals who made those claims have never been provided by DWP to HMRC as part of the data transfer arrangement between the Departments. Inclusion of these claims in the JSA claim data set would bias employment histories and outcomes downwards for the JSA claim group as a whole, so they have been excluded.

JSAPS – ADS data includes claims with a duration of one day or less. It is well known within DWP that these are not genuine claims and so they are excluded from our JSA claim evaluation data set.

Key contextual data: benefit histories

Benefit claim history is a key determinant of future employment outcomes so for each UC and JSA claim in our data we want to build a benefit claim history. We use the National Benefits Database to generate claim histories for a range of benefits such as Employment and Support Allowance (ESA) and Income Support. The period covered by the benefit claim history corresponds to the two-year period preceding each UC and JSA claim in our data sets. So for a UC claim made on 13th January 2018 we build a benefit claim history covering the period back to 13th January 2016.

Variables are derived that capture whether or not an individual had any spells on other benefits, the number of these spells and the duration of the two-year history spent on these other benefits.

In addition to this, for each of the 105 weeks prior to the JSA or UC claim, a flag is created to indicate whether or not the claimant had a live spell on ESA or JSA in that week. For any given week the flag is set if an ESA or JSA spell overlaps with at least part of that week. Figure 5 illustrates how this works with some hypothetical examples.

Figure 5: Hypothetical historical spells of JSA

In example 1, a JSA claim starts at the beginning of week 65 prior to a claim in our one of our evaluation data sets and ends at the end of week 64. Both JSA weekly flags 65 and 64 will be set, but weekly flags 63, 62 and 61 will not. In example 2, a JSA claim starts at the beginning of week 64 and ends part way through week 63. In this case JSA weekly flags 64 and 63 will both be set but none of the others will be. Finally, in example 3 a JSA claim starts part way through week 63 and continues to the end of week 61, so JSA weekly flags 63, 62 and 61 will all be set.

Key contextual data: employment histories and outcomes

Alongside benefit claim history, past employment history is the most important determinant of employment outcomes following a benefit claim. RTI data is used to set flags for each of the 105 weeks before the claim, the week of the claim and the 105 weeks following the claim to indicate whether or not the individual making that (UC / JSA) claim was in employment in that week.

DWP receives a regular feed of RTI payslip data specifically designed for the employment impact evaluation of UC. The data covers every individual who has claimed UC or JSA at any point back to the beginning of 2014[15]. A crucial design feature of this feed is that data continue to be received even after individuals have left the benefit. This enables us to track the employment outcomes of JSA and UC claimants for as long as is necessary to assess the employment impact of UC.

We start the processing of the RTI data by filtering out payslips that are missing key fields, for example encrypted national insurance number, payment date[16] and pay frequency[17].

Next we derive the period of time covered by the payslip. The end date of the spell is set to the payment date and a combination of pay frequency and the number of earnings periods covered by the payslip is used to set the start date of the spell[18]. See Box 1 for an example.

Box 1: Creation of payslip spells from the information on a payslip

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Box 1: Creation of payslip spells from the information on a payslip

Example 1

Payslip payment date: 31st August 2018
Payment frequency: monthly
Number of earnings periods covered by payslip: 1

Payslip start date: 31 July 2018
Payslip end date: 31 August 2018

Example 2

Payslip payment date: 16h November 2018
Payment frequency: weekly
Number of earnings periods covered by payslip: 2

Payslip start date: 2 November 2018
Payslip end date: 16 November 2018

Next, these payslip spells are combined using the unique employment sequence number[19] to generate spells of employment for an individual. The start date of the first payslip in the sequence of payslips covered by the unique employment sequence number is used to set the start of that unique spell of employment and the end date of the final payslip spell in the sequence is used to set the end date. See Box 2 for an example of this.

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[15] Except for the small sub-set of JSA claimants for which RTI data has never requested by DWP.
[16] This records the date on the payslip and refers to the date the employee was actually paid.
[17] Represents the frequency by which an individual is paid i.e. weekly, monthly, 4-weekly etc..
[18] We therefore assume that all pay is paid in arrears.
[19] Unique employment sequence number identifies each unique employment for an individual

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Box 2: Creation of employment spells

Payslip spells

Start date		End date
01 June 2018	to	08 June 2018
08 June 2018	to	15 June 2018
15 June 2018	to	22 June 2018
.	.	.
.	.	.
.	.	.
26 October 2018	to	**02 November 2018**

Employment spell

Start date: **01 June 2018**
End date: **02 November 2018**

The final step is to compare the employment spell dates with the start dates of the JSA and UC claims to determine which weeks, relative to the start of the claim, the claimant was in employment. Box 3 illustrates how this works in practice.

Box 3: Creation of weekly employment flags

Scenario
Employment spell starts: 14 January 2018
Employment spell ends: 27 February 2018

UC claim made: 23 March 2018

Employment spell starts: 15 April 2018
Employment spell ends: 5 May 2018

Weekly employment flags

Start of week	Week reference	In employment	Weekly flag
12-Jan-18	-10		emph_comb_w10 = 1
19-Jan-18	-9		emph_comb_w9 = 1
26-Jan-18	-8		emph_comb_w8 = 1
02-Feb-18	-7		emph_comb_w7 = 1
09-Feb-18	-6		emph_comb_w6 = 1
16-Feb-18	-5		emph_comb_w5 = 1
23-Feb-18	-4		emph_comb_w4 = 1
02-Mar-18	-3		emph_comb_w3 = 0
09-Mar-18	-2		emph_comb_w2 = 0
16-Mar-18	-1		emph_comb_w1 = 0
23-Mar-18	0		emph_comb_w0 = 0
30-Mar-18	1		empo_w1 = 0
06-Apr-18	2		empo_w2 = 0
13-Apr-18	3		empo_w3 = 1
20-Apr-18	4		empo_w4 = 1
27-Apr-18	5		empo_w5 = 1
04-May-18	6		empo_w6 = 1
11-May-18	7		empo_w7 = 0
18-May-18	8		empo_w8 = 0

Adjusting for potential imbalances in the UC and JSA claim data

This impact analysis will suffer from bias where there are uncorrected systematic differences in the comparison group (JSA claims) and treatment group (UC claims) data. This section describes the additional steps we take to ensure that as far as possible our treatment and comparison groups contain the same types of claims with consistently measured characteristics.

Differences in length of assessment periods for UC and JSA claims

It is possible for individuals to achieve employment outcomes very soon after claiming either JSA or UC. Indeed, it is possible for claimants to find work during the claim process and to discontinue a claim altogether as a result.

As already explained, we only include UC claims and JSA claims that reach a first payment in our claim data sets. JSA payments are based on a weekly assessment of means. In contrast UC payments are based on a monthly assessment of means[20].

We think this difference results in more UC claims than JSA claims not making it to a first payment following an early employment outcome. Furthermore, we think early employment outcomes will result in some UC claims that make it to payment, made by individuals who were unemployed and looking for work at the start of their claim, appearing as Working Tax Credit (WTC) "alike" in the data rather than JSA "alike" and therefore being excluded from our "JSA type" UC claim data set. This is made possible because "legacy alike" status is identified on the basis of information available at the end of each assessment period. Figure 6 helps to illustrate this point.

Figure 6: Impact of early employment on UC and JSA claim data

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[20] In Universal Credit this is known as the assessment period.

It is not possible to pinpoint exactly which "WTC alike" UC claimants were actually looking for work at the start of their claim, but examination of their RTI employment records can help narrow this down. It seems less likely that an individual with a full work record in the first assessment period of the claim was looking for work at the point of their claim than an individual with a gap in their employment record during this period.
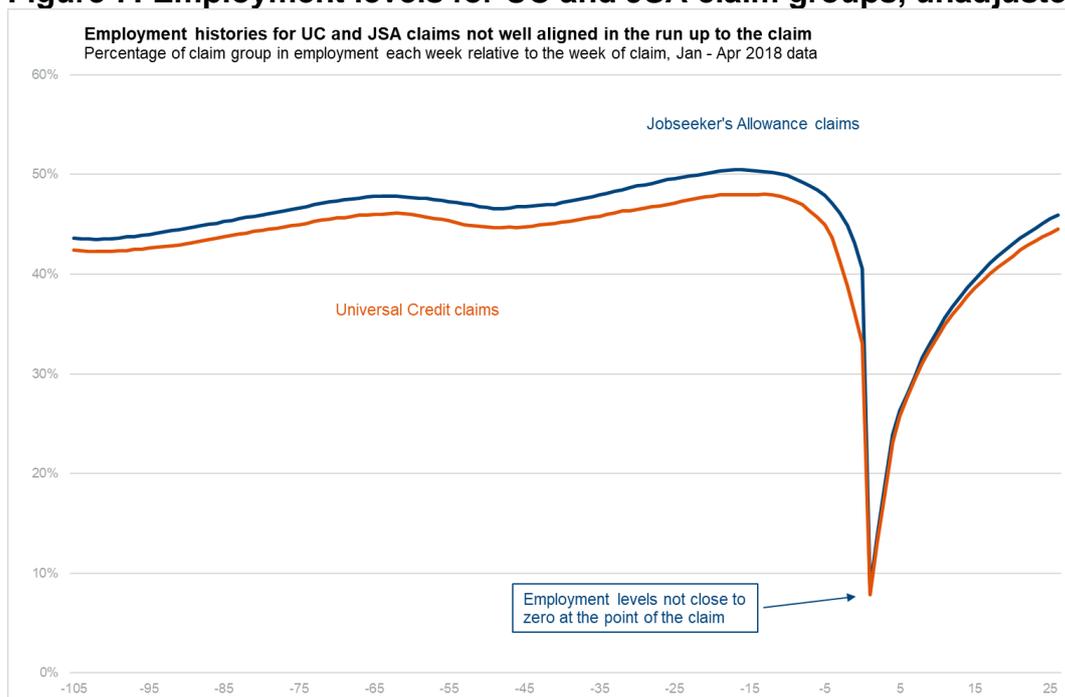
Analysis of RTI data shows that there are significant volumes of "WTC alike" UC claims with gaps in their employment records around the point of their claim[21]. Similarly, the RTI data shows that there are significant volumes of "JSA alike" UC claims and JSA claims with unbroken work records around the point of the claim.

These issues manifest in unexpected differences in the employment levels for the JSA and "JSA alike" UC claim groups in the two-year period prior to the claim and at the point of the claim. Our expectation for these types of claimants is for employment levels to drop in the run up to the claim and then be close to zero at the point of the claim. What we find is that whilst employment levels do drop in the run up to the claim in both the JSA and "JSA alike" UC claim groups, 8-9% of JSA claims and 6-7% of UC claims were in employment at the point of the claim. This suggests we are including some claims by individuals who were not seeking work at the point of their claim and crucially we may be doing this to a different extent in the UC and JSA claim groups. It is also possible that some individuals may have received pay from a previous job following the start of their JSA or UC claim.

Figure 7 shows how employment levels vary in the UC and JSA claim groups in the two years prior to the claim, at the point of claim and beyond. Employment levels are relatively stable up to 15 weeks prior to the claim after which they drop dramatically, but do not reach zero. In the month before the claim employment levels for JSA claims are in excess of 5 percentage points higher than for UC claims.

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[21] In weeks 1 to 4 following the claim.

Figure 7: Employment levels for UC and JSA claim groups, unadjusted

Employment histories for UC and JSA claims not well aligned in the run up to the claim
Percentage of claim group in employment each week relative to the week of claim, Jan - Apr 2018 data

Jobseeker's Allowance claims

Universal Credit claims

Employment levels not close to zero at the point of the claim

We make three adjustments to our UC and JSA claim groups to correct for this:

- Firstly, to our UC claim group we add UC claims made by individuals identified as "WTC alike" in the first assessment period of their claim but who had broken employment records in that first assessment period[22].
- Secondly, we exclude UC claims made by individuals identified as "JSA alike" in the first assessment period of their claim but who appeared to have unbroken work records in their first assessment period[23].
- Finally, we exclude JSA claims made by individuals who appear to have an unbroken work record in the first 4 weeks of their claim[24].
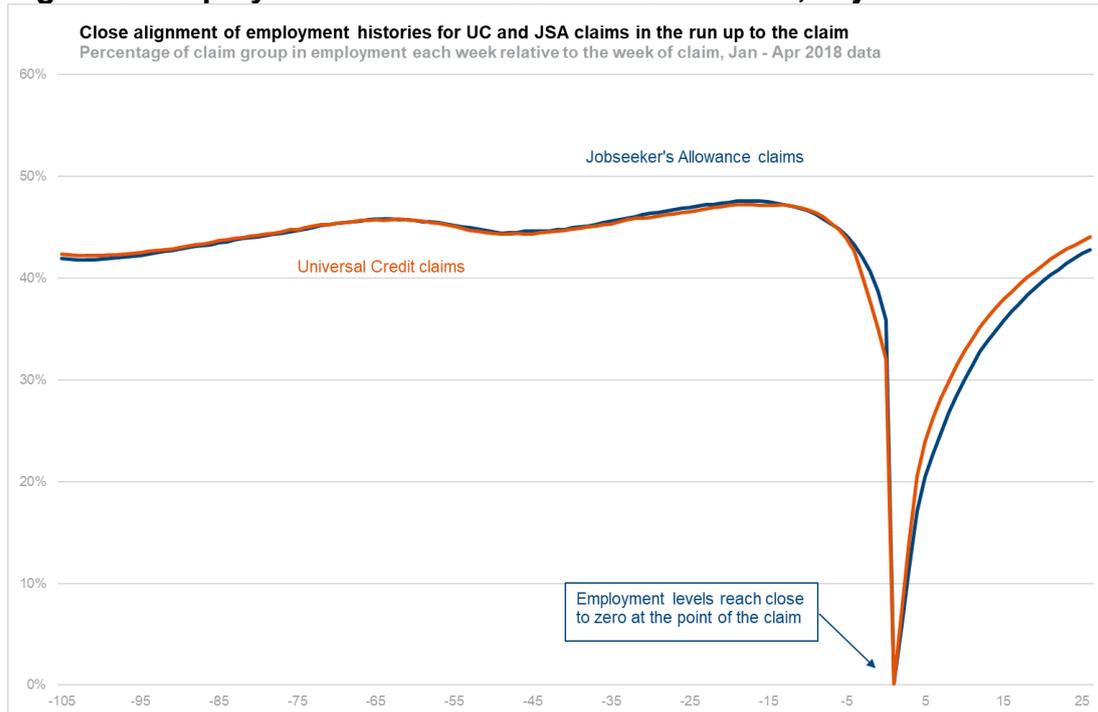
Figure 8 shows how these adjustments affect the employment levels in the JSA and UC claim groups in two years running up to the claim, at the point of the claim and in the 6 months following the claim.

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[22] Strictly we added UC claims modelled as "WTC alike" in assessment period 1 who appear to have been out of work (according to our analysis of the RTI data) in at least one of the first 4 weeks following the claim.

[23] An unbroken employment record around the point of the claim casts serious doubt over whether UC claims were actually "JSA alike".

[24] This is a balancing adjustment to ensure we treat the JSA claim group the same as the UC claim group.

Figure 8: Employment levels for UC and JSA claims, adjusted

Close alignment of employment histories for UC and JSA claims in the run up to the claim
Percentage of claim group in employment each week relative to the week of claim, Jan - Apr 2018 data

Jobseeker's Allowance claims

Universal Credit claims

Employment levels reach close to zero at the point of the claim

Employment levels are very closely aligned pre-claim, become very close to zero at the point of the claim, as we would expect for claimants of this type and then begin to rise in the weeks that follow the claim as claimants find employment.

Table 6 shows how the volume of UC and JSA claims in the data sets changes as the adjustments made to correct for imbalances in employment histories are varied.

Table 6: Adjusting UC and JSA claims for employment history imbalance, Jan – Apr 2018

	Adjustments	Number of claims
JSA	No adjustment	145,000
	Remove claims with perfect work record in first four weeks of claim	133,000
UC	No adjustment	99,000
	Add "WTC alike" claims with broken work record in first four weeks of claim	105,000
	Add "WTC alike" claims with broken work record in first four weeks of claim. Remove "JSA alike" claims with perfect work record in first four weeks of claim	97,000

Note: claims rounded to the nearest 1,000

Flows into "JSA alike" status

In UC full service it is possible for the "legacy alike" status of a claim to change over the life of that claim. This mirrors the changes in benefit claims that would have taken place in the legacy system as individuals' circumstances change over time. So for example a change in status from "JSA alike" to "WTC alike" driven by a claimant starting employment mirrors a move from claiming JSA to claiming WTC instead in the legacy system.

Since "legacy alike" status is modelled in all assessment periods of a UC claim it is possible to identify claims where an individual becomes "JSA alike" in their second or subsequent assessment period. For example, an individual begins their UC claim as "ESA alike" whilst a work capability assessment is carried out and then becomes "JSA alike" in assessment period four after they have been found fit for work following the completion of a work capability assessment.

It is important to capture claims of this type in the UC claim data set because equivalent claims will be present in the JSA claim data set (although it is not possible to separately identify them).

As a result, the UC claim data set includes both claims that are categorised as "JSA alike" in the first assessment period of the claim and claims where "JSA alike" status is identified in the second or subsequent assessment period of the claim – we call these flows into "JSA alike" status claims. For the latter group, claim characteristics (start date, age and sex of claimant, family type) are recorded in the assessment period when "JSA alike" status is first identified. For the former group, claim characteristics are recorded in the first assessment period of the claim.
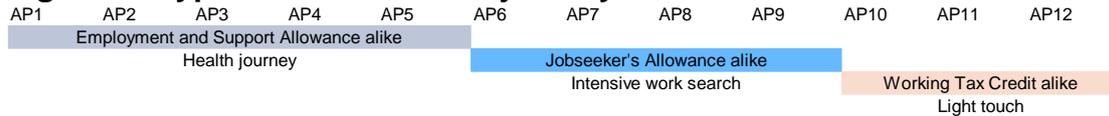
Implicitly, we make the assumption that all individuals claiming UC would have claimed JSA had UC not been available. This assumption is not testable and our analysis will be biased if there are UC claims that would not have been JSA claims in the absence of UC and their employment outcomes differ systematically from other UC claims and JSA claims.

Flows into "JSA alike" claims into the UC data, represent around 35,000 of the 97,000 claims to the data set between January – April 2018.

Controlling for "ESA alike" UC claim history

The inclusion of UC claims that become "JSA alike" in the second or subsequent assessment period of the claim in our UC claim data set opens up the possibility that in the earlier assessment periods of the claim they were "ESA alike", indeed this may have been their status at the start of the claim. Figure 9 illustrates this with a hypothetical UC claim journey.

Figure 9: Hypothetical UC claim journey

AP1	AP2	AP3	AP4	AP5	AP6	AP7	AP8	AP9	AP10	AP11	AP12

Employment and Support Allowance alike
Health journey

Jobseeker's Allowance alike
Intensive work search

Working Tax Credit alike
Light touch

In this example, an individual with a health condition makes a claim for UC full service and is initially put on the health journey while a Work Capability Assessment is carried out. In the sixth assessment period they are found fit for work and they move onto the intensive work search conditionality regime. In assessment period ten they find work and move into the light tough conditionality regime. These changes mirror legacy benefit claims that would have taken place in the absence of Universal Credit: an initial Employment and Support Allowance claim, followed by a Jobseeker's Allowance claim, followed by a Working Tax Credit claim.

If we didn't reflect these periods of past "ESA alike" status in the benefit claim history for UC claims it would create a gap in the ESA claim histories of some UC claims. Since there would be no such gap in the ESA claim histories of JSA claims, this would introduce a mismatch between the UC and JSA claim groups.

To correct for this, we combine these periods of "ESA alike" status with legacy ESA histories to create a single set of controls.

A full list of the controls we use in the propensity score matching is provided at the end of this document.
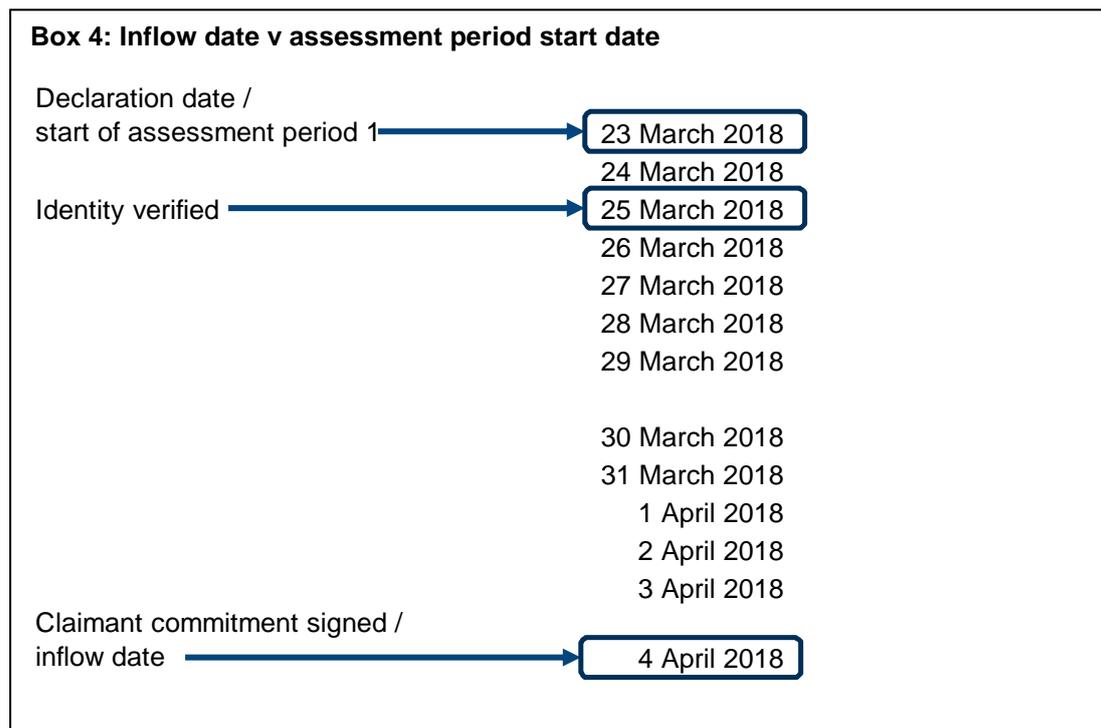
Definition of start date of UC and JSA claims.

Correct identification of the start date of claims is critically important to the analysis because this defines the point from which employment outcomes are tracked. If the chosen dates are not properly aligned in relation to the stage of the new claim journey claims have reached, a bias will be introduced into the impact analysis.

Unfortunately, because UC and JSA claims are administered on different computer systems it is not possible to be certain about the alignment of the claim start dates. In practice there is only one start date we can use for JSA claims – the claim start date - which relates to the date entitlement starts from, whereas there are a number of alternative dates we could use for UC claims, reflecting different points in the new claim journey.

The assessment period start date refers to the date entitlement is assessed from in each month of the UC claim and is equivalent to the declaration date of the UC claim[25]. This seems to most naturally align with the claim start date in JSA claims and so this is what we use for our main analysis. More precisely we use the start date of the first assessment period in which the claim is classified as "JSA alike". As explained above this may not be the first assessment period of the UC claim.

There is an alternative UC claim date available known as the "inflow date" (the earliest of the date the claimant's identification was verified and the date the claimant commitment was signed). Typically, "inflow date" falls one or two weeks after than the first assessment period start date – see Box 4 for a hypothetical example. Using this definition of claim start date tends to increase the employment impact of UC and we think there are a couple of reasons for this. Firstly, the tracking of employment outcomes effectively reaches further into the future beyond the actual start of the claim compared with using first assessment period start date. Secondly, some employment that is treated as an outcome when using the assessment period start date will instead be treated as employment history when using the "inflow date".

Box 4: Inflow date v assessment period start date

Declaration date /
start of assessment period 1 ⟶ 23 March 2018
24 March 2018

Identity verified ⟶ 25 March 2018
26 March 2018
27 March 2018
28 March 2018
29 March 2018

30 March 2018
31 March 2018
1 April 2018
2 April 2018
3 April 2018

Claimant commitment signed /
inflow date ⟶ 4 April 2018

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[25] This corresponds to the date when the UC claim form is submitted following completion.

Controlling for previous UC claims.

When the UC live service gateway was closed in a Jobcentre, ongoing live service claims in that Jobcentre were transferred across to UC full service on a gradual basis. Transfers from live service are not new UC claims in the sense that the claim to full service is not driven by a change in the circumstances of the claimant. Indeed, in the absence of UC, there would not have been a new claim for a legacy benefit.

In contrast all legacy JSA claims are driven by a change in circumstances, for example the break-up of a couple who had previously been making a joint claim for JSA, or by job loss. Since we only want to include new claims, we exclude live service transfers from the UC full service claim data.

Individuals making claims to either JSA or UC full service in January – April 2018 may have previously made a claim to UC live service. Previous experience of claiming UC live service could have an effect on the employment outcomes they achieve following their latest claim and so it is important to take this into account.

Multiple claims per individual are included in both the JSA and UC claim data sets. Again, this previous claim history could have an effect on the employment outcomes they achieve and so we control for it in the analysis.

Given that UC full service (for JSA type claimants), UC live service and JSA are equivalent benefits, we combine the claim histories for these benefits into a single set of controls.

Income-based JSA claims made in UC full service Jobcentres claims

As Jobcentres rolled out to UC full service, the JSA new claim gateway closed (except for claims to "new-style" JSA) and they should have stopped receiving claims for "income-based" JSA. Nevertheless, we find significant volumes of JSA "Contributions and income-based" claims being made in Jobcentres post-rollout to UC full service.

Analysis of these claims suggests that they are quite different to the average "income-based" JSA claim, indeed they look much more like "new-style" JSA claims, especially in terms of employment histories and outcomes suggesting they are more work ready than the average "income-based" JSA claim and more likely to find work following a claim.

Following some investigation into why these claims appear in the JSA claim source data, we concluded that they were most likely misclassified "new-style" JSA claims and so we exclude them from the JSA claim data set. This reduces the number of JSA claims in the January – April 2018 period by around 7,000.

Treatment of claims made by singles without children who used to be part of a couple claim in UC full service.

When a couple who have been claiming UC separates, the individuals who used to be part of that couple are required to make new UC claims. In many cases there will be no gap between the end of the couple claim and the start of two single person claims in the data. So what appears to be a first UC claim for a single person, could actually be the continuation of a single spell of UC that started off as a couple claim.

These types of single person claims are not really new claims and their inclusion risks biasing the employment impact estimates. We considered excluding these claims from the UC claim data set but decided against this for a couple of reasons:

- Firstly, the same phenomenon is present in the JSA claim data but there is no way of identifying which JSA claims are those made by single individuals who used to be part of a couple, so we cannot make a balancing adjustment to the JSA claim data;

- Secondly, we tested the impact of the exclusion of just the UC claims by singles people who used to be part of a couple claim and found that the potential bias was small.

Sensitivity analysis

In the previous section, we described various choices that we made in building the JSA and UC claim data sets. In this section, we test the robustness of our analysis by making alternative choices and observing the difference this makes to the UC employment impacts. We also test the robustness of the results to the use of a different modelling approach based on a two-stage fixed effects model. The purpose of these tests is to demonstrate the extent of the potential for bias in the analysis stemming from choices we made about the data and choices about the modelling approach.

Overall we find that the UC employment impacts do not vary by much when we make different data and modelling choices and so we conclude that our analysis is robust at least to these observables.

Table 7 provides a brief description of the sensitivity tests carried out.

Table 7: Summary of sensitivity tests

Sensitivity test	Description
Test 1: Using different numbers of comparison Jobcentres	In the baseline, we used the 20 most similar Jobcentres. In this test we test the effect of using the 10, 15, or 25 most similar Jobcentres
Test 2: Vary the adjustments we make to account for the effects of differences in length of assessment periods for UC and JSA claims	In one test we make none of the three adjustments described previously. In a second test we use one of the three adjustments – the inclusion of WTC alike UC claims with a broken work record in the four weeks following the claim
Test 3: Use a two-stage fixed effects model to estimate impacts	An alternative to propensity score matching using UC and JSA claim data from the whole of 2018.
Test 4: Only use UC claims where the claimant was deemed to be "JSA alike" in the first assessment period	No flows into "JSA alike" status in a second or subsequent assessment period are included in the UC claim group
Test 5: Only use first UC claims for each individual.	Remove second and subsequent UC claims for each individual.
Test 6: Vary the post-match bias quality cut-off	In the baseline the cut-off is 5 per cent. This is used to determine which Jobcentre level impact estimates are of sufficient quality to include in the final aggregate analysis. Here we vary the cut-off between 2 and 7 per cent.

Test 7: Testing for possible displacement effects	We test to see whether there is any evidence that the positive employment impact estimated for UC claims, comes at the expense of negative impacts for other similar claim groups.
	We include all types of JSA claims made by singles without children in the comparison group and all types of JSA claims made by singles without children in the treatment group.

For each test we compare the impact estimate obtained in the test with the baseline impact estimate. We focus the testing against a single outcome measure: employment at any point in the six months following the claim; which in the baseline is two per cent[26].

Test 1: varying the number of comparison Jobcentres

As explained in the methodology section, for each UC Jobcentre we select the 20 most similar Jobcentres not yet rolled out to UC to use in the formation of our comparison group for that UC Jobcentre.

In this test, we estimate the impact of UC on employment within six months of the claim using various alternative numbers of most similar Jobcentres to form the comparison group. Table 8 summarises the unrounded employment impact estimates for the baseline 20 Jobcentres and the alternatives.

Table 8: Raw UC employment impact estimates for sensitivity test 1

Comparison group size	UC employment impact: employed within six months
10 Jobcentres	1.4%
15 Jobcentres	1.8%
20 Jobcentres	1.9%
25 Jobcentres	1.8%

Overall, varying the number of similar Jobcentres used to form the comparison group does not change the employment impact estimate by very much and as Table 9 shows, other metrics of estimate quality suggest that the chosen comparison group size delivers robust UC employment impacts.

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[26] See Table A2.3.

Table 9: Metrics of impact estimate quality by size of comparison group

Comparison group size	Post-match bias[27]	Common Support	UC claims on support	UC Jobcentres
10 Jobcentres	2.5	81%	67,500	161
15 Jobcentres	2.2	85%	72,000	168
20 Jobcentres	2.0	87%	74,500	169
25 Jobcentres	1.9	89%	76,000	170

Test 2: Accounting for differences in the length of UC and JSA assessment periods

In the detailed data processing section we described the impact that differences in the length of UC and JSA assessment periods can have on the comparability of our UC and JSA claim groups and we presented alternative ways that we could adjust for this (including not making any adjustment). In this test we estimate the impact of UC on employment within six months of the claim using alternative approaches to this issue.

Table 10 summarizes unrounded UC employment impact estimates for the baseline set of adjustments and two alternatives:

- Scenario 1: not making any adjustments; and

- Scenario 2: adding UC claims made by individuals identified as "WTC alike" in the first assessment period of their claim but who had broken employment records in that first assessment period to our UC claim group

Table 10: Raw UC employment impact estimates for sensitivity test 2

Scenario	UC employment impact: employed within six months
Scenario 1	1.0%
Scenario 2	1.8%
Baseline	1.9%

UC employment impacts are very similar using baseline adjustments and scenario 2. As expected, scenario 1 shows that without adjustment the employment impact estimate is biased downwards since we are not including all those "JSA alike" claimants in our treatment group, particularly the group identified as "WTC alike" but with broken employment records mentioned above who are likely to be closer to the labour market than other "JSA alike" UC claimants and therefore have better outcomes. Although it should be noted that this analysis also shows that the degree of bias is relatively small.

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[27] Post-match bias refers to the mean absolute standardised bias across all covariates in the propensity score regression. A value of less than 5 for post-match bias to be indicative of a match of sufficient enough quality to use in our final aggregate estimate.

Test 3: Use of an alternative modelling approach to estimate UC employment impacts

In this test we examine what difference it makes if we use a different modelling approach to estimate UC employment impacts. We use a two-stage fixed effects model to test this on the impact of UC on employment within six months of the claim.

Using UC and JSA claim data covering the whole of 2018 we use a two-stage approach[28]:

- Stage 1: Using the individual claim level data, regress the binary outcome of employment within six months of the claim on the same covariates used in the propensity score matching regression and recover the residuals.
- Stage 2: Average the residuals from stage 1 by month and Jobcentre and run a fixed effects regression of the form:

$$\widehat{resid}_{jt} = \alpha_j + \delta_t + \beta UC_{jt} + e_{jt} + (\widehat{resid}_{jt} - resid_{jt})$$

where UC_{jt} indicates whether the UC full service gateway was open in Jobcentre j at time t, δ_t represents time effects and α_j represents Jobcentre level effects that are fixed over time[29]. The composite error term $e_{jt} + (\widehat{resid}_{jt} - resid_{jt})$, effectively reduces to e_{jt} when the number of month / Jobcentre cells is large[30].

The first stage regression effectively controls for differences in the composition of claims across Jobcentres. The second stage regression controls for unobserved time-invariant heterogeneity between Jobcentres and estimates the impact of UC from variations in the dependent variable over 2018 within each Jobcentre. An estimate of the UC employment impact is recovered from the coefficient β. Intuitively, β represents the UC employment impact averaged over all Jobcentres and claim cohorts in 2018.

There are many differences between this modelling approach and our main propensity score matching approach, but a key one is that this model estimates employment impacts at the Jobcentre level, whereas the propensity score matching model estimates impacts at the individual claim level. As a result, we would expect to get different estimates from the two approaches.

Table 11 presents the unrounded estimate of the impact of UC on employment within six months of the claim from the fixed effects modelling approach alongside the baseline propensity score matching approach.

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[28] This follows the two-stage approach described in Brewer, M., Crossley, T, F., and Joyce, R., "Inference with difference in differences revisited", IZA Discussion Paper No. 7742, (2013), 4-5.

[29] In our implementation, these Jobcentre level effects are not estimated but are removed by de-meaning the data

[30] There are 7,440 month/Jobcentre cells in our model – 12 months and 620 Jobcentres.

Table 11: Raw UC employment impact estimates for sensitivity test 3

Modelling approach	UC employment impact: employed within six months
Fixed effects	2.7%
Propensity score matching (baseline)	1.9%

Whilst the estimate of the employment impact of UC is slightly higher when using the fixed effects approach, the two modelling approaches tell the same broad story of UC having a positive impact on employment outcomes.

Test 4: Only use UC claims where the claimant was deemed to be "JSA alike" in the first assessment period

As explained previously, in our main analysis we include claims made by individuals who don't appear to be "JSA alike" in the first assessment period of their claim, but do appear to be in some subsequent assessment period or periods.

In this test we remove these claims so that we only include "JSA alike" UC claims where the claimant was deemed to be so in the first assessment period of the claim[31].

Table 12 presents the unrounded estimate of the impact of UC on employment within six months of the claim from this test alongside the baseline estimate.

Table 12: Raw UC employment impact estimates for sensitivity test 4

	UC employment impact: employed within six months
Test 4	1.4%
Baseline	1.9%

Exclusion of UC claims that flow into "JSA alike" status from the data reduces the employment impact of UC. This is to be expected since many of. Since these claimants are relatively close to the labour market, we would expect them to have strong employment outcomes and hence excluding them from our treatment group but not our control group lowers our estimate. Nevertheless, the closeness of the estimates suggests that the potential bias from excluding these claims and not excluding equivalent JSA claims is quite small.

Test 5: Only use the first UC claim per individual

Our baseline data includes all UC full service claims made by single individuals without children and we control for previous claims in the

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[31] Other data adjustments remain unchanged. So, for example we continue to add "WTC alike" claims where the claimant has a broken work record in the first 4 weeks of the claim etc..

propensity score matching regression. In this test we remove second and subsequent claims from the data.

Table 13 presents the unrounded estimate of the impact of UC on employment within six months of the claim from this test alongside the baseline estimate.

Table 13: Raw UC employment impact estimates for sensitivity test 5

	UC employment impact: employed within six months
Test 5	2.0%
Baseline	1.9%

Exclusion of second and subsequent UC claims from the data has very little effect on the UC employment impact.

Test 6: varying the quality threshold for Jobcentre level impact estimates

When deciding which Jobcentre level estimates to include in the aggregate UC employment impact estimate we refer to a measure of balance called the average post-match mean absolute standardised bias (across all covariates included in the propensity score model) and only include results from Jobcentres where this metric is less than five per cent.

In this test we vary this threshold of five per cent across selected values from as low as two per cent to as high as seven per cent. We would expect that as the quality threshold is decreased[32], fewer Jobcentre level results will be deemed to be of sufficient quality to include in the aggregate UC employment impact estimates and the average quality of the results included should improve. Conversely, as the quality threshold is increased, we would expect more Jobcentre level results to be deemed of sufficient quality to include in the aggregate impact estimate and the average quality of the results to decrease.

Table 14 presents unrounded estimates of the impact of UC on employment within six months of the claim for selected quality thresholds.

Table 14: Raw UC employment impact estimates for sensitivity test 1

Quality threshold[33]	UC employment impact: employed within six months
2 per cent	1.4%
3 per cent	1.9%
4 per cent	1.9%
5 per cent (baseline)	1.9%
6 per cent	2.0%
7 per cent	2.0%

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[32] Representing a stricter quality threshold.

[33] Average post-match mean absolute standardised bias (across all covariates included in the propensity score model)

The UC employment impact estimate does not vary by much with changes in the Jobcentre level estimate quality threshold. Table 15 shows other metrics of estimate quality for the quality threshold variants.

Table 15: Quality metrics for test 6

Post-match bias threshold	Post-match bias	Common Support	UC claims on support	Number of UC Jobcentres
2 per cent	1.5	89%	41,000	64
3 per cent	1.8	88%	65,500	129
4 per cent	2.0	88%	72,500	157
5 per cent (baseline)	2.0	87%	74,500	169
6 per cent	2.1	87%	76,000	176
7 per cent	2.1	87%	76,000	176

This analysis confirms that there are some small quality gains to be made by applying a stricter quality threshold on the Jobcentre level impact estimates, but that comes at the expense of smaller sample size in the aggregate estimate. Furthermore, as the quality threshold is relaxed above 5 per cent, there is a relatively small worsening of average post-match bias and common support and relatively little gain to be made from increased sample size.

Test 7: displacement effects

For the baseline analysis, the comparison group is comprised of income based JSA claims made in Jobcentres not yet rolled out to UC full service and the treatment group comprises UC full service claims made in Jobcentres that have rolled out to UC full service.

In the detailed data processing section, we explained that there are JSA claims made in UC Jobcentres after rollout to UC[34].

In this test we examine the impact of Jobcentre rollout to UC full service on the employment impacts of all JSA equivalent claims. We define the treatment group as all UC and JSA claims made by single individuals without children in Jobcentres that have rolled out to UC full service; and we define the comparison group as all JSA claims made by single individuals without children in Jobcentres yet to rollout to UC full service.

If the employment impact estimate from this test is lower than the UC employment impact estimate, we would conclude that some of the improvement in employment outcomes for UC claims is being offset by worse employment outcomes for JSA claims made in UC Jobcentres.

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[34] New style JSA claims and what at least appear as income based JSA claims that we think are misclassified new style JSA claims.

Table 16 presents an unrounded estimate of the impact of UC full service rollout on employment within six months of the claim alongside the unrounded baseline estimate of the impact of UC on employment within six months of the claim.

Table 16: Impact of UC full service rollout

Employment impact estimate	UC employment impact: employed within six months
UC rollout	1.4%
UC - baseline	1.9%

The employment impact of UC rollout on JSA type claims is smaller than the employment impact of UC, but not by much. This suggests there is some tentative evidence of a small displacement effect.

Robustness of estimates

This section provides some further diagnostic information on the estimates. We also show how the balance of characteristics between the UC and JSA claim groups improves post-matching. In the final section we look at how UC employment impacts vary by Jobcentre.

UC employment impact across Great Britain

Table 17 presents a selection of diagnostics for the UC employment impact estimates covering the whole of Great Britain (see Table 4).

Table 17: Quality metrics for UC employment impact estimates

Outcome measure	Post-match bias	Common support	UC claims on support	UC Jobcentres
Employed within 3 months	2.0%	88%	76,000	172
Employed within 6 months	2.0%	87%	74,500	169
Employed within 9 months	2.0%	87%	74,500	168
Employed at 3 months	2.0%	88%	75,500	169
Employed at 6 months	2.2%	87%	74,500	169
Employed at 9 months	2.0%	87%	74,500	169

Note: percentages rounded to the nearest 1 per cent, volumes to the nearest 500

179 Jobcentre level UC employment impact estimates were produced for each of the outcome measures using the propensity score approach outlined in the methodology section. The vast majority of these were included in the aggregate estimates. The fewest rejections (7) were made from the "employed within 3 months" measure, whereas the most (11) were made from the "employed within 9 months" outcome measure.

Overall, the bias remaining after matching is low and common support is high across all outcome measures. Jobcentre coverage is wide and the sample sizes are large.

Matching quality – balance across claim characteristics

In figure 10 we repeat the analysis of the high level characteristics of UC and JSA claim groups shown in Figure 4. This time we show the characteristics of the matched samples of JSA and UC claims for the employment within six months of the claim outcome measure. As Table 18 shows, far more granular variables are included the propensity score matching model.

**Figure 10: Matched UC and JSA claims by selected characteristics**
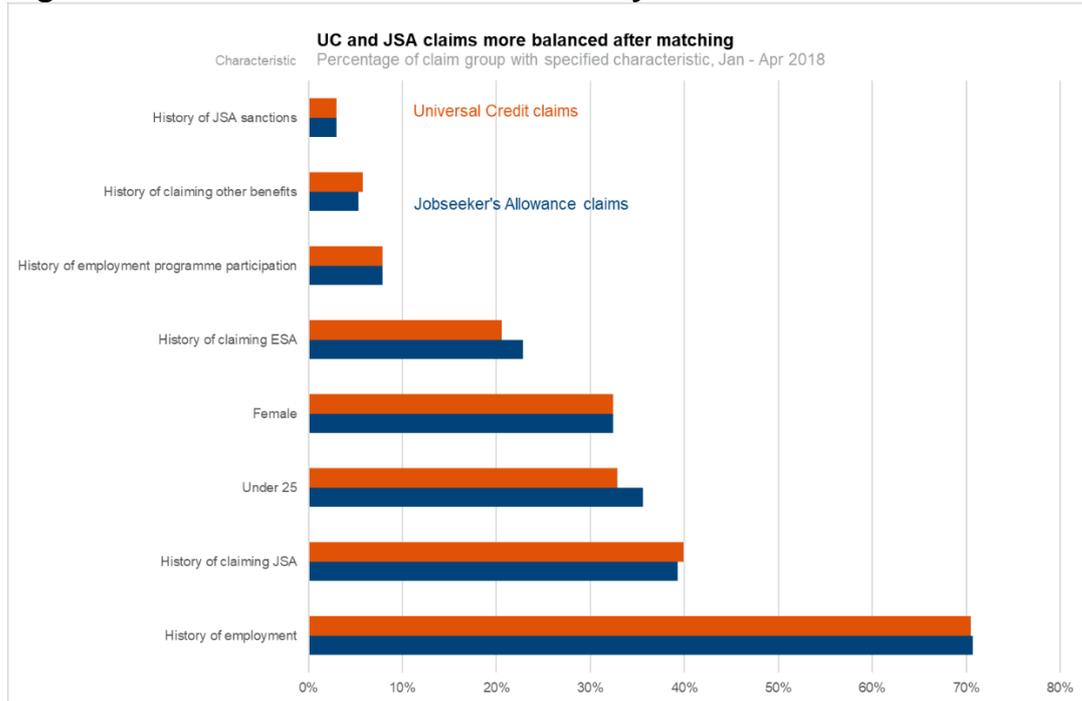
Overall, matching improves the balance of characteristics in the UC and JSA claim groups. There are notable improvements in the balance between the groups on gender, age and JSA claim history. However, the percentage of UC and JSA claim groups with a history of claiming ESA diverges slightly after matching.

Variation in Jobcentre level impact estimates

Figure 11 shows the distribution of UC employment impacts over the 169 Jobcentres include in the analysis of the employment within six months of the claim outcome measure.

Figure 11: Distribution of UC employment impacts by Jobcentre
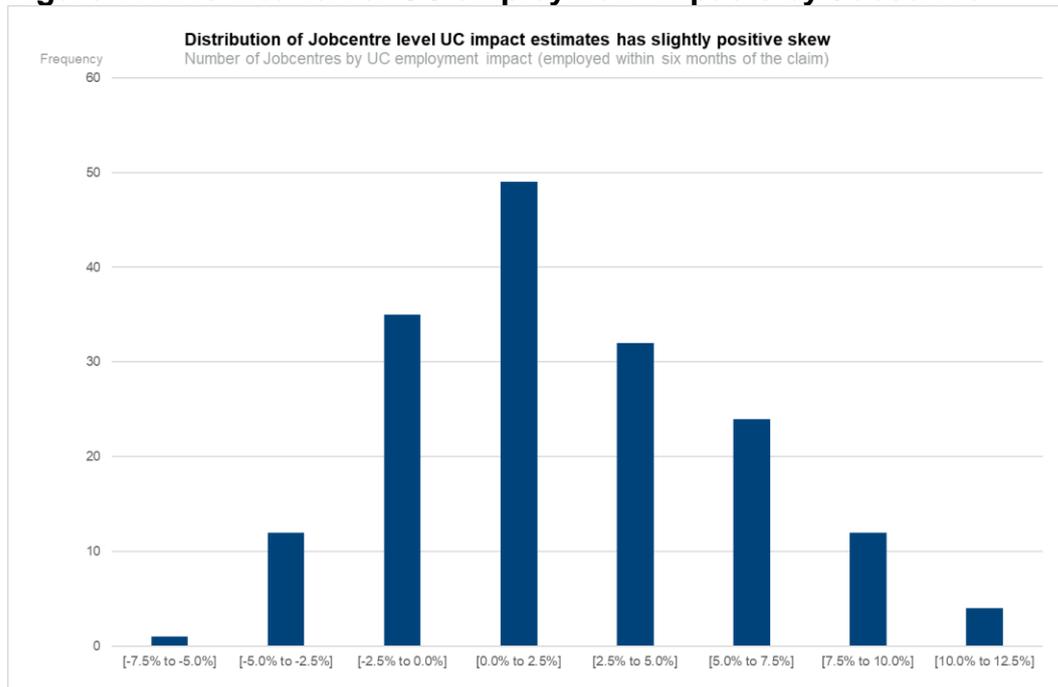
Jobcentre level impacts are distributed fairly evenly around the aggregate estimate of two per cent. The maximum Jobcentre level estimate is 12% and the lowest is -5%. We estimate a negative impact of UC in around a quarter of the 169 Jobcentres included in the aggregate estimate.

In Figure 12 we show the distribution of common support (the percentage of the treatment group for matches from the comparison group were found) over the 169 Jobcentres in the analysis of the employment within six months of the claim outcome measure.

Figure 12: Distribution of common support by Jobcentre

Distribution of common support by Jobcentre is negatively skewed
Number of Jobcentres by percentage common support, (employed within six months of the claim)
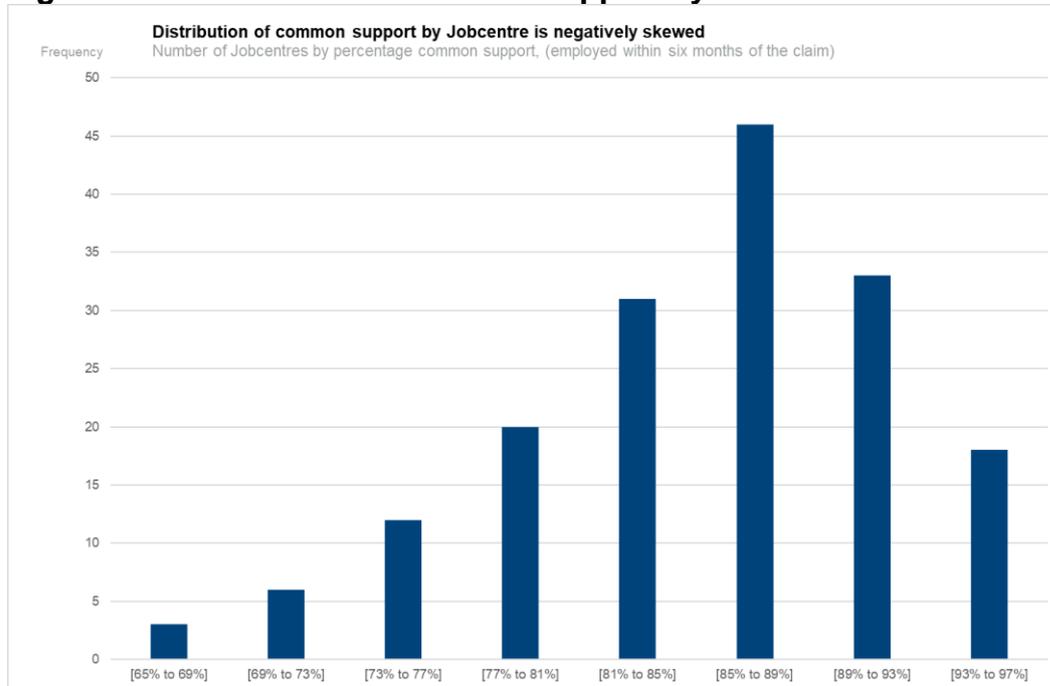
Common support is negatively skewed. The minimum value of common support among the 169 Jobcentres is 65% and the maximum is 97%.

Details of the control variables used in the propensity score regression model

Table 18 provides a complete listing together with a short description of the controls used in the propensity score matching regression model.

Table 18: Control variables used

Control variable	Description
prspelljsa1	Dummy variable set to 1 where individual has 1 prior spell of JSA / UC live service / UC full service in the data set
prspelljsa2	Dummy variable set to 1 where individual has 2 prior spells of JSA / UC live service / UC full service in the data set
prspelljsa3pl	Dummy variable set to 1 where individual has 3 or more prior spells of JSA / UC live service / UC full service in the data set
jsaweeks1-105	Series of dummy variables set to 1 if in receipt of JSA / UC live service / "JSA alike" UC full service in each of the 105 weeks before the claim
esaweeks1-105	Series of dummy variables set to 1 if in receipt of ESA / "ESA alike" UC full service in each of the 105 weeks before the claim
emph_comb_w0 - 105	Series of dummy variables set to 1 if in employment in each of the 105 weeks before the claim and the week of the claim
sanc_total	Number of JSA sanctions in the two years before the claim
empprogf	Dummy variable set to 1 if participated in an employment programme in any week in the two years prior to the claim
timeempprog	Proportion of the two years prior to the claim spent on employment programmes
spellsempprog	The number of separate employment programme spells in the two years prior to the claim
otherbenf	Dummy variable set to 1 if in receipt of other benefits in any week in the two years prior to the claim
timeotherben	Proportion of the two years prior to the claim spent on other benefits
spellsotherben	The number of separate other benefit spells in the two years prior to the claim
otherbenXemp_flag	Interaction of otherbenf with a dummy variable set to 1 if in employment in any week in the two years prior to the claim
otherbenXesa	Interaction of otherbenf and the proportion of the last two years spent on ESA

otherbenXjsa	Interaction of otherbenf and the proportion of the last two years spent on JSA
otherbenXempprog	Interaction of otherbenf and whether participated on an employment programme in the last two years
age	Year of age of claimant: {17 : 16-17 years, 21: 18-24 years, 27: 25-29 years, 32: 30-34 years, 37: 35-39 years, 42: 40-44 years, 47: 45-49 years, 52: 50-54 years, 57: 55-59 years, 62: 60-64 years, 65: 65+ years}
ageXsex	interaction of age and sex
ageXjsa	interaction of age and the proportion of the last two years spent on JSA
ageXesa	interaction of age and the proportion of the last two years spent on ESA
ageXotherben	Interaction of age and whether on other benefits in the last two years
ageXemp_flag	Interacton of age and whether employed in any week in the last two years
ageXempprog	Interaction of age and whether participated on an employment programme in the last two years
sex	Dummy variable set to 1 if claimant is female
sexXjsa	interaction of sex and the proportion of the last two years spent on JSA
sexXesa	interaction of sex and the proportion of the last two years spent on ESA
sexXotherben	Interaction of sex and whether on other benefits in the last two years
sexXemp_flag	Interacton of sex and whether employed in any week in the last two years
sexXempprog	Interaction of sex and whether participated on an employment programme in the last two years
monstartdum2	Dummy variable =1 if claim made in February 2018
monstartdum3	Dummy variable =1 if claim made in March 2018
monstartdum4	Dummy variable =1 if claim made in April 2018