Does housing tenure affect the response of claimants to stricter job search requirements? Evidence from the UK Jobseeker's Allowance[☆,☆☆]

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Abstract

This paper investigates the relation between job search behaviour and housing tenure, exploiting exogenous variation in job search requirements for benefit eligibility introduced by the UK Jobseeker's Allowance (JSA). Labour Force Survey data are used to estimate JSA's impact on the combination of claimant status and search intensity. Many claimants leaving the register without entering employment are found to keep searching with higher intensity, revealing preference for independent search. Decomposing the treatment effect by housing tenure, it is found that the JSA increased the probability to find a job among mortgagers; it also induced a significant claimant outflow for renters, but not for outright owners, and significantly less for mortgagers. This can be due to a different search behaviour of homeowners, either because of higher initial levels of search (mortgagers) or because of higher propensity to adjust search to new requirements (outright owners). Among unemployed stopping claiming benefits, many renters decreased their search effort, but many others increased it, similarly to mortgagers. These findings suggest that tighter enforcement of search requirements led many unemployed to abandon the system despite commitment to look for work, contrary to the stated rationale for the policy design.

Keywords: Counterfactual impact evaluation, unemployment benefit, job search, housing tenure, homeownership.

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1. Introduction

Over the last three decades, a large body of literature has been devoted to the impact of unemployment insurance (UI) systems on the labour market.[1] While the main focus has been on the level and the duration of benefits, a growing strand of research has paid attention to the role of eligibility criteria. Adverse incentive effects of the UI system can be mitigated by conditioning receipt of the benefit to some criteria related to job search, and a good design of eligibility conditions is thought to work without impairing the extent of the insurance protection. Existing evidence generally confirms that the strictness with which the benefit system is operated has strong impact on the functioning of the labour market both at the micro[2] and macro[3] levels.

In this light, the analysis of the Jobseeker's Allowance (JSA), a major reform of the unemployment benefit system introduced in the UK in October 1996, appears of interest. The JSA brought about a key innovation into the UK welfare system with a substantial tightening of job search requirements for eligibility and the intended goal of "drawing a much closer link between the receipt of benefit and the claimant's demonstrated willingness to look for work" (Clarke, 1993).

Housing tenure may influence the labour market, and more in particular the unemployed job search behaviour. A prominent argument is "Oswald's thesis" (Oswald, 1996, 1997, 1999), which posits that homeownership hampers the propensity to move because of higher transaction costs for buying and selling homes, leading to higher reservation wages and lower search intensity for jobs requiring moves. As a consequence, homeowners should experience longer unemployment spells than otherwise comparable renters. Despite empirical evidence generally confirms that homeowners are less willing to relocate for jobs (Van den Berg and Van Vuuren, 1998; Henley, 1998; Munch et al., 2006; Van Vuuren, 2009; Battu et al., 2008), most empirical tests with micro data have found no support for Oswald's thesis (Goss and Phillips, 1997; Coulson and Fisher, 2002; Flatau et al., 2003; Munch et al., 2006; Van Vuuren, 2009; Battu et al., 2008).[4] This paper aims to evaluate the differential effects of the JSA on unemployed with different residential states.

The impact of the JSA has been already investigated by Manning (2009) and Petrongolo (2009) using quasi-experimental methods.[5] Both concluded that the JSA was successful in moving individuals off the claimant count, but that it was not successful in moving unemployed workers into jobs. Taking these studies as background, the first contribution of this paper is to investigate the impact of the JSA on a set of outcome variables capturing different aspects of the unemployed (search) behaviour. One variables captures change in the claimant status ($C = 1$: permanence in claim; $C = 2$: drop-outs, $C = 3$: exit to job), and another variable captures change in the intensity of search ($\Delta s^* \gtreqless 0$). The two variables are then jointly employed to evaluate the change in search intensity for claimants either staying in the register ("stayers") or leaving it without returning to work ("leavers"). In particular, the analysis for leavers can shed light on the success of the JSA in crowding out of the UI unemployed not committed to search. Estimates are performed employing a Difference-in-differences (Diff-in-Diffs) strategy, using Labour Force Survey (LSF) data.

A second contribution of the paper is to bridge the analysis of the impact of the JSA, and more

[1] See Holmlund (1998); Krueger and Meyer (2002); Fredriksson and Holmlund (2006) for reviews of the literature.

[2] See Grubb (2001) for a survey and discussion of the expected effects of eligibility conditions, as well as for general evidence on their impact. See also Fredriksson and Holmlund (2006) for a survey of theoretical and empirical research on unemployment benefit system's instruments to restore incentives.

[3] See Nickell et al. (2005) and references therein.

[4] Empirical analysis with macro data have provided some support to the claim the higher homeonwership rates should lead to to higher unemployment rates (Partridge and Rickman, 1997; Nickell, 1998; Nickell and Layard, 1999; Pehkonen, 1999; Belot and Van Ours, 2001; Di Tella and MacCulloch, 2005; Blanchflower and Oswald, 2013).

[5] See also McVicar (2008) for a natural experiment identifying the impact of the JSA eligibility checks limited to Northern Ireland.

in general of stricter search-related requirements, to the analysis of the role of housing tenure on the labour market functioning. The interest for this interaction is driven by the consideration that the two issues, tighter search requirements and housing tenure, are both related to the unemployed search behaviour.

On the one hand, the JSA treatment effect depends on the initial search intensity of claimants and on their incentives to adjust to tighter rules. On the other hand, unemployed with different housing tenure have different search behaviour; hence they are expected to react differently to the JSA. Several contributions look at these two issues separately, but none of them has explored their combination.

This interaction is analysed in the present paper by decomposing the JSA treatment effect into residential state-specific effects. Housing tenure is separated in the following three states: (1) persons who own their own home outright, (2) homeowners with mortgage, (3) renters. Operationally, the housing tenure indicators are interacted with the relevant Diff-in-Diffs dummies yielding a Diff-in-Diff-in-Diffs regression, see e.g. Wooldridge (2010).

The relation between housing tenure and job search behaviour has also policy relevance, since in many countries homeowners enjoy special fiscal treatments, such as tax advantages for mortgage interest payments, exemptions for capital gains taxation applied to residential property, or subsidies for low-income families to reduce the costs of homeownership. The rationale for encouraging homeownership is usually related to the social and private benefits of owning a home (Di Pasquale and Glaeser, 1999; Rohe et al., 2002; Dietz and Haurin, 2003), and some evidence bears witness to the claim that homeowners are "better citizens", (Di Pasquale and Glaeser, 1999). In the context of the JSA reform, this perspective is relevant to interpret the reaction of homeowners to stricter enforcement of search requirements.

The main findings of the analysis are summarized in the rest of this section, before describing the organisation of the paper. The principal findings of this paper are the following.

1. The tightening of search requirements had a sizeable impact in moving unemployed people off the benefit, while only a small portion of them found a job.
2. Claimant outflows were more typically associated with increases in search intensity rather than decreases, suggesting that the JSA may have removed from the claimant register not only targeted individuals, but also (and to a larger extent) unemployed motivated to re-enter employment. This may be associated with a large increase in the number of unemployed who prefer to look for a job independently, without being forced to contact the Employment Service.

Regarding the decomposition by housing tenure, three main results are found.

1. Despite a null overall JSA effect on the employment inflow, there was a positive effect for mortgagers, and, to a lesser extend, for outright owners.
2. Renters account for a major portion of the JSA impact on claimant outflows, while homeowners managed to keep on claiming to a larger extent by searching more intensively than they would have done without the JSA, especially by limiting search decreases. Mortgagers were preserved also because they had a high search even before the JSA.
3. The JSA had an impact on claimant outflows associated with reduction in search only for renters. However, the JSA had a significant impact also on jobseekers willing to look for work among renters and mortgagers. Outright owners preferred to keep on searching through the system.

The rest of the paper is organized as follows. Section 2 introduces the JSA and relates the present contribution to different strands of literature. Section 3 presents the economic background relevant for the study of the impact of stricter search-related eligibility criteria. Sections 4 and 5, respectively, describe the data and methodology used. Section 6 presents and discusses the main results of the JSA

impact evaluation. Section 7 discusses the results of the decomposition analysis by housing tenure. Section 8 concludes. The Appendix contains methodological details and further estimates.

2. Related work

This section introduces the reform under scrutiny, describing the literature on the impact of stricter enforcement of search requirements and on housing tenure.

2.1. The JSA

The JSA was introduced in the UK on 7 October 1996. Before the JSA, the welfare system for the unemployed consisted of an unemployment insurance scheme, the so-called Unemployment Benefit (UB), and an unemployment allowance scheme, called Income Support (IS). The JSA design includes a contributory component, known as cont-JSA, which replaced the UB scheme, and a means tested component, known as inc-JSA, which replaced the IS element.

The cont-JSA has a limited duration of 6 months maximum, while the inc-JSA has potentially unlimited duration. Inc-JSA is by far the most important component, since many unemployed do not have enough contributions for entitlement to cont-JSA and can get inc-JSA as full payment in place or as a top up of cont-JSA.[6]

The relevant changes introduced by this reform can be allocated to two different areas.[7] First, the JSA slightly reduced the level and the duration of the contribution-based benefit. The payment rate of both components was made identical to the former IS scheme level, that was very similar to UB payments except for young people (aged 18-24), who received about 20% less under IS. The maximum duration for the contribution-based benefit was reduced from 12 to 6 months. Since changes in this area affected only a modest portion of claimants, their impact has been judged negligible (Manning, 2009; Petrongolo, 2009).

The second and most significant change was a substantial increase in job search requirements for eligibility. With the (still ongoing) JSA scheme, all claimants have to sign a Jobseeker's Agreement in which they commit themselves to active search and state the period of work and the types of jobs they are available for. Within this agreement, they have also to detail the steps they are going to undertake to find a job, such as number of contacts to employers and Job Centres.

Claimants have to keep a thorough record of these steps, and at fortnightly interviews, the Employment Officer checks wether this record complies with the agreement. Furthermore, the Employment Officer can instruct claimants to take certain steps and to apply for specific jobs; in case claimants fail to comply with these instructions, they are subject to sanctions or disqualification. Therefore, the JSA appears mainly focused on increasing job search for the unemployed.

2.2. Tighter eligibility criteria

The bulk of evidence on the effects of stricter search requirements is based on a number of social experiments, especially in the US (Meyer, 1995; Johnson and Klepinger, 1994; Klepinger et al., 2002; Black et al., 2003; Ashenfelter et al., 2005).[8] In general, empirical studies find that tighter search requirements, often combined with job search assistance, reduce the time spent on benefit (Johnson and Klepinger, 1994; Abbring et al., 2005; Van den Berg et al., 2004; Lalive et al., 2007). At the

[6]For example, considering LFS data for 1997, 74.3% of the JSA recipients were receiving inc-JSA against 30.4% receiving cont-JSA.

[7]Pointer and Barnes (1997) provide a detailed description of institutional and administrative aspects of the JSA. See Finn et al. (1997) for a description of the previous UB/IS scheme.

[8]See Meyer (1995) for an extensive survey and evaluation of experiments in the US. See also the recent survey by Fredriksson and Holmlund (2006).

same time, evidence that shorter spells in benefit correspond to new hires is less conclusive. In fact, sometimes the impact on employment inflows is null or at best weak (Van den Berg and Van der Klaauw, 2006; Meyer, 1995; Ashenfelter et al., 2005; Gorter and Kalb, 1996; Card et al., 2007).

Evidence on the UK comes from a randomized experiment, the Restart Program in 1986, which can be considered as the precursor of the JSA. It randomly assigned long-term claimants to a treatment consisting of a combination of tighter search requirements and counseling. Dolton and O'Neill (1996) found that the program helped treated individuals to find a job more quickly, but increased UI drop-outs too. For women the employment effect was only short-term (Dolton and O'Neill, 2002).

Previous evaluations of the JSA concluded that its (major) tightening of search requirements remarkably increased claimant outflows (Trickey et al., 1998; Rayner et al., 2000; Manning, 2009; Petrongolo, 2009). However, quasi-experimental evaluations conducted by Manning (2009) and Petrongolo (2009) showed that JSA was less successful in moving unemployed workers into jobs, both in the short run and in the long run. More specifically, Manning (2009) investigated the short-term effect using LFS data, while Petrongolo (2009) investigated the long term effects using administrative data, finding also a negative impact on the level of earnings and the number of weeks worked once re-employed. McVicar (2008) identified the impact of the JSA eligibility checks for Northern Ireland making use of a series of temporary suspensions of the service due to Benefit Office refurbishments, finding a reduction in claimant outflows and employment inflows during these periods.

Whether unemployed leaving the claimant register were actually not committed to active search, appears still a matter of debate. On the one hand, it is likely that, among those who were crowded out of the system, some were not searching assiduously or were even dodging the system (Rayner et al., 2000; Manning, 2009). Consistently with this hypothesis, Manning (2009) found that claimants who abandoned the system had typically low initial levels of search. He also found that the JSA did not have any impact on the job search average intensity, interpreting these findings as a sign that claimants accepted the JSA in a "fatalistic" way.[9]

On the other hand, some claimants genuinely committed to look for work may prefer to quit the benefit system when the administrative task becomes too burdensome. Evidence from social experiments suggests that re-employment services can act as a threat for claimants, regardless of their effectiveness to match unemployed to jobs. In fact, often claimants do not attend these mandatory programs, hence dropping off the benefit, when they are subject to monitoring (Black et al., 2003; Dolton and O'Neill, 2002; Johnson and Klepinger, 1994). It is hence of interest to measure the effects of the JSA on the search behaviour of claimants moving off or staying in the system.

2.3. Housing tenure and the labour market

A second strand of related literature looks at the relation between housing tenure and the labour market. In this context, a strong emphasis on the negative consequences of homeownership was given by Andrew Oswald (Oswald, 1996, 1997, 1999), after observing an aggregate positive relationship between homeownership and unemployment rates. His key explanation was that higher transaction costs to sell and buy housing constrain the geographical extension of homeowners' labour market, resulting in longer unemployment spells.

While several empirical studies confirm that homeownership hampers the propensity to move residence for job reasons (Van den Berg and Van Vuuren, 1998; Henley, 1998; Munch et al., 2006; Van Vuuren, 2009; Battu et al., 2008), Oswald's hypothesis has been repeatedly rejected using unemployment duration models (Goss and Phillips, 1997; Coulson and Fisher, 2002; Flatau et al., 2003; Munch

[9] Petrongolo (2009) found also a positive effect on exits into other benefits.

et al., 2006; Van Vuuren and Van Leuvensteijn, 2007; Battu et al., 2008).[10] The typical finding of these papers is that homeowners have a shorter duration of unemployment than renters.[11]

Some studies acknowledge the importance of distinguishing mortgage-holders from outright owners, pointing out that more rapid exits to job can be driven by those with a weak equity position (Rouwendal and Nijkamp, 2010; Arulampalam et al., 2000). Commitments to housing debt payments should bear a higher pressure to re-enter employment, hence encouraging more intensive job search compared to full owners. When the distinction between mortgage-holders and outright owners is taken into account, studies indeed typically found that mortgagers have the best labour market outcomes, such as shorter unemployment duration (Goss and Phillips, 1997; Flatau et al., 2003; Brunet et al., 2007; Kantor et al., 2013; Morescalchi, 2014), higher likelihood of being employed (Flatau et al., 2003) and higher search intensity (Morescalchi, 2014).[12]

The lack of empirical support to the argument that mobility constraints for homeowners inhibit exits to job has been also attributed to a spatial redistribution of search efforts. Higher expected costs of search for jobs requiring moves may lead homeowners to concentrate their search effort in the local labour market, hence enhancing exits to local jobs (Munch et al., 2006; Rouwendal and Nijkamp, 2010). Empirically, homeowners have been found to have lower hazard rates to non-local jobs, but higher hazard rates to local jobs, suggesting that their overall hazard rate can be higher if the latter effect prevails statistically (Munch et al., 2006; Battu et al., 2008; Van Vuuren and Van Leuvensteijn, 2007).

However, in a theoretical model of search *à la* Mortensen (1986) with moving costs and endogenous search effort, one obtains that the impact on the non-local search dominates, so that homeowners have overall a lower search intensity, as well as a lower job finding rate (Morescalchi, 2014). Evidence on job search intensity measures for the UK confirm that outright owners have lower search than renters, despite having higher chance to escape unemployment (Morescalchi, 2014).

The rationale for encouraging homeownership is usually related to the social and private benefits of owning a home (Di Pasquale and Glaeser, 1999; Rohe et al., 2002; Dietz and Haurin, 2003). In particular, the literature studying the social and political consequences of homeownership points out that homeowners have more incentives to improve the quality of the community they live in for a number of reasons: first, because community quality is capitalized into the value of their property; secondly, because barriers to mobility allow them to consume returns from community investments over longer period.[13]

Existing evidence supports to some extent the claim that homeowners are "better citizens" , as shown by the seminal work of (Di Pasquale and Glaeser, 1999). One of the most generally accepted finding is that homeowners have larger voting rates. Di Pasquale and Glaeser (1999) make use of US data and IV methods to estimate the impact of ownership on a number of externality-creating variables, some of which capture what they call "good citizenship". They find that homeowners are

[10] Homeowners are also found to have a lower probability of being unemployed, lower risk to become unemployed and higher wages. See Havet and Penot (2010).

[11] At macro-level, despite early evidence confirmed that homeownership was a relevant determinant of unemployment (Nickell, 1998; Nickell and Layard, 1999; Belot and Van Ours, 2001; Partridge and Rickman, 1997; Pehkonen, 1999), later econometric evaluations did not support Oswald's thesis (Green and Hendershott, 2001a; García and Hernández, 2004; Nickell et al., 2005; Coulson and Fisher, 2009). Two recent empirical works by Blanchflower and Oswald (2013) and Laamanen (2013) found new empirical support of Oswald's hypothesis.

[12] Among renters, social and private renters may not behave the same way, since social renters face lock-in effects due to below-market rent, long waiting lists, security of tenure, and restricted transferability within social housing (Hughes and McCormick, 1981, 1987; McCormick, 1983; Flatau et al., 2003; Battu et al., 2008). This further distinction was initially considered in the present empirical analysis. However, only results for the pooled rental status are reported because estimates for the two sub-groups are very similar. Disaggregated results between social and private renters are available from the authors upon request.

[13] See Dietz and Haurin (2003) and Rohe et al. (2002) for surveys of the literature analyzing the social and political consequences of homeownership.

more likely to know their local officials, to vote in local elections, to work to solve local problems, to be member of non-professional organizations, to garden, to own guns and to attend church. They also find that much of the influence of homeownership occurs through the channel of longer community tenure.[14]

In other empirical studies, homeowners are found to be more compliant with tax obligations (Landsman et al., 2002; Torgler, 2004) and to have higher level of tax ethics (Song and Yarbrough, 1978). Also, homeownership is found to increase significantly the occurrence of recycling (Mainieri et al., 1997; Daneshvary et al., 1998). Taking stock of this literature, one may deduce that homeowners have higher incentives to align to legal and social norms. This suggests that attention should be paid to different housing tenure positions when analyzing how individuals react to policy interventions similar to the one considered here.

3. Search-related eligibility criteria in job search models

This section covers the theoretical background relevant for the impact evaluation of the JSA. It discusses the effects of search requirements for unemployment benefit eligibility, emphasizing the impact on the unemployed job search behaviour and claimant status, and it relates the impact of tighter enforcement of search requirements to housing tenure.

3.1. The JSA impact and search behaviour

Following Manning (2009) and Petrongolo (2009), a variant of the traditional search model *à la* Mortensen (1986) is considered here as a reference model to analyze the role of search-related criteria.[15]

In this model, the unemployed search with effort s, which affects positively both a (concave) job offer arrival function and a (convex) cost of search function. Job offers are defined as a wage w drawn from a cdf $F(w)$. The unemployed accepts any offer such that $w \geq w_R$, where w_R is the reservation wage, representing the lowest acceptable offer.[16] The individual is assumed risk-neutral and maximising a (non separable) lifetime utility function. This maximisation corresponds to selecting the optimum level of search s^* when unemployed.[17]

The unemployed receives an unemployment compensation flow b in case she/he fulfills search requirements, captured by a non-stochastic level of search $s = \underline{s}$, such that the unemployed is claimant (non claimant) if $s^* \geq \underline{s} (< \underline{s})$. The effect of the JSA reform is represented by an increase in $\underline{s}$.

The unemployed selects s^* taking into account that increases in s^* affects her/his utility through three channels: a positive effect can be created through (1) an increase in the job offers arrival rate and through (2) a higher likelihood to receive income benefit; a negative effect can be caused by (3) an increase in search-related cost. The solution to this model implies a relationship between s^* and the current rule $\underline{s}$, which is qualitatively depicted in Fig. 1 (see also Manning (2009)). This relation is derived from the underlying U-shaped indifference curves in the space (s, b), as follows from the assumptions on the job offer and cost functions. Three points are relevant to draw this relation, corresponding to values of $\underline{s}$ indicated here as s_L, s_H and s_c: s_L and s_H satisfy the first order condition

[14] Recently Engelhardt et al. (2010) estimate the homeownership impact on social capital and local amenities using an IV approach as Di Pasquale and Glaeser (1999). Overall, they do not find any evidence in favour of the standard claim that homeowners are more involved than renters either in political or in neighborhood activities. However, a number of aspects should be kept in mind when interpreting results from this study. First, they estimate only the short run impact of homeownership on social benefits. Second, the sample is small in size and may be subject to external validity concerns.

[15] For other search models that include monitoring and benefit sanctions related to search see also Ljungqvist and Sargent (1995); Abbring et al. (2005); Van den Berg and Van der Klaauw (2006); Boone et al. (2007).

[16] The reservation wage is defined as the level of w equalizing the discounted utility stream for an unemployed and an employed worker. In equilibrium $w = w_R$.

[17] See Petrongolo (2009) for a model without on-the-job search.

Figure 1

RELATIONSHIP BETWEEN OPTIMAL SEARCH INTENSITY s^* AND MINIMUM SEARCH $\underline{s}$ FOR ELIGIBILITY

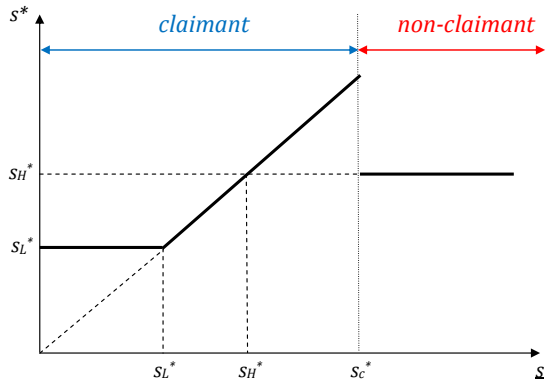


Table 1

POSSIBLE CONFIGURATIONS OF SEARCH BEHAVIOUR IN RESPONSE TO TIGHTENING OF SEARCH ELIGIBILITY CRITERIA FROM $\underline{s}^1$ TO $\underline{s}^2$

cases	$(\underline{s}^1, \underline{s}^2)$ configuration		outcome	
	Wave 1	Wave 2	C	Δs^*
(i)	—	—	1	< 0
(ii)	$0 \leq \underline{s}^1 < s_L^*$	$0 \leq \underline{s}^2 \leq s_L^*$	1	$= 0$
(iii)	$0 \leq \underline{s}^1 \leq s_L^*$	$s_L^* < \underline{s}^2 \leq s_c^*$	1	> 0
(iv)	$s_H^* < \underline{s}^1 \leq s_c^*$	$\underline{s}^2 > s_c^*$	2	< 0
(v)	$\underline{s}^1 \approx s_H^*$	$\underline{s}^2 \geq s_c^*$	2	≈ 0
(vi)	$0 \leq \underline{s}^1 < s_H^*$	$\underline{s}^2 \geq s_c^*$	2	> 0

Notes: The Table illustrates possible scenarios for the unemployed claimant in Wave 1 (before JSA) still unemployed in Wave 2 (after JSA). $C = 1$ indicates permanence in the claimant pool and $C = 2$ indicates exit. See Fig. 1.

when eligibility is unconstrained for the claimant and non-claimant unemployed respectively; s_c is the upper limit of the function $s^*(\underline{s})$, which is read off from the intersection between the horizontal line corresponding to b and the indifference curve whose minimum is s_H. One has that $s_L < s_H$ because $\partial s^*/\partial b < 0$.[18]

When $\underline{s} < s_L^*$ the rule is not binding and the individual chooses the interior solution s_L^*. The increase of $\underline{s}$ from a low level $\underline{s} < s_L^*$ to a higher level $s_L^* < \underline{s} < s_c^*$ affects the optimal search intensity which moves from s_L^* to the corner solution $s^* = \underline{s}$. Further increases in $\underline{s}$ are followed by one-for-one increases in s^*, at least up to $\underline{s} = s_c^*$, where the unemployed is indifferent between meeting the rules and leaving the claimant pool. When $\underline{s} > s_c^*$ the unemployed chooses $s^* = s_H^*$, hence exiting claimant status: the marginal cost to meet the implied search requirements would be higher than the marginal benefits in terms of higher unemployment income and job offer arrivals.

Table 1 highlights possible scenarios of a tightening in search-related criteria $\underline{s}$ for claimants in Wave 1 (before the JSA); their required level of search in Wave 1 is denoted by $\underline{s}^1$ and the one in Wave 2 (after the JSA) in indicated as $\underline{s}^2$. Different scenarios in terms of $\underline{s}^\ell$, $\ell = 1, 2$, generate

[18]The result that $\partial s^*/\partial b$ is negative is due to the fact that increase in b reduces the relative price of leisure. However this result could be challenged in case of strong income effect, for example, if individuals are close to the subsistence level, or liquidity constrained, or leisure is an inferior good locally (Hamermesh, 1982; Ben-Horim and Zuckerman, 1987; Van den Berg, 1990). In these cases $\partial s^*/\partial b$ could close to zero.

reactions of individual optimal search s^* in Wave 2 (after the JSA), or equivalently in terms of change in search intensity (Δs^*), as well as a change in the claimant status ($C = 1$ if still claimant in Wave 2, $C = 2$ if drop-out).

Table 1 shows that increases in $\underline{s}$ from $\underline{s}^1$ to $\underline{s}^2$ can affect s^* in both directions or leave it stable. The unemployed can be affected only if the initial search level is such that $\underline{s}^1 \leq s^* < \underline{s}^2$, since the unemployed is always claimant if $s^* \geq \underline{s}^2$, and always non-claimant if $s^* < \underline{s}^1$. Those affected by the introduction of the JSA are initially claimants; after the JSA some will find optimal to increase search effort to keep on claiming (case (iii)) while others are better off by stopping to claim benefit (cases (iv)-(vi)). In the former case, s^* is so close to $\underline{s}^2$ that the marginal cost to increase s^* to $\underline{s}^2$ is small relative to gains in terms of benefit receipt (and more job offers). In the latter case, the marginal cost to adjust s^* to $\underline{s}^2$ would be too large instead.

One intended outcome of the JSA was to remove from the benefit system individuals not committed "to make every effort to get back to work" (DSS and DoE, 1994). As Table 1 points out, among those leaving the claimant pool ($C = 2$), some will reduce s^* (case (iv)), while others will increase it (case (vi)) or keep it stable (case (v)). The benefit loss always comes with higher incentives to search because employment becomes relatively more valuable, but these incentives can be offset whenever the initial search was kept large enough just to take advantage of the benefit.

A comparison of the impact of the JSA on categories (iv)-(vi) can shed light on the adequacy of the reform to address targeted unemployed. In fact, on the one hand, in case (iv) leavers reduce search effort while losing the benefit, suggesting that they may use search as a means to achieve benefit eligibility rather than to escape unemployment. On the other hand, in case (vi) leavers show commitment to look for work since they increase search even if this does not help preserving eligibility. In case (vi) leavers increase search effort, which corresponds to an unintended outcome of the JSA policy design.

Overall, while the expected effect of the JSA on claimant outflows is positive, its effects on the average search intensity and on flows into jobs are ambiguous. In fact, while the JSA should have a positive impact (or at least non-negative) on the search intensity of those who are eligible in Wave 2, potentially leading to higher job findings, the JSA can either increase or reduce the search intensity of leavers.

The analysis of the relationship between s^* and $\underline{s}$ relates the impact of the JSA on UI exits to the claimant's search behaviour. For given $\underline{s}^1$ and $\underline{s}^2$, the likelihood of exit is higher for claimants with lower probability to adjust search to $\underline{s}^2$. This probability depends on the position of s_L, s_H and s_c. First, those with a lower initial search intensity are more likely to exit as they are required to perform a larger increase in s^*.

Second, some individuals may have more incentives to perform larger increments, for given initial search. The latter can happen when s_c is particularly large relative to s_L. s_c can be larger when the indifference curves increase slowly after the minimum, which is the case when, for high search, the unemployed needs a small increase in b to compensate for a marginal increase in search. s_L can be lower when the indifference curves are steeper in the decreasing part, which is the case when, for low search, the unemployed is willing to suffer a large decrease in b to increase search marginally.

The combination of the two cases can give the result that unemployed with higher search in Wave 1 drop off claiming, while individuals with lower search in Wave 1 keep on claiming.

3.2. The JSA impact and housing tenure

In light of the role of search behaviour in shaping the impact of the JSA, and considering that housing tenure influences search behaviour, it is important to analyse the link between the JSA impact and housing tenure. As the theory discussed in Section 3.1 suggests, the impact of tighter search

requirements depends on the propensity to adjust search to stricter rules, which in turn depends on the initial level of search and on the increment the unemployed is willing to perform for given initial search.

Theoretical search models *à la* Mortensen (1986) enriched with mobility costs show that homeowners search less intensively than renters in the non-local labour market, but more intensively locally (Munch et al., 2006; Morescalchi, 2014). Since the first effect dominates, homeowners have in equilibrium lower search intensity (Morescalchi, 2014).[19] This difference in the average search intensity has been confirmed for outright owners and renters on UK data (Morescalchi, 2014). As a consequence, it can be expected that the JSA increased claim exits relatively more for individuals who were more mobility constrained.

However, this may not be the case for homeowners with financial commitments, since compliance with mortgage payments brings about liquidity constraints which can counteract the effect of restricted mobility. In the literature analysing the relation between housing tenure and labour market, it is indeed typically found that mortgagers have best labour market outcomes, and in particular the highest search intensity (Morescalchi, 2014). Hence, for mortgagers, the JSA impact should be the largest on inflows to job, and the lowest on claimant outflows.

Also, claimants starting with a lower level of search may be willing to perform larger increments in search whenever, for example, the utility loss due to reduction in leisure is small relative to gains in term of more job offers. While there are few theoretical reasons to make such assumption for specific residential states, one can infer if the two effects were consistent across residential states by decomposing the statistical impact of the JSA on search intensity. This exercise is carried out in the following empirical analysis.

4. Data

The data source is the UK Quarterly Labour Force Survey (LFS) which collects address-based interviews of about 60,000 households. Each individual is interviewed in five consecutive quarters on a rotating panel basis. Quarters are referred to as *jmyyyy* (January-March of year *yyyy*), *ajyyyy* (April-June), *jsyyyy* (July-September) and *odyyyy* (October-December). Because the JSA reform was introduced on Monday, 7 October 1996, all calendar quarters are postponed by one week in the data, considering the first week of any quarter as the last week of the previous quarter.

LFS quarterly data contain detailed information on individual and household characteristics covering many features of the UK labour market. In particular, the focus will be on variables referring to individual labour market status, search behaviour and housing tenure. The LFS panel component is used here to construct outcome variables that reflect changes in labour market status between two consecutive quarters. Specifically, the pool of claimants in a given quarter is considered (either *ajyyyy* or *jsyyyy*), called Wave 1, and their changes are tracked in the following quarter (either *jsyyyy* or *odyyyy*, respectively), called Wave 2. Outcome variables are taken to be either changes in the claimant status, or changes of search intensity, or a combination of the two.

The LFS provides a derived variable reporting whether or not an individual is claiming unemployment related benefits. Housing tenure related information is used to distinguish among three categories: outright owners, owners still paying mortgage or loan and renters.

The LFS questions about job search methods used by unemployed allow to track changes in job search effort. Following the empirical literature, a proxy for the job search intensity can be

[19] The proof of Morescalchi (2014) is based on the assumption of endogenous search in the model of Munch et al. (2006).

constructed by counting the number of methods the respondent used (Holzer, 1988; Blau and Robins, 1990; Wadsworth, 1991; Schmitt and Wadsworth, 1993; Gregg and Wadsworth, 1996; Boeheim and Taylor, 2001; Addison and Portugal, 2002; Weber and Mahringer, 2008; Manning, 2009; Bachmann and Baumgarten, 2012; Morescalchi, 2014). Considering a total of 14 methods, this variable ranges from 0 to 14 according to the number of positive answers.[20] A zero value is assigned to individuals who have not searched in the last four weeks, hence not being classified as ILO unemployed.

The number of search methods may be a crude measure of search intensity as it says little about how intensively the individual uses each method. Despite potential criticism, evidence suggests that this variable can capture relevant dimensions of search intensity. In fact, it is typically found to be strongly associated to the probability of finding a job (Holzer, 1988; Gregg and Wadsworth, 1996; Boeheim and Taylor, 2001), notably in British data (Gregg and Wadsworth, 1996; Boeheim and Taylor, 2001), and to be related to other variables coherently with theory (Holzer, 1988; Blau and Robins, 1990; Schmitt and Wadsworth, 1993; Gregg and Wadsworth, 1996; Addison and Portugal, 2002; Weber and Mahringer, 2008; Morescalchi, 2014). Moreover, considering the change in this variable for the same individual between two following quarters reduces remarkably the risk of measurement error.

5. Methodology

Following Manning (2009) and Petrongolo (2009), a Difference-in-differences (Diff-in-Diffs) strategy is employed to estimate the JSA treatment effect on the outcome variables. The reference population is made of non-employed claimants in a given quarter (Wave 1) and their status transition is tracked in the following quarter (Wave 2). The treatment group comprises all claimants interviewed in $js1996$, i.e. the 3rd quarter of 1996, who are also interviewed in $od1996$, i.e. the 4th quarter of 1996. In $js1996$ claimants are not formally treated as they are still under the old UI rules, but they are under treatment in $od1996$ and movements from the initial status are affected by the new rules.

Movements from $js1996$ to $od1996$ could have occurred also in the absence of the JSA. Therefore, treated claimants are compared to a control group of claimants in $aj1996$ and followed through $js1996$. Treatment and control groups are close enough in date to allay fears that differences in their behaviour could be affected by cyclical factors. Differences in response between treatment and control groups built in this way are expected to capture the impact of the policy change, at least so long as these groups are similar in observable and unobservable characteristics.

Table 2 shows that these groups are very similar in observables. Moreover, given the Survey sampling design, it is also rather unlikely that they differ systematically in unobservables. However, since they do differ in quarters, treatment effect estimates would be biased if the outcome variable had any seasonal pattern.

Seasonality can be accommodated by drawing cohorts of claimants from other years to create similar treatment and control groups. The average seasonal effect is then eliminated applying Diff-in-Diffs (Manning, 2009; Petrongolo, 2009). In particular, the two adjacent years 1995 and 1997 are used to estimate a model for the probability to be in state $j \in \{1, \ldots, J\}$ depending on the following linear index:

$$\beta' Z_i = \beta_0 + \beta_1 jsa_i + \beta_2 d96_i + \rho\, jsa_i \cdot d96_i + \beta_3 d97_i + \delta' X_i, \tag{1}$$

[20] Search methods are the following: (1) Visit a Jobcentre, (2) Visit a Careers office, (3) Visit a Jobclub, (4) Have your name on the books of a private employment agency, (5) Advertise for jobs in newspapers or journals, (6) Answer advertisements in newspapers and journals, (7) Study situations vacant in newspapers or journals, (8) Apply directly to employers, (9) Ask friends, relatives, colleagues or trade unions about jobs, (10) Wait for the results of an application for a job, (11) Look for premises or equipment, (12) Seek any kind of permit, (13) Try to get a loan or other financial backing for a job or business (14) Do anything else to find work

Table 2
SAMPLE SUMMARY STATISTICS

			all		jsa=1		jsa=0	
	min	max	mean	std	mean	std	mean	std
jsa	0	1	0.499	0.500				
d95	0	1	0.409	0.492	0.409	0.492	0.409	0.492
d96	0	1	0.350	0.477	0.353	0.478	0.347	0.476
d97	0	1	0.241	0.428	0.238	0.426	0.243	0.429
outright owner	0	1	0.122	0.328	0.121	0.326	0.123	0.329
mortgager	0	1	0.302	0.459	0.307	0.461	0.298	0.457
renter	0	1	0.576	0.494	0.572	0.495	0.579	0.494
female	0	1	0.267	0.442	0.272	0.445	0.262	0.440
age	16	64	35.96	12.54	35.83	12.54	36.08	12.53
married	0	1	0.342	0.474	0.334	0.472	0.350	0.477
nkids19	0	10	0.743	1.184	0.722	1.168	0.765	1.199
Highest Education								
Degree or equiv.	0	1	0.074	0.261	0.085	0.279	0.062	0.241
Higher education	0	1	0.044	0.205	0.043	0.204	0.044	0.206
GCE, A-level or equiv.	0	1	0.210	0.407	0.208	0.406	0.211	0.408
GCSE grades A-C or equiv.*	0	1	0.192	0.394	0.192	0.394	0.192	0.394
Other qualifications	0	1	0.188	0.391	0.184	0.388	0.192	0.394
No qualification	0	1	0.293	0.455	0.287	0.452	0.298	0.458
Duration since last job								
$0-3$ *months*	0	1	0.197	0.398	0.208	0.406	0.187	0.390
$3-6$ *months*	0	1	0.121	0.326	0.115	0.319	0.126	0.332
$6-12$ *months*	0	1	0.150	0.357	0.152	0.359	0.148	0.355
$1-2$ *years*	0	1	0.153	0.360	0.148	0.356	0.158	0.364
$2-3$ *years*	0	1	0.092	0.289	0.090	0.286	0.094	0.291
$3-4$ *years*	0	1	0.062	0.242	0.059	0.235	0.066	0.248
$4-5$ *years*	0	1	0.056	0.230	0.056	0.230	0.056	0.230
$5-8$ *years*	0	1	0.078	0.268	0.079	0.270	0.077	0.266
>8 *years*	0	1	0.091	0.287	0.093	0.290	0.089	0.284
never worked	0	1	0.081	0.273	0.090	0.286	0.072	0.259
Region								
North East	0	1	0.058	0.233	0.057	0.232	0.058	0.234
North West (with Mersey.)	0	1	0.115	0.320	0.117	0.321	0.114	0.318
Yorkshire & Humberside	0	1	0.087	0.282	0.088	0.284	0.086	0.280
East Midlands	0	1	0.059	0.236	0.057	0.233	0.061	0.239
West Midlands	0	1	0.092	0.288	0.088	0.283	0.095	0.293
Eastern	0	1	0.078	0.268	0.081	0.273	0.075	0.263
London	0	1	0.144	0.351	0.141	0.348	0.147	0.354
South East	0	1	0.089	0.285	0.089	0.285	0.089	0.285
South West	0	1	0.066	0.249	0.067	0.250	0.065	0.247
Wales	0	1	0.049	0.216	0.052	0.221	0.047	0.211
Scotland	0	1	0.102	0.302	0.101	0.301	0.102	0.303
Northern Ireland	0	1	0.061	0.239	0.061	0.240	0.061	0.239
obs.			14,241		7,108		7,133	

Notes: The sample is made of all non-employed claimants in Wave 1 who are subsequently interviewed in Wave 2. For each year, Wave 1 can correspond either to the 3rd quarter for the treatment group ($jsa = 1$) or to the 2nd quarter for the control group ($jsa = 0$). Data corresponds to years 1995, 1996 and 1997. The following list of variables is the set of controls included in estimation: gender, age, quadratic age, education, duration since last job, never worked, marriage status, number of kids below 19 in household, region.

where jsa_i takes value 1 if i is claimant in the 3rd quarter and takes 0 if i is claimant in the 2nd quarter of any year; $d96_i$ and $d97_i$ are year dummies.

In case of a linear probability model with specification as in eq. (1), the coefficient of the interaction term, ρ, is the Diff-in-Diffs coefficient and captures the causal effect of the JSA. The vector X_i contains variables controlling for observable characteristics in Wave 1. The set of controls comprises: gender, age, quadratic age, marriage status, number of kids below 19 in household, highest education dummies, duration since last job and regional dummies.

Fig. 2 shows the quarterly series for the employment inflow and claimant outflow rates. Remark that the two rates are typically higher in the 3nd quarter than in the 2nd. If two separate linear regressions are run using a binary flow outcome, one for the 1995 cohort alone (here no one is receiving treatment), and one for the 1997 cohort (here all are receiving treatment), the impact on exits to job is equal to 3.7% and 1.6%, respectively, and the impact on claimant drop-outs is equal to 0.5% and 2.2%, respectively. The 1996 cohort alone would hence inflate the actual treatment effect in both cases. The double difference serves the purpose of removing the seasonal bias averaged over the two years.

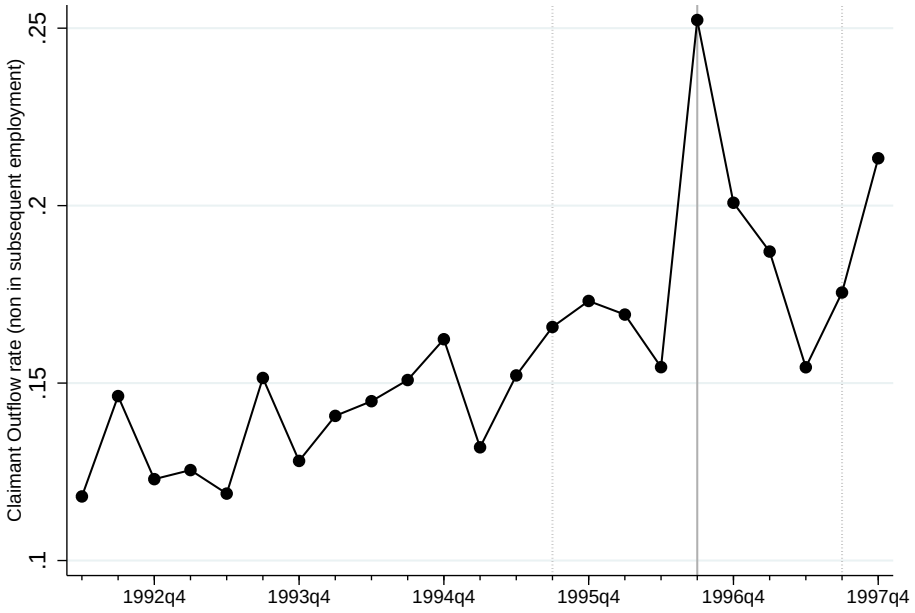
In theory one extra cohort (year) would be enough to identify the JSA effect; however, as Fig 2 suggests, the seasonal effect estimate could be sensitive to the choice of the particular comparison year. For example, focusing only on the previous year, one may not capture a downward trend in flows into employment and an upward trend in claimant outflows, as the "fictitious" treatment effects suggest. In particular, for the former(-latter) outcome, the seasonal effect would be overemphasized(-underemphasized), hence the JSA effect underestimated(-overestimated). For example, Manning (2009) uses only 1995, while Petrongolo (2009) uses two subsequent years 1997 and 1998. The use of just the two adjacent years is preferred to exploit the persistence in the series hence to better remove the seasonal effect.[21]

The empirical analysis makes use of a pair of outcome variables similar to the ones discussed in Section 3.1, namely C and Δs^*, either considered in isolation or jointly. In practice, one cannot observe the search intensity for individuals finding a job in Wave 2; therefore the six cases illustrated in Table 1 are complemented with the state $\{C = 3\}$ ="transitions into jobs". Specifically:

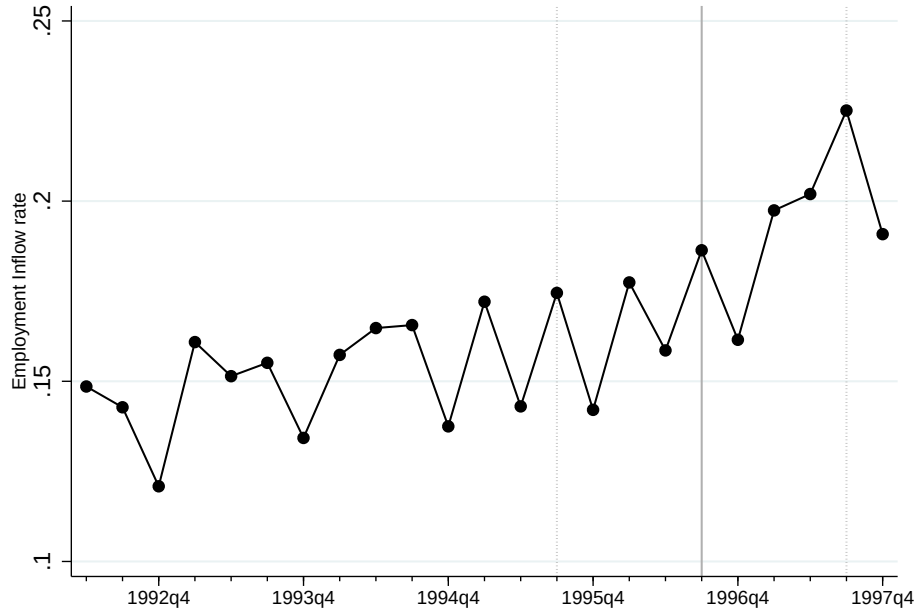
1. C is a discrete variable capturing claim and job transitions, with three different possible values: $C = 1$ if still non-employed and claimant, $C = 2$ if still non-employed but no longer claimant, $C = 3$ if employed. The outcome variable y is hence defined as: $\{y = 1\} = \{C = 1\}$; $\{y = 2\} = \{C = 2\}$; $\{y = 3\} = \{C = 3\}$.
2. Δs^* is used to construct an indicator of change in job search intensity, a discrete variable with four possible values, three of which corresponding to $\Delta s^* \gtreqless 0$ between Wave 1 and Wave 2. These three transitions are observed for any claimant i with $C = 1, 2$. The fourth possible value corresponds to $C = 3$, for which Δs^* is not defined. The outcome variable y is hence defined in this case as: $\{y = 1\} = \{\Delta s^* < 0\}$; $\{y = 2\} = \{\Delta s^* = 0\}$; $\{y = 3\} = \{\Delta s^* > 0\}$; $\{y = 4\} = \{C = 3\}$.
3. A third outcome variable is constructed as the joint discrete distribution of the two previous outcome variables, giving rise to the following seven possible outcomes: $\{y = 1\} = \{C = 1, \Delta s^* < 0\}$; $\{y = 2\} = \{C = 1, \Delta s^* = 0\}$; $\{y = 3\} = \{C = 1, \Delta s^* > 0\}$; $\{y = 4\} = \{C = 2, \Delta s^* < 0\}$; $\{y = 5\} = \{C = 2, \Delta s^* = 0\}$; $\{y = 6\} = \{C = 2, \Delta s^* > 0\}$; $\{y = 7\} = \{C = 3\}$.

[21] No evidence of anticipatory effect of the JSA is found (Manning, 2009; Petrongolo, 2009). This was checked estimating a "fictitious" treatment effect for claimants interviewed in the last week or previous weeks before the date the JSA was introduced. The coefficients are negligible and not significant.

Figure 2
CLAIMANT OUTFLOWS AND EMPLOYMENT INFLOWS



(a) Claimant outflow



(b) Employment inflow

Notes: Flow rates in t are computed as ratio between the flow in $(t,t+1)$ and the stock in t. In both series the stock in t consists of non-employed claimants. Non-employed claimants entering employment in $t+1$ are removed in Fig. 2(a).

The outcome variable y for individual i is modelled by means of a multinomial logistic distribution, with probability of $y_i = j$ equal to

$$P(y = j|Z) = g_j(\beta_j' Z) \qquad j = 1, \ldots, J, \tag{2}$$

where J is the number of values y can take, g_j equals the multinomial probability $g_j = \exp(\beta_j' Z)/\sum_{u=1}^{J} \exp(\beta_u' Z)$ and $Z := (V', W')'$, where $V := (jsa, d96, jsa{\cdot}d96)'$ and $W := (1, d97, X')'$. In eq. (2) and hereafter the subscript i indexing individuals is omitted for simplicity.

For parameter identification one can set $\beta_{j_0} = 0$ for the reference state $j = j_0$; this implies $P(y = j_0|Z) = 1/\left(1 + \Sigma_{j \neq j_0} \exp(\beta_j' Z)\right)$. Estimation of the model is performed by maximum likelihood.

Hence consider the $J \cdot 2 \cdot 2$ probabilities

$$P^j_{q,t} = P(y = j|jsa = q, d96 = t, W = \overline{W}), \tag{3}$$

where $j \in \{1, \ldots, J\}$, $q \in \{0, 1\}$, $t \in \{0, 1\}$, and $\overline{W}$ indicates the sample average values of W. J Diff-in-Diffs coefficients are identified as $DiD^j = (P^j_{1,1} - P^j_{0,1}) - (P^j_{1,0} - P^j_{0,0})$ where DiD^j is the JSA effect on the probability of experiencing transition j; see Puhani (2012) for a discussion of Diff-in-Diffs estimates in non-linear settings.

The decomposition of the JSA effect by housing tenure is achieved including in eq. (1) a full set of interaction terms among the relevant diff-in-diffs variables jsa and $d96$ and the housing tenure categorical variable. The counterfactual method turns out to be a Difference-in-difference-in-differences (Diff-in-Diff-in-Diffs, see Wooldridge (2010)). This allows us to test formally whether the JSA effect differs by housing tenure.

Remark that the decomposition by housing tenure does not aim to state a causal relation between housing tenure and the JSA effect. The role of unobserved characteristics related to housing tenure is not accounted for in the estimation, so the JSA effect may differ among categories reflecting differences in these unobservables. For example less mobile workers may self-select into homeownership because they do not expect to move in the future (Green and Hendershott, 2001b; Van Leuvensteijn and Koning, 2004; Munch et al., 2006; Battu et al., 2008; Van Vuuren and Van Leuvensteijn, 2007; Coulson and Fisher, 2009; Brunet and Lesueur, 2009; Morescalchi, 2014). As a result, lower search intensity, hence potentially larger crowding out for homeowners, might be a result of lower mobility to begin with.[22]

Let *house* indicate housing tenure, with $house = 0, 1, 2$ indicating respectively renters, outright owners and mortgagers; renters are used as base category. Let $H = (h_1, h_2)'$ indicate a set of 2 dummies for the last 2 categories, where $h_i = 1(house = i)$ and $1(\cdot)$ is the indicator function (dummy). The Z variables in the linear index are specified to include W as well as H, V and the associated vector of interactions. Given $R = 3$ possible residential states, one can consider the following $J \cdot 2 \cdot 2 \cdot R$ probabilities

$$P^j_{q,t,r} = \Pr(y = j|jsa = q, d96 = t, house = r, W = \overline{W}), \tag{4}$$

where $j \in \{1, \ldots, J\}$, $q \in \{0, 1\}$, $t \in \{0, 1\}$, $r \in \{0, 1, 2\}$. The probabilities $P^j_{q,s,r}$ are relevant to capture the JSA effect by housing tenure; one can define $J \cdot R$ DiD coefficients $DiD^j_r := (P^j_{1,1,r} - P^j_{0,1,r}) - (P^j_{1,0,r} - P^j_{0,0,r})$, which lead to the definition of $J{\cdot}(R{-}1)$ $DiDiD$ coefficients $DiDiD^j_r := DiD^j_r - DiD^j_0$, where $r = 0$ is the baseline housing tenure category, in this case renter. A given $DiDiD^j_r$ coefficient represents the impact of the JSA on the probability of observing transition j for category r relative to renters.

[22] Very few individuals changed housing tenure between Wave 1 and Wave 2; they were deleted from the sample.

The probabilities P in the expressions for DiD or $DiDiD$ are estimated replacing parameters with maximum likelihood estimates. These coefficients can be interpreted as Treatment Effects at the Average (TEA) (see Wooldridge (2010) Section 15.6). An alternative measure of the impact is the Average Treatment Effect (ATE), estimated as the average of the Treatment Effects for each individual within the sample (see Wooldridge (2010) Section 15.6). Denoting by TE_i^j the individual effect, obtained replacing $W = W_i$ in the computation of DiD^j, of DiD_r^j, or alternatively of $DiDiD_r^j$, ATE^j is given by $N^{-1}\sum_{i=1}^{N} TE_i^j$. ATE estimates turned out to be very similar to TEA estimates and are reported in AppendixC. In both cases, analytical standard errors are computed using the Delta method, see AppendixA for derivations.[23]

6. The Impact of the JSA

6.1. Results

This section discusses results of the JSA impact evaluation. Table 3 provides Diff-in-Diffs estimates of the JSA TEA for specific transitions using the three outcome variables defined in Section 5.[24] Column (1) shows that the JSA increased transition in non-claimant non-employed status ($C = 2$) by 5.5%, without increasing transitions to job ($C = 3$). These results confirm earlier evidence that the JSA had a sizeable impact in removing people from the claimant count, without causing an influx into jobs.[25]

Column (2) shows the JSA effect on job search patterns of non-employed (Δs^*) jointly with transitions into employment ($C = 3$). A clear positive impact is found on the probability of increasing the level of search without altering the probability of reducing it. [26] This evidence suggests that, overall, claimants may have failed to accept the JSA in a "fatalistic" way. A further decomposition by claimant outflows gives more insight on this, as discussed in Section 3.1, see below.

Column (3) shows estimates for the case when the sign of Δs^* is considered jointly with C, giving rise to the seven possible outcomes defined in Table 1 (see AppendixB, Table B.7 for estimates of the multinomial logit). Three main findings can be singled out. Firstly, on the one hand, there is evidence that the JSA increased significantly (by 2.3%) the probability of increasing search intensity while dropping off claimant status (case (vi) in Section 3.1). On the other hand, no significant effect can be found on the probability of increasing search for those who keep on claiming (case (iii)).

Secondly, for leavers ($C = 2$) the JSA increased the probability (by 1.5%) of reducing search ($\Delta s^* < 0$, case (iv)), but it increased significantly less the probability to increase search ($\Delta s^* > 0$, case (vi)). In fact, the relative risk ratio (RRR) between the two outcomes estimated by the multinomial

[23] In a standard linear case, standard error estimates of panel Diff-in-Diffs have been blamed to be quite unreliable under mis-specification, as they can lead to over-rejection (Donald and Lang, 2007; Bertrand et al., 2004). This is a more general problem of common group errors that can be quite serious when the number of groups is small, as in a Diff-in-Diffs setting. In fact, standard asymptotics based on the number of groups going to infinity provide a poor approximation to the finite sample distribution. However, the present analysis is free from this critique as the Diff-in-Diffs strategy is not applied either on a panel of data or on a linear setting. To avoid possible sources of mis-specification in the computation of $DiDiD_r^j$-s standard errors, the covariance matrix of the multinomial logit is anyway computed in its sandwich robust form.

[24] Diff-in-Diffs estimates of the ATE for the corresponding models are very similar and they are reported in AppendixC, Table C.9.

[25] In principle the well known drop in the claimant count registered soon after the JSA could also be driven by a JSA effect on the claimant inflow. However, when estimating Diff-in-Diffs for claimant inflows, i.e. for Wave 1 non-claimants entering the claimant pool in Wave 2, no significant effect was found. This confirms earlier evidence provided by Manning (2009) and Petrongolo (2009). Consistently, attention is restricted to claimant outflows.

[26] Moreover, by performing an OLS regression of Δs on the variables included in the linear index, see eq. (1), one finds a modest but positive and statistically significant Diff-in-Diffs coefficient ρ, suggesting that the JSA may have had only a modest impact on the average search intensity. Specifically, one finds $DiD = 0.18$ ($p < 0.05$) in the sample of claimants staying non-employed. In fact, more search increments of small magnitude can have limited impact on the cardinal change in the average. These results are available upon request from the authors.

Table 3
JSA TEA ON CLAIMANT BEHAVIOUR

(1)			(2)			(3)		
C	DiD^j		Δs^*	DiD^j		$(C, \Delta s^*)$	DiD^j	
$P(C=1)$	-0.0618	***	$P^\star(\Delta s^*<0)$	-0.0078		$P(C=1, \Delta s^*<0)$	-0.0230	*
	(0.0147)			(0.0141)			(0.0133)	
$P(C=2)$	0.0552	***	$P^\star(\Delta s^*=0)$	-0.0364	**	$P(C=1, \Delta s^*=0)$	-0.0544	***
	(0.0107)			(0.0181)			(0.0179)	
$P(C=3)$	0.0067		$P^\star(\Delta s^*>0)$	0.0395	***	$P(C=1, \Delta s^*>0)$	0.0153	
	(0.0115)			(0.0153)			(0.0151)	
			$P(C=3)$	0.0047		$P(C=2, \Delta s^*<0)$	0.0152	**
				(0.0114)			(0.0063)	
						$P(C=2, \Delta s^*=0)$	0.0168	**
							(0.0072)	
						$P(C=2, \Delta s^*>0)$	0.0230	***
							(0.005)	
						$P(C=3)$	0.0071	
							(0.0117)	
obs = 14,241			obs = 14,241			obs = 14,241		

Notes: *** significant 1%, ** significant 5%, * significant 10%. $P^\star(\cdot) := P(\cdot|C \in \{1,2\})$. j indexes outcomes $\{y=j\}$ across rows. See notes to Table 2. Reported coefficients are changes in the probability of ending up in state j in Wave 2. DiD^j coefficients are computed as difference in differences in predicted probabilities from a multinomial logit (see Table B.7). TEA estimates are computed setting regressor values at sample means (see Table C.9 for ATE estimates). Standard errors in parenthesis are computed using the Delta method (see AppendixA).

logit is 2.04 ($p < 0.05$) suggesting that the JSA doubled the probability of observing case (vi) relative to case (iv) (see AppendixB, Table B.7).[27]

Thirdly, while the effect in case (iii) is not significant, it is relatively significant with respect to case (i), meaning that the JSA had overall a positive impact on search intensity of those who keep on claiming, though especially by limiting search decreases ($RRR_{j=3 \text{ versus } j=1} = 1.27$, $p < 0.10$).

6.2. Discussion

The present JSA impact evaluation confirms that the tightening of search requirements had a sizeable impact in moving non-employed people off benefit, but had no impact on employment inflows. Also, the JSA increased search intensity for many individuals who did not manage to escape unemployment, but the increase was small on average. Among stayers, the increase in search intensity was driven by a lower probability of reducing search rather than a higher probability of increasing it. Among leavers, it was more likely to observe increments in search intensity rather than reductions, suggesting that the JSA may have removed from the claimant register not only targeted individuals, but also – and to a larger extent – unemployed motivated to re-enter employment.

In the end, the substantial administrative burden faced by claimants under the JSA may have induced several individuals to search for a job independently. This is consistent with evidence from social experiments suggesting that re-employment services can act as threat for claimants.

[27] Regarding the fate of people who dropped off the register, Petrongolo (2009) and Machin and Marie (2004) provide two further pieces of evidence. Petrongolo (2009) finds that the JSA increased exit rates from unemployment into other benefits, such as Incapacity Benefits. Machin and Marie (2004) find that crime rates rose more in areas where the impact of the JSA on claimant outflows was higher, and that the JSA increased the outflow to unknown destination pooling no job, no full time education or training, and no other benefits.

Table 4
JSA TEA ON CLAIMANT OUTFLOWS - DECOMPOSITION BY HOUSING TENURE

C	DiD^j_{own}	DiD^j_{mort}	DiD^j_{rent}	$DiDiD^j_{own}$	$DiDiD^j_{mort}$
$P(C=1)$	0.0387	-0.0807 ***	-0.067 ***	0.1057 **	-0.0137
	(0.0459)	(0.0283)	(0.0187)	(0.0495)	(0.0339)
$P(C=2)$	0.0115	0.0336 *	0.0752 ***	-0.0637 *	-0.0417 *
	(0.0325)	(0.0196)	(0.014)	(0.0354)	(0.024)
$P(C=3)$	-0.0503	0.0472 **	-0.0082	-0.042	0.0554 **
	(0.0378)	(0.0235)	(0.014)	(0.0403)	(0.0274)
obs			14,241		

Notes: *** significant 1%, ** significant 5%, * significant 10%. *own*=owner outright, *mort*=owner with mortgage, *rent*=renter. See notes to Table 2 and 3. Reported coefficients are changes in the probability of ending up in the state j in Wave 2. DiD^j_r coefficients are computed for each housing tenure category as difference in differences in predicted probabilities from a multinomial logit. $DiDiD^j_r$ coefficients are computed as $DiD^j_r - DiD^j_{r_0}$, where $r_0 = rent$. See Table C.10 for ATE estimates.

7. Decomposition of the JSA impact by Housing Tenure

7.1. Results

Tables 4, 5 and 6 report the decomposition of the JSA treatment effect by housing tenure. The first three columns of each table report Diff-in-Diffs (DiD^j_r, $r \in \{own, mort, rent\}$) estimates for $y = j$ in each category. The remaining two columns report Diff-in-Diff-in-Diffs ($DiDiD^j_r = DiD^j_r - DiD^j_{rent}$, $r \in \{own, mort\}$) estimates using renters as base category. $DiDiD^j_r$ coefficients allow to test whether the JSA impact is statistically different from the one of renters.

Regarding the impact on the employment inflow ($C = 3$), a common conclusion can be drawn from these tables. Despite a null overall JSA effect, while renters were not affected by the JSA, homeowners were affected in opposite directions. Notably, the JSA increased employment inflows for mortgagers by around 4.5/4.8%, a significant effect relative to renters. The effect for outright owners is negative and insignificant, but it is almost 10% lower than the one of mortgagers.

Table 4 shows that the JSA increased claimant outflows ($C = 2$) largely and significantly for renters. The effect for mortgagers is smaller and mildly significant, while outright owners were not affected at all. Overall, homeowners were crowded out significantly less than renters.

Table 5 reports that the JSA increased the frequency of search increments and reduced the frequency of search reductions for mortgagers and outright owners. The two coefficients are significant only for mortgagers. However if the two effects are aggregated, one finds that a substantial 10% of outright owners had higher search than they would have had without the JSA. No significant variations in search can be found for renters though. As a result, the JSA appears to have increased search significantly more for homeowners relative to renters, while the overall relative impact operated mainly through less frequent decreases rather than more frequent increments. In fact, $DiDiD^j_{mort}$ and $DiDiD^j_{own}$ are significant only for $P^\star(\Delta s^* < 0)$ and not for $P^\star(\Delta s^* > 0)$.[28]

Turning to Table 6, further conclusions distinguishing between stayers and leavers can be derived (see AppendixB, Table B.8 for estimates of the multinomial logit). Considering stayers, the JSA had

[28]By combining the effects on $P^\star(\Delta s^* > 0)$, e.g. $j = 3$, and on $P^\star(\Delta s^* < 0)$, e.g. $j = 1$, one obtains results for outright owners and mortgagers, respectively, ($DiDiD^{j=3}_{own} - DiDiD^{j=1}_{own}$)=10.46% and ($DiDiD^{j=3}_{mort} - DiDiD^{j=1}_{mort}$)=10.92%. By deducting further the combined effect for renters, i.e. ($DiDiD^{j=3}_{rent} - DiDiD^{j=1}_{rent}$)=0.29%, we obtain respectively $(10.46 - 0.29)$=10.17% and $(10.92 - 0.29)$=10.63%, which are the combined effects relative to this category. The finding that the JSA increased search intensity of homeowners relative to renters has been double checked by running an OLS regression using the cardinal change in search intensity. In the sample of claimants staying non-employed, the Diff-in-Diff-in-Diffs coefficient for binary homeownership is positive and statistically significant ($DiDiD = 0.40$, $p < 0.05$). These results are made available by the authors upon request.

Table 5

JSA TEA ON SEARCH INTENSITY - DECOMPOSITION BY HOUSING TENURE

Δs^*	DiD^j_{own}	DiD^j_{mort}	DiD^j_{rent}	$DiDiD^j_{own}$	$DiDiD^j_{mort}$
$P^\star(\Delta s^* < 0)$	-0.0661 *	-0.0452 *	0.0248	-0.0909 **	-0.07 **
	(0.0398)	(0.0263)	(0.0184)	(0.0439)	(0.0321)
$P^\star(\Delta s^* = 0)$	0.0802	-0.064 **	-0.0421 *	0.1223 **	-0.0218
	(0.0507)	(0.0323)	(0.0238)	(0.056)	(0.0402)
$P^\star(\Delta s^* > 0)$	0.0385	0.064 **	0.0277	0.0108	0.0364
	(0.0426)	(0.0283)	(0.02)	(0.047)	(0.0347)
$P(C = 3)$	-0.0525	0.0451 *	-0.0103	-0.0421	0.0554 **
	(0.0377)	(0.0235)	(0.014)	(0.0402)	(0.0274)
obs			14,241		

Notes: *** significant 1%, ** significant 5%, * significant 10%. *own*=owner outright, *mort*=owner with mortgage, *rent*=renter. See notes to Table 2, 3 and 4. See Table C.11 for ATE estimates.

Table 6

JSA TEA ON OVERALL CLAIMANT BEHAVIOUR - DECOMPOSITION BY HOUSING TENURE

$(C, \Delta s^*)$	DiD^j_{own}	DiD^j_{mort}	DiD^j_{rent}	$DiDiD^j_{own}$	$DiDiD^j_{mort}$
$P(C = 1, \Delta s^* < 0)$	-0.0503	-0.0542 **	-0.0004	-0.0499	-0.0538 *
	(0.0368)	(0.0248)	(0.0175)	(0.0407)	(0.0303)
$P(C = 1, \Delta s^* = 0)$	0.0579	-0.0648 **	-0.0671 ***	0.1249 **	0.0023
	(0.0492)	(0.0316)	(0.0237)	(0.0546)	(0.0395)
$P(C = 1, \Delta s^* > 0)$	0.0335	0.0371	0.0007	0.0328	0.0364
	(0.0423)	(0.0278)	(0.0197)	(0.0467)	(0.0341)
$P(C = 2, \Delta s^* < 0)$	-0.0144	0.0079	0.0254 ***	-0.0398 *	-0.0175
	(0.0198)	(0.0117)	(0.0081)	(0.0214)	(0.0142)
$P(C = 2, \Delta s^* = 0)$	0.0198	0.0018	0.024 **	-0.0042	-0.0223
	(0.0229)	(0.0125)	(0.0095)	(0.0248)	(0.0158)
$P(C = 2, \Delta s^* > 0)$	0.0059	0.0246 ***	0.0254 ***	-0.0196	-0.0008
	(0.0114)	(0.0091)	(0.0066)	(0.0132)	(0.0109)
$P(C = 3)$	-0.0524	0.0477 **	-0.0081	-0.0443	0.0558 **
	(0.0384)	(0.0239)	(0.0143)	(0.041)	(0.0278)
obs			14,241		

Notes: *** significant 1%, ** significant 5%, * significant 10%. *own*=owner outright, *mort*=owner with mortgage, *rent*=renter. See notes to Table 2, 3 and 4. See Table C.12 for ATE estimates.

a large impact on search intensity for homeowners, either favouring search increments or preventing search reductions. This can be shown by combining the effects on $P(C = 1, \Delta s^* < 0)$ and $P(C = 1, \Delta s^* > 0)$, which yields a 9.1% impact for mortgagers and an 8.4% impact for outright owners. These effects are minimal for renters considering that the JSA crowded out many of them. Hence, unlike renters, mortgagers and outright owners managed to escape the benefit loss by expending larger search effort than what they would have done without the JSA.

Considering leavers, the JSA increased significantly transitions with higher search for mortgagers and renters. For renters, this was associated to an identical increase in transitions with reduced search. Outright owners were not affected in either transitions. Looking at $DiDiD$ coefficients, a significant and negative effect is found only for outright owners in $P(C = 2, \Delta s^* < 0)$. However, aggregating the impact on $P(C = 2, \Delta s^* < 0)$ and $P(C = 2, \Delta s^* > 0)$, no substantial relative effect for outright owners and mortgagers can be found. The three categories must have experienced, on average, similar variations in search.

7.2. Discussion

The three main findings can be summarizes as follows. First, despite a null overall JSA effect on the employment inflow, a positive effect for mortgagers is found, and no significant effect for renters and outright owners. This result is consistent with evidence suggesting that mortgagers have the highest search intensity[29] and job finding rates. In fact, commitment to mortgage payments induces higher pressure to return to work, leading to higher incentives to search, hence to higher probability to escape unemployment. This effect is stronger than the effect of mobility constraints, as can be understood by finding a significantly larger impact for mortgagers with respect to outright owners.

Second, renters account for a major portion of the JSA impact on claimant outflows, while homeowners managed to keep on claiming to a larger extent by searching more intensively than they would have done without the JSA, especially by limiting search decreases. Mortgagers were preserved also by having high initial search. However, outright owners avoided the crowding out effect completely, despite larger mobility constraints. It is likely that the JSA incentivized outright owners to maintain a stronger attachment to the labour market, while normally they would have dropped off active search.

Third, the JSA succeeded in removing from the UI system claimants not committed to search only in the case of renters. This however accounts only for part of the exits from the system. In fact, the JSA removed also jobseekers willing to look for work among renters and mortgagers. These individuals have probably opted for independent search because they perceived the new administrative burden as too heavy. Outright owners preferred to keep on searching within the system though.

These findings prompt to possible interpretations related to differences in the social and political behaviour. In the literature homeowners are generally associated to behaviours deemed as positive for the formation of social capital and local amenities, which are explained by their larger incentives to improve the quality of their community. More in general, it is likely that homeowners have higher incentives to comply with legal and social norms to sustain the society stakes. In the context of the JSA reform, higher propensity to abide by the rules could explain homeowners' higher likelihood to adjust their behaviour to stricter enforcement of eligibility checks. This may be especially true for outright owners who have longer expected tenure and should consume returns from investment in the community over longer period.

8. Concluding remarks

This paper has investigated the impact of the Jobseeker's Allowance (JSA), a major reform of the unemployment benefit system introduced in the UK in 1996. The foreword of the White Paper accompanying its introduction, stated: "People have a right to expect the highest standards of advice and service while they are unemployed. The taxpayer has a right to expect the commitment of unemployed people to make every effort to get back to work. Through the Jobseeker's Allowance we are determined to address both expectations" (DSS and DoE, 1994). Previous impact evaluations have found that stricter enforcement of search requirements implied by this reform have moved off the claimant register many unemployed without reintegrating them to jobs.

The present JSA impact evaluation contributes to existing analyses in two main directions. First, the focus of the present analysis is on the response of unemployed claimants in terms of job search behaviour, claimant status and their joint pattern. By using data from the UK Labour Force Survey, the JSA treatment effect on three outcome variables was estimated. A theoretical background for the impact of a strengthening in search-related criteria is also discussed. This framework implies that the

[29]This evidence is present also in the sample. In fact, by running an OLS regression of the count of search methods in Wave 1, one finds that mortgagers have significantly higher search than any other category.

likelihood to stop claiming without finding a job is higher for unemployed with lower initial search intensity, and for unemployed with lower incentives to meet the stricter rules.

Second, in light of the expected relation between housing tenure and search behaviour, the impact of the JSA on the proposed outcomes has been estimated separately for three residential states: (1) outright owners, (2) owners with mortgage, (3) renters. This permitted to test whether unemployed with different housing tenure have actually experienced different treatment effects, as predicted by the consideration that barriers to mobility imposed by homeownership could act as disincentives to search. The treatment effect of the JSA and its decomposition have been estimated by a Diff-in-Diffs and a Diff-in-Diff-in-Diffs strategy.

The results suggest that expectations accompanying the introduction of the JSA were only partially met. On the one hand, the consistent removal of claimants brought about by the JSA should have created large savings in the welfare expenditure, as expected. These savings were induced in a substantial part by some renters who decreased search efforts soon after the strengthening of eligibility checks and were probably using search only as means to achieve eligibility.

On the other hand, the present evidence raises concerns about the success of the JSA to fine-tune the link between commitment to search and reception of the benefit for unemployed people. In fact, the substantial extra administrative hurdle may have induced several individuals committed to get back into job to stop claiming and to search independently. This effect is present for renters and mortgagers but not for outright owners. Higher propensity to abide by the rules could explain homeowners' higher likelihood to adjust their search behaviour to stricter eligibility criteria; higher incentives to invest in the community and to sustain the society stakes may in fact make homeowners more diligent citizens. This may be especially true for outright owners who have longer expected tenure in the community.

These findings suggest that tighter enforcement of search requirements can succeed in making benefit eligibility contingent upon search commitment for unemployed with higher search intensity or with higher incentives to adapt search to new rules. However, for individuals who perceive the administrative process as too burdensome, this provision can lead them to abandon the system despite willingness to look for work. Overall, housing tenure can be an important driver of these responses, hence should be carefully considered when analysing the impact of similar policies.

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AppendixA. Asymptotic standard errors for ATE and TEA

This section derives formulas for the standard errors of Diff-in-Diff-in-Diff and Diff-in-Diff coefficients within a Multinomial Logistic (MNL) specification.

Recall that for the case not disaggregated by housing tenure the probabilities in eq. (2), are specified with $Z := (V', W')'$, $V := (jsa, d96, jsa \cdot d96)'$ and $W := (1, d97, X')'$. In the disaggregated case by housing tenure, probabilities $P^j_{q,t,r} = P(y = j|jsa = q, d96 = t, house = r, W = \overline{W})$, see eq. (4), are specified in terms of $Z := (U', W')'$, where $Q := (jsa, d96, house)'$, $U := U(Q) := (V', H', (V \otimes H)')'$, and $\otimes$ indicates Kronecker product. Recall that $H := (h_1, h_2)'$, $h_i := 1(house = i)$ and $1(\cdot)$ is the indicator function (dummy) and remark that H is a function of *house*.

Observe that for $j = 1, \ldots, J$ one can write

$$DiD^j := (P^j_{1,1} - P^j_{0,1}) - (P^j_{1,0} - P^j_{0,0}) = \sum_{q,t=0}^{1} (-1)^{q+t} P^j_{q,t}, \tag{A.1}$$

$$DiD^j_r := (P^j_{1,1,r} - P^j_{0,1,r}) - (P^j_{1,0,r} - P^j_{0,0,r}) = \sum_{q,t=0}^{1} (-1)^{q+t} P^j_{q,t,r}, \tag{A.2}$$

$$DiDiD^j_r := DiD^j_r - DiD^j_0 = \sum_{q,t=0}^{1} (-1)^{q+t} \left(P^j_{q,t,r} - P^j_{q,t,0} \right). \tag{A.3}$$

Eq. (A.1) is the relevant DiD equation for eq. (3), while eq. (A.2) is the relevant DiD equation for eq. (4). Finally eq. (A.3) is the relevant DiDiD equation for eq. (4).

Let θ be the $n_\theta \times 1$ vector of parameters. Both Average Treatment Effect $ATE^j := N^{-1} \sum_{i=1}^N TE^j_i$, and a Treatment Effect at the Average TEA^j are considered, see Wooldridge (2010) Section 15.6; both TE^j_i and TEA^j can be written in the following form

$$TEA^j := \sum_{m=1}^{M} w_m P^j_{(m)},$$

where $P^j_{(m)}$ indicates the probabilities $P^j_{q,t,r}$ indexing the triplet (q, t, r) in lexicographical order (m) and w_h is set equal to ± 1 following the coefficients defined in eq. (A.1), eq. (A.2) and eq. (A.3). TE^j_i has the same form as TEA^j, except the probabilities $P^j_{(m)}$ in eq. (4) are computed for $W = W_i$.

Consider the asymptotic variance of $\widehat{TEA}^j$ and $\widehat{ATE}^j$, indicated as avar$(\cdot)$, where $\widehat{\ }$ indicates quantities evaluated at $\widehat{\theta}$, the ML estimator of θ. Because $P^j_{(m)}$ are smooth function of θ, one can apply the delta method, see Wooldridge (2010) page 47. Let $G^j := G^j(\theta) := \partial_\theta TEA^j := \partial TEA^j / \partial \theta'$, a $1 \times n_\theta$ row vector of first order derivatives evaluated at θ (see Magnus and Neudecker (2007)), and similarly for $G^j_i := G^j_i(\theta) := \partial_\theta TE^j_i := \partial TE^j_i / \partial \theta'$. The delta method implies that

$$\begin{aligned} \text{avar}(\widehat{TEA}^j) &= \widehat{G}^j \ \text{avar}(\widehat{\theta}) \widehat{G}^{j\prime}, \\ \text{avar}(\widehat{ATE}^j) &= N^{-2} \sum_{i,h=1}^{N} \widehat{G}^j_i \ \text{avar}(\widehat{\theta}) \ \widehat{G}^{j\prime}_h = \overline{\widehat{G}}^j \ \text{avar}(\widehat{\theta}) \ \overline{\widehat{G}}^{j\prime}. \end{aligned}$$

where $\overline{\widehat{G}}^j_i := N^{-1} \sum_{i=1}^N \widehat{G}^j_i$. The rest of this appendix contains the expressions for G^j and G^j_i that are needed in these computations for the MNL specification.

Assume for simplicity that the reference state in the MNL specification is $j_0 = 1$; one has

$$P^j_{(m)} = \frac{\exp(\beta_j' Z_{(m)})}{1 + \sum_{h \neq 1} \exp(\beta_h' Z_{(m)})}$$

where β_j is $u \times 1$ and $\beta_1 := 0$. The total number of states is defined as $J \in \{3, 4, 7\}$. The parameters of the MNL are ordered as $\theta = (\beta_2', \ldots, \beta_J')'$, where $\beta_1 := 0$ is skipped in the θ vector, which hence contains $n_\theta := (J-1)u$ parameters. One needs to calculate G^j, a $1 \times n_\theta$ vector; by linearity one finds

$$G^j = \sum_{m=1}^{M} w_m \partial_\theta P^j_{(m)} = w' S^j_{(m)},$$

where $w := (w_1, \ldots, w_J)'$, $S^j_{(m)} := (\partial_\theta P^{j\prime}_{(1)}, \ldots, \partial_\theta P^{j\prime}_{(M)})'$, $\partial_\theta P^j_{(m)} = (\partial_{\beta_2} P^j_{(m)}, \ldots, \partial_{\beta_J} P^j_{(m)})$. Then one has $\widehat{G}^j := w' \widehat{S}^j_{(m)}$. Similarly $G^j_i = \sum_{m=1}^{M} w_m \partial_\theta P^j_{(m),i} = w' S^j_{(m)i}$ and $\widehat{G}^j_i = w' \widehat{S}^j_{(m)i}$ in an obvious notation.

One next wishes to show that

$$\partial_\theta P^j_{(m)} = v^{j\prime} \otimes Z_m', \qquad \partial_\theta P^j_{(m),i} = v^{j\prime}_i \otimes Z_{i,m}', \tag{A.4}$$

where $v^j_i := (v^j_{i2}, v^j_{i3}, \ldots, v^j_{iJ})'$, $v^j_{il} := P^j_{(m),i} 1(j = l) - P^j_{(m),i} P^l_{(m),i}$, $v^j := (v^j_2, v^j_3, \ldots, v^j_{iJ})'$, $v^j_l := P^j_{(m)} 1(j = l) - P^j_{(m)} P^l_{(m)}$, $Z_m := (U_m', \overline{W}')'$, $Z_{i,m} := (U_m', W_i')'$, $U_m := U(Q_m)$ and Q_m is the value of Q associated with (q, t, r) via the corresponding value of (m).

In fact consider $\partial_\theta P^j_{(m)} = (\partial_{\beta_2} P^j_{(m)}, \ldots, \partial_{\beta_J} P^j_{(m)})$ and its generic term $\partial_{\beta_l} P^j_{(m)}$ for $j \neq j_0 = 1$. One finds

$$\begin{aligned}
\partial_{\beta_l} P^j_{(m)} &= -\frac{\exp(Z_{(m)}'\beta_j)\exp(Z_{(m)}'\beta_l) Z_{(m)}'}{\left(1 + \sum_{h\neq 1} \exp(Z_{(m)}'\beta_h)\right)^2} + \frac{\exp(Z_{(m)}'\beta_l) Z_{(m)}' 1(l = j)}{1 + \sum_{h\neq 1} \exp(Z_{(m)}'\beta_h)} \\
&= \left(P^j_{(m)} 1(l = j) - P^j_{(m)} P^l_{(m)}\right) Z_{(m)}' =: v^j_l Z_{(m)}'.
\end{aligned}$$

A similar expression applies for $P^j_{(m),i}$. This completes the proof of eq. (A.4).

AppendixB. Multinomial logit estimates

Table B.7

JSA EFFECT ON OVERALL CLAIMANT BEHAVIOUR — MULTINOMIAL LOGIT

	$P(C=1,\Delta s^*<0)$		$P(C=1,\Delta s^*=0)$		$P(C=1,\Delta s^*>0)$		$P(C=2,\Delta s^*=0)$		$P(C=2,\Delta s^*>0)$		$P(C=3)$	
	RRR	std. err.	RRR	std. err.	RRR	std. err.	RRR	std. err.	RRR	std. err.	RRR	std. err.
jsa	0.908	(0.101)	0.936	(0.098)	0.948	(0.103)	1.086	(0.141)	0.877	(0.155)	1.155	(0.128)
d96	0.928	(0.135)	0.983	(0.135)	0.903	(0.129)	1.138	(0.186)	0.694	(0.167)	1.099	(0.162)
jsa_d96	0.592***	(0.111)	0.600***	(0.105)	0.750	(0.137)	0.890	(0.185)	2.037**	(0.596)	0.715*	(0.132)
d97	0.666***	(0.076)	0.671***	(0.071)	0.689***	(0.077)	0.517***	(0.071)	0.750	(0.136)	1.051	(0.118)
female	0.543***	(0.055)	0.570***	(0.052)	0.494***	(0.048)	1.982***	(0.213)	0.731**	(0.112)	0.717***	(0.070)
age	1.107***	(0.030)	1.094***	(0.028)	1.114***	(0.029)	0.975	(0.030)	1.011	(0.042)	1.106***	(0.030)
age^2	0.999***	(0.000)	0.999***	(0.000)	0.999***	(0.000)	1.000	(0.000)	1.000	(0.001)	0.998***	(0.000)
married	0.806*	(0.094)	0.641***	(0.071)	0.769**	(0.088)	0.815	(0.108)	0.801	(0.144)	1.091	(0.129)
nkids19	0.899**	(0.040)	0.972	(0.039)	0.926*	(0.040)	1.188***	(0.053)	1.095	(0.065)	0.935	(0.041)
Highest Education												
Higher education	0.776	(0.213)	0.556**	(0.147)	0.740	(0.200)	0.890	(0.299)	0.669	(0.304)	0.523**	(0.139)
GCE, A-level or equiv.	0.690*	(0.147)	0.756	(0.153)	0.693*	(0.146)	1.077	(0.282)	0.944	(0.308)	0.458***	(0.094)
GCSE grades A-C or equiv.*	0.687*	(0.147)	0.692*	(0.140)	0.705*	(0.147)	1.048	(0.271)	0.828	(0.273)	0.386***	(0.079)
Other qualifications	0.902	(0.198)	0.996	(0.208)	1.052	(0.227)	1.704**	(0.449)	1.073	(0.360)	0.507***	(0.107)
No qualification	0.783	(0.163)	1.023	(0.201)	0.824	(0.168)	1.362	(0.343)	0.943	(0.302)	0.357***	(0.072)
Duration since last job												
$3-6$ *months*	0.986	(0.203)	0.898	(0.174)	0.691*	(0.137)	0.963	(0.241)	0.698	(0.246)	0.693*	(0.133)
$6-12$ *months*	0.933	(0.181)	0.917	(0.167)	0.633**	(0.118)	1.061	(0.248)	0.834	(0.266)	0.471***	(0.086)
$1-2$ *years*	0.697*	(0.130)	0.608***	(0.106)	0.476***	(0.085)	0.909	(0.204)	0.973	(0.287)	0.225***	(0.040)
$2-3$ *years*	0.949	(0.205)	0.953	(0.194)	0.691*	(0.145)	1.578*	(0.400)	1.476	(0.482)	0.234***	(0.050)
$3-4$ *years*	1.275	(0.323)	1.200	(0.287)	0.889	(0.219)	1.707*	(0.501)	2.698***	(0.944)	0.294***	(0.075)
$4-5$ *years*	0.934	(0.229)	0.863	(0.200)	0.745	(0.176)	1.384	(0.396)	1.276	(0.477)	0.185***	(0.047)
$5-8$ *years*	1.039	(0.231)	0.891	(0.187)	0.661*	(0.143)	2.079***	(0.527)	0.984	(0.351)	0.129***	(0.031)
>8 *years*	0.648*	(0.144)	0.933	(0.189)	0.475***	(0.101)	1.770*	(0.439)	1.029	(0.356)	0.089***	(0.022)
never worked	0.754	(0.173)	0.727	(0.155)	0.577**	(0.127)	1.346	(0.353)	1.173	(0.410)	0.287***	(0.062)
region dummies							✓					
obs							14,241					

Notes: *** significant 1%, ** significant 5%, * significant 10%. Statistical significance refers to test of the null $RRR = 1$. Robust standard errors are reported. See Table 3, column (3).

Table B.8

JSA EFFECT ON OVERALL CLAIMANT BEHAVIOUR (WITH HOUSING TENURE) — MULTINOMIAL LOGIT

	$P(C=1,\Delta s^*<0)$		$P(C=1,\Delta s^*=0)$		$P(C=1,\Delta s^*>0)$		$P(C=2,\Delta s^*=0)$		$P(C=2,\Delta s^*>0)$		$P(C=3)$	
	RRR	std. err.	RRR	std. err.	RRR	std. err.	RRR	std. err.	RRR	std. err.	RRR	std. err.
jsa	0.962	(0.146)	1.094	(0.155)	1.120	(0.167)	1.268	(0.220)	0.945	(0.216)	1.399**	(0.219)
d96	1.061	(0.212)	1.169	(0.220)	1.149	(0.226)	1.432	(0.315)	0.775	(0.242)	1.396	(0.290)
jsa_d96	0.494***	(0.128)	0.425***	(0.102)	0.505***	(0.127)	0.694	(0.195)	1.634	(0.631)	0.455***	(0.121)
own	0.804	(0.202)	0.812	(0.190)	1.027	(0.250)	1.245	(0.355)	0.687	(0.286)	1.784**	(0.443)
mort	0.996	(0.178)	0.713**	(0.120)	1.082	(0.190)	0.985	(0.212)	0.862	(0.243)	1.773***	(0.317)
own_jsa	1.014	(0.349)	0.700	(0.225)	0.705	(0.237)	0.676	(0.268)	1.196	(0.684)	0.667	(0.226)
mort_jsa	0.846	(0.210)	0.695	(0.163)	0.686	(0.167)	0.730	(0.214)	0.773	(0.311)	0.691	(0.169)
own_d96	0.589	(0.232)	0.398**	(0.146)	0.430**	(0.166)	0.444*	(0.198)	0.478	(0.377)	0.508*	(0.196)
mort_d96	0.878	(0.273)	0.886	(0.261)	0.696	(0.214)	0.702	(0.252)	1.020	(0.519)	0.713	(0.223)
own_jsa_d96	1.994	(1.107)	3.820***	(1.963)	3.189**	(1.718)	2.595	(1.595)	1.354	(1.358)	2.254	(1.225)
mort_jsa_d96	1.202	(0.508)	1.627	(0.644)	2.010*	(0.825)	1.264	(0.605)	1.513	(0.990)	2.311**	(0.958)
d97	0.662***	(0.076)	0.651***	(0.069)	0.683***	(0.076)	0.512***	(0.070)	0.734*	(0.132)	1.080	(0.122)
female	0.542***	(0.055)	0.575***	(0.053)	0.494***	(0.048)	2.006***	(0.216)	0.729**	(0.112)	0.706***	(0.069)
age	1.103***	(0.030)	1.086***	(0.028)	1.111***	(0.030)	0.974	(0.030)	1.005	(0.042)	1.111***	(0.030)
age^2	0.999***	(0.000)	0.999***	(0.000)	0.999***	(0.000)	1.000	(0.000)	1.000	(0.001)	0.998***	(0.000)
married	0.816*	(0.096)	0.687***	(0.076)	0.781**	(0.091)	0.852	(0.114)	0.817	(0.148)	1.018	(0.121)
nkids19	0.893**	(0.039)	0.960	(0.039)	0.920*	(0.039)	1.182***	(0.053)	1.085	(0.065)	0.947	(0.042)
Highest Education												
Higher education	0.768	(0.211)	0.535**	(0.142)	0.731	(0.198)	0.876	(0.294)	0.653	(0.297)	0.542**	(0.144)
GCE, A-level or equiv.	0.676*	(0.145)	0.706*	(0.143)	0.678*	(0.143)	1.042	(0.274)	0.906	(0.296)	0.479***	(0.099)
GCSE grades A-C or equiv.*	0.671*	(0.143)	0.644**	(0.130)	0.690*	(0.144)	1.004	(0.260)	0.799	(0.264)	0.408***	(0.084)
Other qualifications	0.868	(0.192)	0.875	(0.183)	1.012	(0.219)	1.590*	(0.421)	1.002	(0.339)	0.565***	(0.121)
No qualification	0.748	(0.157)	0.883	(0.175)	0.786	(0.162)	1.261	(0.321)	0.867	(0.282)	0.402***	(0.082)
Duration since last job												
$3-6$ *months*	0.978	(0.202)	0.882	(0.171)	0.685*	(0.136)	0.953	(0.239)	0.692	(0.244)	0.698*	(0.134)
$6-12$ *months*	0.918	(0.179)	0.873	(0.160)	0.621**	(0.117)	1.035	(0.243)	0.814	(0.260)	0.484***	(0.089)
$1-2$ *years*	0.689**	(0.129)	0.578***	(0.101)	0.469***	(0.084)	0.887	(0.200)	0.954	(0.283)	0.235***	(0.042)
$2-3$ *years*	0.930	(0.202)	0.885	(0.181)	0.676*	(0.142)	1.523*	(0.389)	1.418	(0.466)	0.248***	(0.053)
$3-4$ *years*	1.246	(0.316)	1.109	(0.267)	0.868	(0.214)	1.648*	(0.485)	2.586***	(0.910)	0.313***	(0.080)
$4-5$ *years*	0.904	(0.223)	0.774	(0.180)	0.717	(0.171)	1.304	(0.375)	1.200	(0.452)	0.201***	(0.051)
$5-8$ *years*	1.006	(0.226)	0.798	(0.170)	0.638**	(0.139)	1.965***	(0.503)	0.924	(0.334)	0.142***	(0.034)
>8 *years*	0.626**	(0.14)	0.818	(0.168)	0.456***	(0.098)	1.659**	(0.415)	0.959	(0.335)	0.099***	(0.024)
never worked	0.751	(0.173)	0.716	(0.153)	0.576**	(0.127)	1.339	(0.353)	1.172	(0.410)	0.284***	(0.062)
region dummies							✓					
obs							14,241					

Notes: *** significant 1%, ** significant 5%, * significant 10%. Statistical significance refers to test of the null $RRR=1$. Robust standard errors are reported. See Table 6.

AppendixC. JSA impact — Average Treatment Effect

This section reports Average Treatment Effect estimates of models reported in Table 3, Table 4, Table 5, and Table 6. Instead of computing the Treatment Effect of the JSA by setting regressor values at sample means as in the TEA, ATE estimates are computed averaging coefficient estimates across all observations. Standard errors in parenthesis are computed using the Delta method as well (see AppendixA).

Table C.9
JSA ATE ON CLAIMANT BEHAVIOUR

(1)			(2)			(3)		
C	DiD^j		Δs^*	DiD^j		$(C, \Delta s^*)$	DiD^j	
$P(C=1)$	-0.0669	***	$P(\Delta s^*<0)$	-0.0076		$P(C=1, \Delta s^*<0)$	-0.0234	*
	(0.0159)			(0.0137)			(0.0124)	
$P(C=2)$	0.0630	***	$P(\Delta s^*=0)$	-0.0332	*	$P(C=1, \Delta s^*=0)$	-0.0542	***
	(0.0124)			(0.017)			(0.0165)	
$P(C=3)$	0.0038		$P(\Delta s^*>0)$	0.0366	**	$P(C=1, \Delta s^*>0)$	0.0107	
	(0.0123)			(0.0143)			(0.0137)	
			$P(C=3)$	0.0042		$P(C=2, \Delta s^*<0)$	0.0163	**
				(0.0123)			(0.0072)	
						$P(C=2, \Delta s^*=0)$	0.0205	**
							(0.0096)	
						$P(C=2, \Delta s^*>0)$	0.0260	***
							(0.0055)	
						$P(C=3)$	0.0040	
							(0.0121)	
obs = 14,241			obs = 14,241			obs = 14,241		

Notes: *** significant 1%, ** significant 5%, * significant 10%. See Table 3 for comparison; same notes apply here.

Table C.10
JSA ATE ON CLAIMANT OUTFLOWS - DECOMPOSITION BY HOUSING TENURE

C	DiD^j_{own}	DiD^j_{mort}	DiD^j_{rent}	$DiDiD^j_{own}$	$DiDiD^j_{mort}$
$P(C=1)$	0.0374	-0.0813 ***	-0.0752 ***	0.1126 **	-0.0061
	(0.0473)	(0.0292)	(0.0205)	(0.0515)	(0.0357)
$P(C=2)$	0.0131	0.0384 *	0.0871 ***	-0.074 *	-0.0487 *
	(0.0373)	(0.0229)	(0.0162)	(0.0406)	(0.028)
$P(C=3)$	-0.0505	0.0429 *	-0.0119	-0.0386	0.0548 **
	(0.0378)	(0.0232)	(0.0153)	(0.0408)	(0.0278)
obs			14,241		

Notes: *** significant 1%, ** significant 5%, * significant 10%. See Table 4 for comparison; same notes apply here.

Table C.11
JSA ATE ON SEARCH INTENSITY - DECOMPOSITION BY HOUSING TENURE

Δs^*	DiD^j_{own}	DiD^j_{mort}	DiD^j_{rent}	$DiDiD^j_{own}$	$DiDiD^j_{mort}$
$P^\star(\Delta s^* < 0)$	-0.0633	-0.0439 *	0.0247	-0.0881 **	-0.0686 **
	(0.0388)	(0.0256)	(0.0181)	(0.0428)	(0.0313)
$P^\star(\Delta s^* = 0)$	0.0777	-0.0594 *	-0.039 *	0.1167 **	-0.0204
	(0.0479)	(0.0306)	(0.0228)	(0.0531)	(0.0382)
$P^\star(\Delta s^* > 0)$	0.0377	0.0596 **	0.0262	0.0115	0.0335
	(0.04)	(0.0266)	(0.019)	(0.0443)	(0.0327)
$P(C = 3)$	-0.052	0.0437 *	-0.0119	-0.0401	0.0556 **
	(0.0378)	(0.0232)	(0.0152)	(0.0407)	(0.0277)
obs			14,241		

Notes: *** significant 1%, ** significant 5%, * significant 10%. See Table 5 for comparison; same notes apply here.

Table C.12
JSA ATE ON OVERALL CLAIMANT BEHAVIOUR - DECOMPOSITION BY HOUSING TENURE

$P(C, \Delta s^*)$	DiD^j_{own}	DiD^j_{mort}	DiD^j_{rent}	$DiDiD^j_{own}$	$DiDiD^j_{mort}$
$P(C = 1, \Delta s^* < 0)$	-0.0463	-0.0515 **	-0.0031	-0.0431	-0.0484 *
	(0.0341)	(0.023)	(0.0164)	(0.0378)	(0.0283)
$P(C = 1, \Delta s^* = 0)$	0.0513	-0.0614 **	-0.0687 ***	0.12 **	0.0073
	(0.0457)	(0.0294)	(0.0223)	(0.0508)	(0.0369)
$P(C = 1, \Delta s^* > 0)$	0.0306	0.0314	-0.003	0.0336	0.0344
	(0.0384)	(0.0254)	(0.0181)	(0.0425)	(0.0312)
$P(C = 2, \Delta s^* < 0)$	-0.0169	0.0084	0.0281 ***	-0.045 *	-0.0198
	(0.0224)	(0.0134)	(0.0092)	(0.0242)	(0.0163)
$P(C = 2, \Delta s^* = 0)$	0.0257	0.0018	0.0292 **	-0.0035	-0.0274
	(0.03)	(0.0173)	(0.0125)	(0.0325)	(0.0213)
$P(C = 2, \Delta s^* > 0)$	0.0066	0.0287 ***	0.0291 ***	-0.0224	-0.0003
	(0.0134)	(0.0106)	(0.0072)	(0.0151)	(0.0128)
$P(C = 3)$	-0.0511	0.0426 *	-0.0116	-0.0395	0.0541 **
	(0.0374)	(0.023)	(0.0151)	(0.0403)	(0.0275)
obs			14,241		

Notes: *** significant 1%, ** significant 5%, * significant 10%. See Table 6 for comparison; same notes apply here.