The Puzzle of Job Search and Housing Tenure: a Reconciliation of Theory and Empirical Evidence

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Abstract

This paper attempts to reconcile the empirical evidence with the argument in favour of a positive effect of homeownership on exit rates from unemployment, known as "Oswald's thesis". While the theory would suggest that homeowners experience more difficulties than renters to exit unemployment due to lower residential mobility, the empirical literature has typically found lower unemployed duration for homeowners. Taking into account some of the reasons for the falsification of the Oswald's thesis, we provide evidence which supports it.

At first, in a theoretical model of endogenous job search we show that homeowners' higher moving costs imply unambiguously lower search and lower job finding rates, even though an opposite effect works for jobs which do not require a move. Then, in the empirical analysis we make use of data drawn from the British Household Panel Survey to compare job search intensity measures by housing tenure. We find that, controlling for housing costs and for different residential statuses, non-employed outright owners have definitely a lower attachment to the labour market than renters, and that this effect is even more evident when we compare them to private renters.

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1 Introduction

During the nineties Andrew Oswald[1] studied the relationship between the unemployment rate and the homeownership rate for OECD countries and he argued that homeownership was one of the major culprits of high unemployment given the observed strong positive correlation. The most influential microeconomic interpretation of this finding has focused on the supposed lower job finding rates of unemployed people who own the home. In fact, since homeownership hampers propensity to move for job reasons, homeowners should have longer unemployment durations than otherwise comparable renters[2]While there is abundant evidence supporting the first element of this rationale[3], several empirical studies have found no support for the second, and in most cases even the opposite, that is lower unemployment durations for homeowners[4].

The existing literature[5] has provided two possible explanations for this paradox. The first one looks at the different effect of mobility costs on job search behaviour between the local and the non local labour market. The second has focused on the importance of making distinctions among homeowners, in particular between mortgage-holders and outright owners, and among renters, in particular between social and private renters, since results can be very different by subgroups.

With regards to the first explanation, Munch et al. [2006] point out that the lower propensity of owner-occupiers to move for job reasons does not necessarily imply that they have lower exit rates from unemployment. In fact, homeowners may have higher reservation wages for jobs which require a residential move, but also lower reservation wages for jobs which do not, so that job finding rates in the local labour market may be as high as to offset the lower rate for jobs in a distant area. Whether or not the total job finding rate is lower for homeowners is just, they argue, an empirical matter which depends on the magnitude of these two opposite effects. However, Van Vuuren and Van Leuvensteijn [2007] show that in the model of Munch et al. [2006] the hazard rate out of unemployment should be always lower for homeowners, but in a special case, that is when homeowners can receive

[1]See Oswald [1996], Oswald [1997] and Oswald [1999].

[2]Other interpretations explored in the literature refer to the effect of homeownership on the probability to be employed and on the employed's probability to become unemployed.

[3]See Van den Berg and Van Vuuren [1998], Henley [1998], Munch et al. [2006], Van Vuuren and Van Leuvensteijn [2007] and Battu et al. [2008].

[4]See Goss and Phillips [1997], Coulson and Fisher [January, 2002], Flatau et al. [2003], Munch et al. [2006], Van Vuuren and Van Leuvensteijn [2007] and Battu et al. [2008].

[5]See Rouwendal and Nijkamp [2008], and Havet and Penot [2010] for a survey of this literature.

unemployment benefit only for a fixed period, while renters never run out of it. Even in this case, the theoretical effect of homeownership is ambiguous.

The second explanation takes into account some controversies with the original Oswald's definitions of residential status. At first, when comparing homeowners and renters one should account for the role of mortgage payments in confounding the relation between mobility costs and job search behaviour. Committed housing expenditures such as the mortgage and the rent should increase exit rates from unemployment through higher pressure to return to work. Given that outright owners do not cope with these expenses and that rent payments should be on average lower than mortgage payments, this interpretation is consistent with the observed unemployment duration for mortgage-holders being typically the lowest among different residential statuses[6]. Second, also social and private renters do not behave the same way[7]. Social renters may have lower mobility due to lock-in effects similar to those which hamper homeowners mobility[8]. For example, long waiting lists, security of tenure and the restricted transferability within social housing may cause social renters to be less prone to move for job reasons than private renters[9]. Moreover, also the housing costs effect differs by tenant status since social renters pay below-market rent.

Our contribution consists in refining the empirical analysis by taking into account simultaneously housing costs and the distinctions among all the relevant residential statuses, with the purpose of bringing out the empirical effect of the main mechanism underlying the Oswald's hypothesis[10]. We start by building a theoretical framework with endogenous search which models the Oswald's effect as in Munch et al. [2006]. Homeownership rises the reservation wage and reduces the optimal search in the non local labour market, but has opposite effects locally. In line with the findings of Van Vuuren and Van Leuvensteijn [2007], our model overcomes the theoretical ambiguity of the model of Munch et al. [2006] in that the negative effect of homeownership on non local outcomes turns out to be unambiguously stronger. In particu-

[6]Rouwendal and Nijkamp [2008] and Arzilli and Morescalchi [2011] provide evidence for mortgagers having higher housing costs than renters on average.

[7]Social housing is a form of housing tenure in which the property is owned by Local Authorities or by Housing Associations, usually with the aim of providing accommodation at below-market rent or even rent-free.

[8]See Flatau et al. [2003], Battu et al. [2008], McCormick [1983], Hughes and McCormick [1981] and Hughes and McCormick [1987].

[9]Hughes and McCormick [2000] in a later work argue that these effects may have lessened.

[10]Munch et al. [2006], Van Vuuren and Van Leuvensteijn [2007] and Battu et al. [2008], which represent the most updated analysis of the Oswald's hypothesis have disregarded one or both of these issues.

lar, the endogenisation of search allows us to evaluate the marginal impacts of homeownership on both local and non local optimal search and then to compare them. As a net effect, homeownership reduces the optimal search and the job finding rate, which means that the Oswald's hypothesis is still verified.

In the theoretical model we ignore the role of housing costs but we are aware that the effect of housing costs may revert the Oswald's outcome empirically. Hence, the comparison in the model is intended to be between owners with no mortgage payments and private renters. We do allow for housing costs in the empirical analysis, where observed outcomes are confounded by this effect.

We carry out our empirical analysis using data from the British Household Panel Survey (BHPS), which provides job search effort's measures for unemployed. We use these categorical measures as dependent variables and we regress them on the housing tenure dummies using a random effects probit and controlling for several individual (or household) characteristics. The BHPS provide us with a measure for housing costs, which we plug in the regression in order to purge search differentials of the housing costs effect. Moreover, we control for different tenure statuses among homeowners, between mortgage and outright, and among renters, between social and private.

Our focus is on the job search intensity, unlike the empirical literature, which typically has tested the Oswald's hypothesis looking at the hazard rate. The probability that an unemployed worker will find a job can be decomposed as the product of two probabilities: the probability of receiving a job offer and the probability of this offer being accepted. Job search effort is positively related to the first, and to the second through the negative relation with the reservation wage and maybe also through the positive effect of search on the quality of job offers. Whatsoever, the relationship between search and the hazard rate is always positive, so nothing is lost whenever we state the Oswald's hypothesis in terms of a negative effect of homeownership on the search intensity.

The empirical evidence we provide is consistent with the theory outlined. In fact, the Oswald's hypothesis is confirmed in the sense that the search differential between outright owners and private renters, the two extremes of mobility, is negative, even whenever the housing costs effect is netted out. More in details, though search intensity is usually higher for homeowners than renters, this difference is no more meaningful when we refine the residential status definitions, since it is clear that mortgagers search more than outright owners and private renters more than social. Anyway, the negative search differential between outright owners and private renters manifests itself through the owners' lower attachment to the labour market, while no

statistical difference in search intensity measures is found looking only at non-employed workers who state to have been looking for work in the last four weeks. Moreover, housing costs work in the expected direction albeit with weak impact, and never revert the sign of search differentials.

Our findings are very similar to those of Flatau et al. [2003] who, examining data for Australia, provide strong evidence that the counter-Oswald results are due to the behaviour of leveraged owners and social tenants. In fact, while they find that homeowners have higher probability to exit unemployment than renters, when they compare outright owners with private renters they find strong evidence, particularly for females, that outright owners are slower to become reemployed than private renters.

2 The Theoretical Model

In this section we present a simplified model of job search with endogenous search effort and exogenous wage offer distribution[11]. In order to investigate the Oswald's explanation for the impact of homeownership on search behaviour, we ignore housing costs and we just focus on moving costs[12].

The effect of homeownership is captured by allowing for two labour markets which differ geographically as in Munch et al. [2006]. By definition, the local labour market is the region in which a worker can take a job without moving. The non local labour market is the rest of the economy. Workers can have a job only in the region they live in, so if they want to accept a job offer in the other region they have necessarily to move, *i.e.* we do not allow commuting. This setup captures the idea that there exist two distinct reservation wages, one for the local labour market and one for jobs outside, which will diverge when moving entails a cost.

To model the lifetime utility of the employed as simple as possible without affecting our main results, we rule out on-the-job search and we set to zero the separation rate, that is:

$$V^E(w) = \frac{w}{\rho}, \tag{1}$$

where w is the wage and ρ is the discount rate.

The unemployed can increase the job offer arrival rate through search activity at the cost of an utility loss of C^s. This cost and the job offers

[11] See Mortensen [1986] for the background of search modeling and Manning [2009] for a similar version.

[12] See **?** for an endogenous search model which includes also the housing costs effect. When comparing search outcomes of homeowners (outright owners) and renters in this setup, housing costs simply reinforces the negative effect of homeownership due to moving costs.

arrival rate differ between the local and non local labour market uniquely for the search effort exerted in each of them, which we call s_l and s_n respectively. We assume that the total cost of search function is additive in the costs of search in the two labour markets, *i.e.* $C^s = c(s_l) + c(s_n)$, where $c' > 0$ and $c'' > 0$[13]. The arrival rate of job offers in the local and non local labour markets are respectively $\alpha(s_l)$ and $\alpha(s_n)$, where $\alpha' > 0$ and $\alpha'' < 0$. Wage offers are sampled from the *c.d.f.* $F(w)$ which we assume identical for both markets. When choosing how to distribute search effort in the two labour markets, the unemployed must take into account the cost of moving, that is the cost he would incur if he found and accepted a job in the other region. The difference in this cost for homeowners and renters is precisely what captures the Oswald's effect in the model. For simplicity, we set this cost to zero for renters since we need only that it is higher for homeowners. The value equation for the unemployed renter is:

$$\rho V^U = b - c(s_l) - c(s_n) + (\alpha(s_l) + \alpha(s_n)) \int_{w_r^*} (V^E(w) - V^U)\, dF(w), \tag{2}$$

where w_r^* is the reservation wage for the renter and b is the unemployment benefit. The unemployed sets the reservation wage and the search effort levels in order to maximise his lifetime utility. As the renter can move without costs, he is indifferent between accepting a job in the local labour market or outside, so the reservation wage is the same in both. Given risk neutrality, the reservation wage will be such that $w_r^* = \rho V^U$. Replacing this and equation (1) in (2), and rearranging we have:

$$w_r^* = b - c(s_l) - c(s_n) + \frac{(\alpha(s_l) + \alpha(s_n))}{\rho} \int_{w_r^*} (w - w_r^*)\, dF(w). \tag{3}$$

Differentiating (3) with respect to s_l and s_n we get the first order conditions for the maximum:

$$c'(s_l^*) = \alpha'(s_l^*)A, \tag{4}$$

$$c'(s_n^*) = \alpha'(s_n^*)A, \tag{5}$$

where we set $A = \rho^{-1} \int_{w_r^*} (w - w_r^*)\, dF(w)$. It is easy to show that the unemployed renter will exert the same search effort in both markets. In fact, from (4) and (5) we get $c'(s_l^*)/\alpha'(s_l^*) = c'(s_n^*)/\alpha'(s_n^*)$, which is true only when $s_l^* = s_n^*$[14].

[13] The assumptions on c yield a standard convex total cost of search function. The model may be enriched by allowing higher costs of search in the non local labour market, but this is irrelevant for the comparison between search behaviours of homeowners and renters.

[14] Alternatively, since s_l and s_n have the same impact on the cost and the revenue for the unemployed renter, we may maximise with respect to the total search effort s subject to the constraint $s = s_l + s_n$.

In this simple setup, with no additional costs of search far from home and no costs of moving, the renter is indifferent between search locally and in a distant area.

If the unemployed is homeowner he has to consider the cost m which he would run into if he accepted a job in the non local labour market[15]. The discounted lifetime utility for the unemployed homeowner is:

$$\rho\tilde{V}^U = b - c(s_l) - c(s_n) + \alpha(s_l)\int_{w_l^*}\left(\frac{w}{\rho} - \tilde{V}^U\right) dF(w) + \alpha(s_n)\int_{w_n^*}\left(\frac{w}{\rho} - \tilde{V}^U - m\right) dF(w), \tag{6}$$

where we have already replaced $V^E(w) = w/\rho$. Now, we have two distinct levels of the reservation wage, one for each of the two markets. The reservation wage for the local labour market is $w_l^* = \rho\tilde{V}^U$, while the reservation wage for the job offers outside the local labour market is $w_n^* = \rho\tilde{V}^U + \rho m$: to accept a job offer which requires a move, the unemployed homeowner needs a compensation for the cost of moving. Equation (6) can be rewritten as

$$w_l^* = b - c(s_l) - c(s_n) + \frac{\alpha(s_l)}{\rho}\int_{w_l^*}(w - w_l^*)\, dF(w) + \frac{\alpha(s_n)}{\rho}\int_{w_n^*}(w - w_l^* - \rho m)\, dF(w). \tag{7}$$

The optimal search levels in the two markets are determined by the following first order conditions:

$$c'(s_l^*) = \alpha'(s_l^*)B, \tag{8}$$

$$c'(s_n^*) = \alpha'(s_n^*)C, \tag{9}$$

where we set $B = \rho^{-1}\int_{w_l^*}(w - w_l^*)\, dF(w)$ and $C = \rho^{-1}\int_{w_n^*}(w - w_n^*)\, dF(w)$. Since $w_l^* < w_n^*$, $B > C$ holds for any w. From (7) and (8), $B > C$ implies $c'(s_l^*)/\alpha'(s_l^*) > c'(s_n^*)/\alpha'(s_n^*)$. Given that c is convex and α is concave, the latter inequality implies $s_l^* > s_n^*$. Unlike the renter, for the homeowner is optimal to search harder in the local labour market than outside.

Up to this point we have found that the renter chooses the same level of optimal search in both markets, which we indicate as s_r^*, while the homeowner sets $s_l^* > s_n^*$. To identify the effect of housing tenure we compare now the search effort of the renter and the homeowner in both markets. A first result is stated in the following proposition:

Proposition 1 $s_l^* > s_r^* > s_n^*$.

[15]The cost of moving will be the same whether the homeowner moves to another owner-occupied housing or to a rental accommodation, hence, this model captures only the lower mobility due to the cost of selling a home. We may enrich the model by differentiating between moves to a rental and to an owner-occupied accommodation (with higher costs for the latter), but this higher complexity will not come with any benefits for our purposes.

Proof:

(a) $s_l^* > s_r^*$. To prove this we calculate the derivative of s_l^* with respect to m by means of the implicit function theorem. At first, we need to calculate dw_l^*/ds_l and dw_l^*/dm and evaluate these functions at the optimum.

Differentiating equation (7) with respect to w_l^* and s_l we obtain:

$$\frac{dw_l^*}{ds_l} = \frac{\rho^{-1}\alpha'(s_l)\int_{w_l^*}(w - w_l^*)\,F'(w)dw - c'(s_l)}{1 + \rho^{-1}\alpha(s_l)[1 - F(w_l^*)] + \rho^{-1}\alpha(s_n)[1 - F(w_n^*)]}. \tag{10}$$

It can be easily shown that this derivative is zero for $s_l = s_l^*$, since the numerator is zero as follows directly from the first order condition for s_l^*. Moreover $dw_l^*/ds_l > (<)0$ if $s_l < (>)s_l^*$. Differentiating equation (7) with respect to w_l^* and m we obtain:

$$\frac{dw_l^*}{dm} = -\frac{\alpha(s_n)[1 - F(w_l^* + \rho m)]}{1 + \rho^{-1}\alpha(s_l)[1 - F(w_l^*)] + \rho^{-1}\alpha(s_n)[1 - F(w_n^*)]} < 0. \tag{11}$$

This derivative is negative for any value of s_l. Intuitively, as the moving cost increases, the reservation wage in the local labour market for the homeowner drops since the acceptation of a job far from home comes with a lower expected surplus. We rewrite now the first order condition for s_l^* as

$$\Phi(s_l^*, m) = c'(s_l^*) - \frac{\alpha'(s_l^*)}{\rho}\int_{w_l^*(s_l^*,m)}[w - w_l^*(s_l^*, m)]F'(w)dw = 0. \tag{12}$$

Applying the implicit function theorem we have[16]

$$\frac{ds_l^*}{dm} = -\frac{\Phi_m}{\Phi_{s_l^*}} = -\frac{\rho^{-1}\alpha'(s_l^*)\int_{w_l^*}\left(\frac{dw_l^*}{dm}\right)F'(w)dw}{c''(s_l^*) - \rho^{-1}\alpha''(s_l^*)\int_{w_l^*}(w - w_l^*)F'(w)dw} > 0. \tag{13}$$

As expected, the higher is the moving cost, the higher is the search of the homeowner in the local labour market. Since the relation between s_l^* and m is positive for any value of m, this will be true in particular when $m = 0$, that is when the optimal search locally (and non locally) is $s_r^* = s_l^*$. Thus,

[16]When computing $\Phi_{s_l^*}$ we remark that

$$\Phi_{s_l^*} = c''(s_l^*) - \frac{\alpha''(s_l^*)}{\rho}\int_{w_l^*}(w - w_l^*)F'(w)dw + \frac{\alpha'(s_l^*)}{\rho}\int_{w_l^*}\left(\frac{dw_l^*}{ds_l}\right)F'(w)dw =$$
$$= c''(s_l^*) - \frac{\alpha''(s_l^*)}{\rho}\int_{w_l^*}(w - w_l^*)F'(w)dw > 0,$$

where the simplification is allowed given that $dw_l^*/ds_l = 0$ when $s_l = s_l^*$. This derivative is clearly positive since $c'' > 0$, $\alpha'' < 0$, $F' > 0$. Also, Φ_m is negative since $\alpha' > 0$, $F' > 0$ and $dw_l^*/dm < 0$.

when m increases from zero to a positive number, which captures a shift from tenant to owner status, the unemployed will increase search in the local labour market from s_r^* to s_l^*.

(b) $s_n^* < s_r^*$. As in the previous case we calculate the derivatives dw_n^*/ds_n and dw_n^*/dm and we study the sign of ds_n^*/dm. Differentiating the equation $w_n^* = w_l^* + \rho m$ with respect to w_n^* and s_n we obtain:

$$\frac{dw_n^*}{ds_n} = \frac{\rho^{-1}\alpha'(s_n)\int_{w_n^*}(w - w_n^*)\,F'(w)dw - c'(s_n)}{1 + \rho^{-1}\alpha(s_l)[1 - F(w_l^*)] + \rho^{-1}\alpha(s_n)[1 - F(w_n^*)]}. \tag{14}$$

Given the first order condition for s_n^*, this derivative is zero when $s_n = s_n^*$. Moreover $dw_n^*/ds_n > (<)0$ if $s_n < (>)s_n^*$. Differentiating with respect to w_n^* and m we obtain:

$$\frac{dw_n^*}{dm} = \frac{\rho + \alpha(s_l)[1 - F(w_l^*)]}{1 + \rho^{-1}\alpha(s_l)[1 - F(w_l^*)] + \rho^{-1}\alpha(s_n)[1 - F(w_n^*)]} > 0. \tag{15}$$

This derivative is positive for any value of s_n. A rise in the moving cost requires a higher wage to induce the homeowner to move for a job. We rewrite the first order condition for s_n^* as

$$\Psi(s_n^*, m) = c'(s_n^*) - \frac{\alpha'(s_n^*)}{\rho}\int_{w_n^*(s_n^*,m)}[w - w_n^*(s_n^*, m)]F'(w)dw = 0. \tag{16}$$

Applying the implicit function theorem we have[17]

$$\frac{ds_n^*}{dm} = -\frac{\Psi_m}{\Psi_{s_n^*}} = -\frac{\rho^{-1}\alpha'(s_n^*)\int_{w_n^*}\left(\frac{dw_n^*}{dm}\right)F'(w)dw}{c''(s_n^*) - \rho^{-1}\alpha''(s_n^*)\int_{w_n^*}(w - w_n^*)F'(w)dw} < 0. \tag{17}$$

The relation between s_n^* and m is negative for any value of m, thus, when m increases from zero to a positive number the unemployed will reduce search in the non local labour market from s_r^* to s_n^*.

The rationale of this proposition is straightforward. When the unemployed has to face a cost of moving to accept a job offer far from home, he search less outside and centres his effort on the local area to reduce the probability of incurring this cost[18]. Whether or not the homeowner search in general less than the renter depends on the balance of these two opposite effects, whose net result can be identified within this framework, unlike

[17] In the computation of $\Psi_{s_n^*}$ we make use of the fact that $dw_n^*/ds_n = 0$ when $s_n = s_n^*$. The sign of Ψ_m is positive since $dw_n^*/dm > 0$.

[18] Commuting would be another mechanism which implies that homeowners may search locally more than renters. Given the higher costs of moving, homeowners would be willing to commute longer so that their local labour market would be larger. Anyway, no major changes would take place for our purposes if we allowed for commuting in this set-up.

in Munch et al. [2006]. Before to tackle this point, we show the relations between the reservation wages of homeowners and renters in both markets, which is the counterpart of proposition 1. That is stated in the following proposition[19]:

Proposition 2 $w_l^* < w_r^* < w_n^*$.

Proof: We only need to look at the first order conditions (4), (5), (8), (9) and to remark the result of Proposition 1 and that $c'(\cdot)/\alpha'(\cdot)$ is an increasing function.

$$w_l^* < w_r^* \longleftrightarrow B > A \longleftrightarrow \frac{c'(s_l^*)}{\alpha'(s_l^*)} > \frac{c'(s_r^*)}{\alpha'(s_r^*)} \longleftrightarrow s_l^* > s_r^*,$$

$$w_n^* > w_r^* \longleftrightarrow C < A \longleftrightarrow \frac{c'(s_n^*)}{\alpha'(s_n^*)} < \frac{c'(s_r^*)}{\alpha'(s_r^*)} \longleftrightarrow s_n^* < s_r^*.$$

In order to compare the total search level of the homeowner and the renter, that is the impact of housing tenure on search, we just have to compare the sum of search levels in the local and in the non local market for both. The search level of the homeowner will be higher, equal or lower than that of the renter as far as $s_l^* + s_n^* \gtreqless 2s_r^*$. The only thing which differentiates the homeowner from the renter is the moving cost, so we may expect that an increase of the moving cost from zero to a positive number, which represents just a shift from renter to owner tenure, comes with a reduction of the total search. The rationale is that, although this cost is incurred only if the homeowner actually moves, it increases the *expected* cost of search, which in turn makes unemployment more valuable. Thus, despite the incentive to search harder locally, this expected cost has to be covered by an extra reduction in the non local search (from s_r^* to s_n^*) with respect to what would be needed to compensate the increase in the local search (from s_r^* to s_l^*). The following proposition supports this insight:

Proposition 3 $2s_r^* > s_l^* + s_n^*$.

Proof: Since we cannot derive a closed form for the optimal search levels, the device of the demonstration is to study the derivatives of s_l^* and s_n^* with regards to m evaluated at $m = 0$. In fact, when $m = 0$ the optimal search is identical in both the local and non local markets, so by deriving the optimal search levels with respect to m we can compare the magnitude of the (opposite) marginal variations, which can be interpreted simply as "marginal"

[19]This result is the same of what Munch et al. [2006] obtain in a model of search very similar to ours except that they do not endogenise search effort.

differences in each market's search levels between homeowner and renter. Then we just need to show that the magnitude of the marginal decrease in the non local search is higher, in absolute terms, than the marginal increase in the local search. Let's look at equations (13) and (17) which represent the marginal variations of the homeowner's local and non local search respectively. When $m = 0$, we have $s_l^* = s_r^* = s_n^*$ thus the two derivatives are identical expect for the derivatives of the reservation wage in the numerator, which have opposite sign:

$$\frac{ds_l^*}{dm}(m=0) = -\frac{\rho^{-1}\alpha'(s_r^*)\int_{w_r^*}\left(\frac{dw_l^*}{dm}(m=0)\right)F'(w)dw}{c''(s_r^*) - \rho^{-1}\alpha''(s_r^*)\int_{w_r^*}(w-w_r^*)F'(w)dw}, \tag{18}$$

$$\frac{ds_n^*}{dm}(m=0) = -\frac{\rho^{-1}\alpha'(s_r^*)\int_{w_r^*}\left(\frac{dw_n^*}{dm}(m=0)\right)F'(w)dw}{c''(s_r^*) - \rho^{-1}\alpha''(s_r^*)\int_{w_r^*}(w-w_r^*)F'(w)dw}. \tag{19}$$

Making use of equations (11) and (15) we can evaluate the derivatives of the reservation wages at the optimal values of search when $m = 0$:

$$\frac{dw_l^*}{dm}(s_r^*, m=0) = -\frac{\alpha(s_r^*)[1-F(w_r^*]}{1+\rho^{-1}\alpha(s_r^*)[1-F(w_r^*)]+\rho^{-1}\alpha(s_r^*)[1-F(w_r^*)]}, \tag{20}$$

$$\frac{dw_n^*}{dm}(s_r^*, m=0) = \frac{\rho+\alpha(s_r^*)[1-F(w_r^*)]}{1+\rho^{-1}\alpha(s_r^*)[1-F(w_r^*)]+\rho^{-1}\alpha(s_r^*)[1-F(w_r^*)]}. \tag{21}$$

It is easy to show that $\rho > 0$ implies $\frac{dw_n^*}{dm}(s_r^*, m=0) > |\frac{dw_l^*}{dm}(s_r^*, m=0)|$, which in turn implies $|\frac{ds_n^*}{dm}(m=0)| > \frac{ds_l^*}{dm}(m=0)$. This means that, for small m, the difference in the non local search between homeowner and renter is higher, in absolute value, than the difference in the local search, that is $s_r^* - s_n^* > s_l^* - s_r^*$, which rearranging is identical to the proposition. This holds for every m so the proposition is proved.

Unlike the model of Munch et al. [2006], but like Van Vuuren and Van Leuvensteijn [2007], we can make clear predictions also on the whole job finding rates of the homeowner and the renter[20]. The renter's job finding rate is two times $h_r = \alpha(s_r^*)\,[1 - F(w_r^*)]$, which is the common job finding rate for both

[20]Van Vuuren and Van Leuvensteijn [2007] show that in the model of Munch et al. [2006] the hazard rate to exit unemployment for homeowners is unambiguously lower than that for renters. Anyway, in the generalized version of the model Van Vuuren and Van Leuvensteijn [2007] allow for differences in the unemployment benefit duration between homeowners and renters which brings non-stationarity into the model of Munch et al. [2006]. In particular they assume that homeowners receive benefits for only T periods of unemployment, while renters receive benefits for the whole unemployment spell. This implies a reduction in the relative reservation wages of homeowners from T onwards. As a consequence, though homeowners have higher exit rates from unemployment than renters

markets, while the owner's job finding rate is the sum of $h_l = \alpha(s_l^*)\,[1 - F(w_l^*)]$ and $h_n = \alpha(s_n^*)\,[1 - F(w_n^*)]$, which refer respectively to the local and to the non local market. In order to compare job finding rates, we first point out that, given Propositions 1 and 2, $h_l > h_r > h_n$. Thus, unemployed living in owner-occupied accommodation are expected to have a higher exit rate from unemployment towards jobs which require a move, but a lower exit rate towards employment in the local labour market. The main mechanism of the Oswald's hypothesis works in this setup, since homeownership reduces the chances to find an acceptable job far from home by hampering residential mobility. Can we also state that renters have a higher exit rates than homeowners *in general*? This is the case if $2h_r > h_l + h_n$, which again can be showed to be true within this framework. The logic of the demonstration is similar to that of Proposition 3 and relies on its results.

Proposition 4 $2\alpha(s_r^*)\,[1 - F(w_r^*)] > \alpha(s_l^*)\,[1 - F(w_l^*)] + \alpha(s_n^*)\,[1 - F(w_n^*)]$.

Proof: We just need to prove the negative sign of the derivative of $(h_l + h_n)$ with respect to m at the optimal values of search when $m = 0$. Defining $\frac{dw_l^*}{dm}(s_r^*, m = 0) = L^w$, $\frac{dw_n^*}{dm}(s_r^*, m = 0) = N^w$, $\frac{ds_l^*}{dm}(m = 0) = L^s$ and $\frac{ds_n^*}{dm}(m = 0) = N^s$, we have:

$$\begin{aligned}\frac{d(h_l + h_n)}{dm}(s_r^*, m = 0) &= \alpha'(s_r^*)\,[1 - F(w_r^*)]\,L^s - \alpha(s_r^*)F'(w_r^*)L^w + \\ &+ \alpha'(s_r^*)\,[1 - F(w_r^*)]\,N^s - \alpha(s_r^*)F'(w_r^*)N^w = \\ &= \alpha'(s_r^*)\,[1 - F(w_r^*)]\,(L^s + N^s) - \alpha(s_r^*)F'(w_r^*)(L^w + N^w) < 0,\end{aligned} \tag{22}$$

where the latter inequality holds since $(L^s + N^s) < 0$ and $(L^w + N^w) > 0$, which are results of Proposition 3.

To conclude, the theoretical section delivers us a clear message: mobility costs imply lower search and exit rates from unemployment for homeowners, thus the local versus non local search explanation is not able *alone* to revert the argument underlying the Oswald effect. In the empirical section we will provide some evidence for this by abstracting from the role of housing costs.

in the local labour market, the reverse is no more necessarily the case in the non local labour market. Thus, as long as the benefit exhaustion assumption holds, the model of Van Vuuren and Van Leuvensteijn [2007] yields ambiguous results as in Munch et al. [2006] pointing out the need for empirical research. But whit no unemployment benefit exhaustion, as in the stationary framework of Munch et al. [2006] and in the ours, this indeterminacy is eliminated.

3 Methodology and Data

We draw our data set from the British Household Panel Survey (BHPS), a nationally representative annual panel survey which has been carried out continuously since 1991. A random sample of around 5,500 households, accounting for around 10,000 adult members, was drawn at the start of the survey, then all residents of those households were traced and re-interviewed each year up to now. Each wave there are flows in and out of the survey, so the panel is highly unbalanced[21]. At time of writing the last wave released refers to 2007, so we have 17 waves at our disposal.

The BHPS contains detailed information about the economic activity status of an individual. We focus on the group of non-employed, that is people who state not to have a job, and among these we distinguish between unemployed and people out of the labour force, the first being essentially job seekers and the second non-job seekers. Our definition of unemployment is similar but not identical to the standard ILO definition. We classify as unemployed those without a job who have been looking for work in the last four weeks, which is one of the two ILO's requirements, but, unlike the second, we do not drop out of the pool people who are not available to start a new job within the following two weeks[22]. The BHPS provides two different measures of job search intensity for unemployed. On the one hand, they are asked whether they searched for work in the last week or in the last four. On the other hand, they are asked which search methods they used so we can derive the total number of methods (from 0 to 5). We use these categorical measures as dependent variables and we regress them on the housing tenure dummies controlling for several individual (or household) characteristics[23].

Since our dependent variables are categorical, either binary or ordinal, we run non linear panel regressions, using in particular a random effects probit model[24]. Unfortunately it is very problematic to perform a fixed effects

[21] If a member of the original sample drops off the original household, all adult members of his new households will also be interviewed. Moreover, the original sample has been supplemented with a number of "boost" groups, including major additional subsamples from Wales and Scotland (1999 onwards), and Northern Ireland (2001 onwards). Many people out of the original sample and out of those who are subsequently added, may drop off the survey due to various reasons such as move abroad, death, co-residents of original sample members who no longer live with a sample member and so on.

[22] The problem is that the related question is asked only since wave 6.

[23] See Wadsworth [1991] for a reduced form estimation of search intensity measures on data drawn from the UK Labour Force Survey. He used as dependent variable the number of search methods too, but in a simpler econometric set-up. See also Schmitt and Wadsworth [1993] and Gregg and Wadsworth [1996]

[24] The motivation for using non linear rather than linear models for categorical dependent

analysis for non linear models such as probit or logit. This is due to the so called "incidental parameters problem" which prevents to consistently estimate the parameters of the index function along with the individual effects when the number of cross sections is small[25]. While a solution to get consistent estimates for fixed effects logit models has been found (see for example Chamberlain [1980]), this is not the case for the fixed effects probit. The usual device is to find a sufficient statistic for the unobserved effects which allows these to be conditioned out of the likelihood function. Such a sufficient statistic does not exist for the fixed effects probit. An unconditional fixed effects probit maybe estimated just plugging in a large number of individual dummies, but estimates would be biased[26].

Though fixed-T-consistent estimators have been derived for panel logit models, these methods have some drawbacks. In particular, given the way the sufficient statistic is build, only observations for individuals who switch status between two subsequent periods can be kept in the computation. Then they do not provide estimates for individual effects, thus precluding estimation of other quantities of interest such as marginal effects. Also, unlike the probit approach, these fixed effects logit models require a conditional serial independence assumption for consistency, which may be even less appealing when several time periods are available (see Wooldridge [2010], pag. 492). In the end, the random effects probit turned out to be the most reliable technique we have come up with, although of course it puts restrictions on the relation between the regressors and the unobserved effects. The choice of a panel rather than a pooled analysis is motivated by the better properties of the random effects model in the presence of unobserved heterogeneity, which is always detected by the likelihood ratio test of ρ in our regressions.

variables is typically that in the linear model the predicted probabilities are not guaranteed to lie in the unit interval. Moreover, in a panel setting the linear model would also require an unnatural assumption on the unobserved heterogeneity (see Wooldridge [2010]).

[25]See Wooldridge [2010] and Baltagi [2008] for an exhaustive treatment of estimation techniques and problems in applying panel models with a discrete dependent variable.

[26]See Fernándes-Val [2009] for a discussion of the magnitude of the fixed effects probit's bias. He argues that the magnitude of the bias of the marginal effects' estimates may be small for a range of distributions of regressors and individual effects, even for small T.

4 Empirical Results

4.1 Unemployed Sample

In our sample we can observe search measures only for unemployed, that is for those who searched for work in the last four weeks[27]. At first, we report estimates of random effects probit models for both of search measures within the unemployed sample. Then we discuss the sample selection bias issue which arises when inactive people, for whom search intensity is zero by definition, are excluded from the sample. In fact we can think of inactive people as workers who have chosen a degree of search intensity equal to zero due to the same set of variables which affect the search intensity of unemployed, at least after controlling for other characteristics which may be crucial in determining the choice of being out of the labour force, such as full-time education, retirement or disability. The final specification will thus include also inactive and the fairly larger sample will allow us to get more precise results[28].

Tables 1, 2 and 3 report estimates for the unemployed sample. The dependent variable used in Table 1 is a dummy which takes 1 if the unemployed searched in the last week and 0 if searched in the last 4 weeks but not in the last. Tables 2 and 3 report estimates which focus on the number of search methods, the former using an ordinal variable (from 0 to 5 methods), the latter grouping these numbers in a dummy which takes 1 for high numbers (3, 4 and 5 methods), and takes 0 for low numbers (0, 1 and 2 methods). The first two columns of each table refer to models which include the dummy *owner* for housing tenure, which pools both outright owners and mortgagers, while in models (3) and (4) we use two housing tenure dummies, *mortgager* and *outright owner*, in order to distinguish between these two categories: the coefficient of each of these dummies captures the difference in search between the category which names the dummy and the reference category, *i.e.* renters. In models (1) and (3) there is no control for housing costs, while in models (2) and (4) we add the housing costs variable in order to check how it affects the coefficients of the housing tenure dummies.

Table 1 shows that owners as a whole have a higher probability than renters to search in the last week. Anyway, in models which distinguish between the two owners categories we see that this difference is driven by the higher probability of mortgagers, while there is no significant difference between outright owners and renters. Housing costs have a positive impact

[27]We restrict the sample to people in working age, *i.e.* males in age range 16-64 and females in age range 16-59.

[28]See the appendix for a description of the variables selected.

on search as expected, but the effect is not significant when we allow for the *mortgager* dummy (see column 4). Moreover, when we add the housing costs variable to model (3), the coefficient of *mortgager* slightly drops while the coefficient of *outright owner* slightly increases. These results are even more evident when we look at search methods. Table 2 gives perhaps more precise results since it exploits all the variation in the number of search methods. In fact *owner* and *mortgager* dummies are highly significant confirming that the difference in search between owners and non owners is explained only by the higher search of mortgagers. Housing costs are again significant in model (2) but not in model (4).

Unfortunately, since coefficients reported in Table 2 are just the coefficients of the probit's index function, they do not have a straight meaning in terms of magnitude, although they give information on the direction and on the statistical importance of the effect. For ordered probit models like this one might report the marginal effects on the probability of being in each of 6 statuses but it would be confusing, so we prefer to look at Table 3 to have an idea of the magnitude of the effects. In column (4) of Table 3 we see that the probability of using a large number of methods for mortgagers is around 10 percentage points higher than renters, which is very close to the effect we get when we use the last-week/last-4-weeks variable in Table 1. Moreover, a 1% rise in housing costs increases this probability by 4 points, while the effect in Table 1 is 2.5 points (for money variables such as housing costs and equivalized income we always report semi-elasticities)[29]. There are also several significant and interesting effects from other variables which we prefer to discuss later when we deal with a larger sample.

4.2 Whole Sample

The analysis so far focuses on the unemployed sample, but we argue that estimates are biased unless we allow also for inactive people. Search behaviour does not concern only the choice of the degree of search, but also the choice of searching or not in the first place. For some individuals the outcome of the set of variables we have allowed for may be no search in the last four weeks, which means that these drop out of the unemployed sample. This is a clear example of non-random sample selection, which results in biasing estimates on the sub-sample. In order to account for individuals who self-select in inactivity we replicate the same analysis as above for the overall sample, that is unemployed plus inactive.

[29]For model (4), the housing costs variable is significant only in Table 3, though mildly, while in Table 1 and 2 it is very close to significance.

Anyway, this strategy must be tackled carefully since the choice of being inactive depends also on other reasons than those which influence the search optimization process, such as housing tenure for example. In fact, for individuals in working age who are simply not interested in work, the choice between unemployment and inactivity cannot be interpreted as a matter of choice about the intensity of search. In order to distinguish within the inactive sample between these individuals and those who would be interested in working but have set their search level to zero, we use controls for retirement, full-time education and incapability to work, which should account for most of the reasons for individuals not being involved in a search choice process.

Table 4 reports estimates of the baseline models when we use the larger sample of unemployed plus inactive and the dependent variable is a dummy for the status. Since these models include also the three controls, coefficients of the other variables should actually capture the effect on the search choice for individuals who are actually involved in the search choice process. As expected, all of these controls are highly significant and have a very strong impact. Interestingly, outright owners are far less likely to search than renters, while typically there are not significant differences in search intensity when unemployed as shown before. Thus the mobility effect of homeownership seems to work by reducing the attachment to the labour market of outright owners rather than by reducing their search intensity relative to renters.

One alternative strategy to allow for purely inactive individuals, may be to drop people who are in full-time education, who get retirement pension or get disability benefits. Anyway this strategy does not seem very promising since the percentage of people in each of these statuses who are actually inactive is not as high as one may expect. As Table 5 shows, more than a half of people in full-time education or getting a retirement pension can be job seekers or even employed, while for people on disability benefits this is the case for at least 15%. Since a non negligible portion of these people seem to be able to look for work or even to have a job, it is reasonable that their search behaviour may be influenced by also other reasons than being in that status, which arguably are the same which affect the degree of search intensity of job seekers, such as housing tenure. We thus include in the sample all inactive people setting their search effort equal to zero[30].

Tables 6, 7 and 8 report results when we pool unemployed and inactive. In models of Table 6 we just add the inactive category to the two used in the dependent variable of Table 1: the dependent variable has now three

[30]People who have not searched in the last four weeks may have searched, for example, 5 or 6 weeks before, but since we cannot observe these measures we set search to zero for all of them.

categories so an ordered probit is required for estimation. Table 7 and 8 correspond to Table 2 and Table 3 respectively, except that in the 0 methods group we include also inactive people.

These three Tables conceive the same information on the differences in search activity by housing tenure, confirming part of the results found within the unemployed sample. The difference in search between homeowners as a whole and renters is positive and not strongly significant, but this is clearly the result of the balancing of two opposite effects as the models in column (3) and (4) highlight: on the one side, mortgagers search more than renters, but on the other side, outright owners search less. In fact, the coefficient of *outright owner* is negative and strongly significant in Table 6 and 7[31], which is in line with results of Table 4 but at odds with results drawn from the unemployed sample. Thus it appears that among unemployed there is not a relevant difference in search intensity between outright owners and renters, but once we allow for the effect of housing tenure on the choice to search, the difference gets negative and significant. To have an idea of the magnitude of the effect, in column (4) of Table 8 is shown that outright owners are less likely than renters by 10 percentage points to use a high number of search methods.

Are these differences in search intensity driven by mobility or by housing costs? Something can be said by analysing the housing costs variable. Its coefficient is always positive and significant, which means that the higher the housing costs the higher the pressure to find a job thus the higher the search intensity. In particular, a 1% increase in housing costs implies 3.3 points more in the probability of using a high number of search methods (see Table 8, model 4). Typically, the housing costs effect decreases and is fairly less significant when we split the *owner* dummy in two dummies[32]. In fact, when mortgagers and outright owners are pooled as in model (2), the variation in search due to the difference in their individual characteristics is left unexplained, and this effect is captured by the housing costs variable. Moreover, when we add the housing costs variable in the model with two housing tenure dummies, the coefficient of *mortgager* drops while that of

[31]In model (4) of Table 8 this coefficient is significant only at a 10% level, but here the effect cannot be captured as precisely as when all the variation in the number of search methods is exploited

[32]This is clear both in the unemployed sample, as discussed above, and in the non-employed sample. Reported coefficients In Table 6 and 7 are just those of the index function, so we cannot state how large is an effect though we can state if the effect of a variable is larger in a specific model. The coefficient of housing costs is always 0.0 in these Tables (since we are measuring the effect of an only one pound increase in the variable) thus the lowering of the size from model (2) to model (4) cannot be identified. Anyway, if we look at omitted decimals we can state that this is the case for both Tables.

outright owner increases; clearly, since mortgagers and outright owners have, respectively, higher and lower housing costs than renters, if we omit the housing costs variable the coefficient of the former is biased upwards while the coefficient of the latter is biased downwards, given the positive effect of housing costs on search. Anyway, the change in these coefficients whenever we add the control for housing costs is always slight and the signs are never reverted: this means that housing costs matter but also that much of the search differentials are still unexplained.

To sum up, it appears that renters search more than outright owners since they have housing costs to cope with, but whenever we control for this effect, the differential in search is still high which is probably due to renters' higher mobility. This negative differential in search between outright owners and renters is precisely what the Oswald effect calls for. Right here comes the reconciliation between theory and evidence argued in the title. In fact, on the one hand, our theoretical model confirms the old idea that the lower mobility of homeowners implies lower search effort, *once we abstract from the role of housing costs*. On the other hand, we observe in the data, even after controlling for housing costs, higher search measures for renters than outright owners, for whom the mobility effect is the only one operating, and even at its maximum.

4.3 Social vs Private Renters

Anyway, given that mobility matters, we would not expect also that mortgagers search more than renters whenever we net out the housing costs effect. One partial explanation for this counterintuitive finding can be sought in the nature of rent. In fact, when comparing renters to the other categories we should be aware that renters' search outcome may be different between social and private renters, since the former may actually be less prone to move for job reasons due to lock-in effects similar to those which hamper homeowners' mobility[33]. In our whole sample of non-employed, 73% of renters occupy social housing, thus our analysis so far may be seriously confounded unless social housing does not hamper mobility. In order to control if the "lock-in" effect of social housing really matters, we replicate the previous estimations splitting the renter sample in two distinct groups. In particular, we add a dummy for social renters to the specification with the housing costs variable and with dummies for outright owners and mortgagers. The omitted group

[33]Moreover, social renting comes at below market rent or even rent-free. In our whole sample of non-employed, 48% of social renters pay zero rent. Anyway this effect on search differentials should be captured by the housing costs variable.

consists of private renters, thus the coefficient of the groups included is to be interpreted as the search differential with respect to them.

Table 9 reports results for five of the regressions previously discussed: each regression is identical to that of the correspondent Table except for the social renter dummy. The first two models use the unemployed sample and refer to the dummy for search last week or last 4 weeks, and to the number of search methods variable, respectively (see Table 1 and Table 2 respectively). Again, when unemployed, mortgagers search more than every other category notwithstanding the control for social housing, while there are no significant differences among the other categories. But if we look at regression III, which models the probability of being a job seeker, we notice that the difference between mortgagers and private renters disappears, while both social renters and outright owners are less likely to be unemployed than private renters. These results are confirmed in the subsequent two models which account also for the different degree of search among unemployed. Moreover, the hypothesis that the coefficients of the three housing tenure dummies are identical in pairs are strongly rejected, which means that we can identify a clear pattern of search effort levels: (1) private renters search as much as mortgagers; (2) mortgagers and private renters search more than both social renters and outright owners; (3) social renters search more than outright owners. Anyway, we remark that this pattern of search behaviour work through a different degree of attachment to the labour market, while the results within the unemployed sample are not clear cut.

In conclusion, the distinction between social and private renters can at least in part explain why the difference in search between mortgagers and renters as a whole is so high. But it is still unexplained why mortgagers, who are homeowners, are the category with the highest search measures. In the first place, we should take into account that the mobility effect for some mortgagers may be not as strong as that for outright owners (and social renters). In fact it seems reasonable to believe that outright owners have a stronger attachment to the accommodation since time spent in the current accommodation should be longer on average and since they may have higher transaction costs for moving home. With regards to the housing cost effect, some possible explanations may be that the housing costs variable of the BHPS has some measurement errors, or that it cannot capture what increases the search of mortgagers relative to renters who pay the rent. However, the most likely explanation is that the pressure to pay the mortgage is far higher than the pressure to pay the rent and this different pressure may not be simply captured by treating housing costs in the same way for both.

4.4 The Effect of the Other Covariates

In order to shed some light on the reliability of our conclusions, we discuss now the estimated effects of the economic and demographic variables on search effort. Estimates are consistent with economic interpretation, which is a valid signal of the goodness of our specification. We refer to results of Table 9 as models reported here distinguish among all of the housing tenure categories, and allow for housing costs. In particular we select model V since the dependent variable is the most precise. Moreover, if we look at model V in combination with models II and III, we can also understand whether the impacts work through an influence on labour force participation, on the intensity of search, or on both.

Variables which increase the reservation wage imply lower search, hence, as expected, the effect of the household income is negative and the effect of the variable which captures the perceived individual's financial situation is positive, where a higher value means a worse situation. More educated workers search more than less educated or with no qualifications, as education increases the probability of finding a job and the return from employment. Females search less than males due to the lower participation to labour market, but this effect is clear even within the unemployed sample. Individuals who live in households within which there is at least one dependent child search less, but the effect is not significant: in theory, the need to look after children may affect labour force participation of at least one household member, who is typically a female (no wonder, this effect is significant in model III). The fact that this effect should work mainly for females and not for males, may explain why the coefficient is not significant given that we include a dummy for gender[34].

Search intensity drops as the number of household members rises. In theory the effect of the household size on search activity should work through the influence on the household income, but as our measure of household income is scaled controlling for the number of members, this effect should no more appear in the household size variable. So this variable is probably capturing a residual effect not accounted for by the scaling of the household income or by other variables related to the household size.

The effect of age on search is negative and monotonic, given that prime-age workers search more than older and less than younger ones. The rationale is that the return from search is lower the lower the time horizon. However, while the effect of the elderly dummy is very strong, the difference between young and prime-age workers is typically smaller (see Table 8), given that

[34]Wadsworth [1991] found a negative and significant effect on search in the sample of females, while the effect was not significant in the sample of men.

workers at the start of their career may experience some inactivity spells[35]. The duration effect is very clear: the higher the duration since last job the lower search effort due to the deterioration of skills and the discouragement effect[36]. People who have never had a job search less than those with low duration, but their coefficient is not as high as that of the last category since some of them may be young workers about to enter the labour market with strong motivations.

The dummies which capture the relationship with the head of household show that children search more than the head of household and his/her partner, and that between the latter there is no difference (see the appendix for the groupings in these dummies). In theory we should expect that more responsible members, *i.e.* those with stronger commitments to the home or the household, search more, thus it appears strange that children are more active in the job search. However, this does not imply that the commitment effect is not operating once we take into account that a not negligible percentage of head of households live alone within the household (11% within the non-employed sample), for whom commitments are definitely lower, and that the *child* dummy may be capturing part of the negative effect of age. Moreover, it is worth pointing out that in the unemployed sample the sign of the *child* dummy is negative, which means that the positive coefficients in the whole sample reflects a higher attachment to the labour market for children rather than a stricter job search behaviour.

Unemployed benefit claimants search more than non-claimants and the effect is strongly significant in all models we tested. It can be argued that claimants are able to keep closer ties with the labour market due to the financial support (see Wadsworth [1991]). However, there is also a reverse causality issue: non-employed who search more are more likely to meet the requirements for the benefit eligibility. This channel is even more important from 1996, when the UK Jobseeker's Allowance was introduced[37].

To conclude, one concern about the reliability of the estimated difference in search between renters and outright owners may arise. In the literature it has been argued that housing tenure may be endogenous since it may be

[35]These findings are similar to those of Wadsworth [1991]. He found that old workers search significantly less than their prime-age counterparts, and that young workers search more if males and less if females, though the latter two effects are not significant.

[36]These findings partly disagree with those of Wadsworth [1991], who found a hump-shaped relation in the sense that search effort increases in the initial stages of unemployment and then drops.

[37]The Jobseekers' Allowance involved notable tightenings of search criteria which have to be met for the unemployment benefit eligibility. See Manning [2009], Petrongolo [2009] and **?**

correlated with unobservable factors which in turn help determine labour market outcomes. For example, individuals may self-select housing tenure on the ground of their intrinsic mobility, as well as of their greater desire to retain proximity to family members or friends, so that people who are more mobile may prefer to chose rented accommodations. Moreover, housing tenure choice may be influenced by unaccounted wealth effects or unobserved skill gaps which as well increase search intensity. Depending on which are the most important sources of endogeneity, the true differences in search between residential statuses may be larger or smaller than what we estimated. Unfortunately, if one is willing to exploit the panel dimension of data at hand, there is not a simple way to control for endogeneity in this econometric set-up given that the fixed effects analysis for discrete response models is not well developed.

5 Conclusion

This paper has investigated the old argument that homeownership reduces exit rates from unemployment by hampering residential mobility, which is known under the name of Oswald's effect. While the empirical literature on this point has confirmed that unemployed homeowners are less prone than renters to move for job reasons, the typical finding is that homeowners have lower unemployment duration, which is exactly the reverse of the Oswald hypothesis. By exploring the reasons for these falsifications of the Oswald hypothesis, we provide a more refined empirical evidence which is consistent with the underlying theory.

At first, we develop a search theory which is in accordance with the Oswald effect. In particular this model overcomes an ambiguity which may arise in models which distinguish between local and non local labour markets. In these models homeownership reduces the job finding rate in the non local labour market but it increases the local job finding rate, so that the latter effect may dominate empirically. By allowing for endogenous search we show that, as net result, homeownership unambiguously reduces the optimal search and the job finding rate.

Then, in the empirical analysis we allow for housing costs and for the different nature of tenure, both among owners and among renters, in order to point out the true effect of owners' lower mobility. In particular, within the homeowners' group we distinguish between outright owners and owners who pay the mortgage, and within the renters' group we distinguish between social and private. Once the housing costs effect is controlled for, the results show that, while homeowners search more than renters as found in the earlier

literature, outright owners alone search less than renters, and the difference is even higher when we compare them to private renters. This difference works mainly through a lower attachment to the labour market of outright owners, while there are not significant differences within the unemployed sample.

Housing costs work in the expected direction, though the effect is not as strong as expected. Moreover, once we control for housing costs, mortgagers have a similar search to the supposed more mobile private renters, which means that the higher level of housing costs cannot explain alone why mortgagers search so much. The most likely explanation is that the pressure to pay the mortgage is far higher than the pressure to pay the rent and this pressure cannot simply be captured by treating housing costs in the same way for both.

In brief, we argue that tests of the Oswald hypothesis which compare homeowners and renters as if they were two distinct groups are misleading, since some individuals who belong to one of these share common features with some individuals belonging to the other. If we group individuals in only two different categories the empirical effect is confounded, but if we allow for proper distinctions, some evidence in favour of the Oswald hypothesis can be provided.

Appendix. Description of Variables

Housing Tenure dummies

Housing tenure related questions refer to the household. Then the outcome of the household is imputed to all individuals belonging to it at the date of interview.

owner: selects all individuals whose household owns the accommodation, either outright or with mortgage.

mortgager: accommodation owned with mortgage.

outright owner: accommodation outright owned.

renter: accommodation rented.

social renter: accommodation rented from Local Authorities or Housing Associations.

private renter: accommodation rented from private.

Housing costs

Measures net monthly mortgage or rent costs as paid in the last month instalment. For renters who receive housing benefit, either partial or complete, includes the rent after the rebate. Variable is zero for houses rent free or owned outright. This is an household variable, so the housing costs for the household are imputed to all individuals within it at the date of interview. As all monetary variables, this is adjusted for inflation using a Retail Prices Index (the czbh series at the ONS web site).

Equivalized household income

As household income we use the sum of the gross individual incomes perceived last month. It is a gross variable in that we refer to incomes before deductions for income tax, NI, pension contributions and local taxes have been made. For each household income we apply the McClements' scale factor to account for the effects of household size and composition on needs in making income comparisons. Thus the effect of our equivalized income measure should not be sensitive either to the household size or to its composition.

Household size

Number of people living within the household at the time of interview.

Dependent child

This is a dummy for households with at least one dependent child, that is those up to 18, if they are still in (non-advanced) full-time education.

Claimant

This is a dummy for people claiming unemployment-related benefit. On the 7th October 1996 it was introduced the Job Seeker's Allowance who replaced the old unemployment benefit system. With JSA unemployed can claim both cont-JSA, which replaced the old contribution-based Unemployment Benefit (UB), and inc-JSA, which replaced the old retributive element, *i.e.* Income Support for unemployed. While after 1996 there is a clear question which asks directly if the respondent is claiming JSA (whether cont-JSA or inc-JSA), before that it is more complicated to identify claimants for the retributive element, since the question on income support benefits is general and does not specify the reasons for the claim. The strategy is thus to count in the unemployment benefit claimants pool also people who get income support, both before and after JSA. Of course this has the shortcoming that also people who get IS for reasons other than unemployment (for example since they have just low income) are counted as unemployment benefit claimants. But it is not so problematic for our analysis, given that the effect on search effort of the unemployment benefit may be similar to that of income-related benefits, which may be lost as well when the unemployed finds a job and his income rises.

Financial Situation

This variable captures a subjective evaluation of respondent financial situation. Precisely it refers to the question: "How well would you say you yourself are managing financially these days?". The responses may be five, where the higher is the number, the worse is the financial situation: (1) Living comfortably; (2) Doing alright; (3) Just about getting by; (4) Find it quite difficult; (5) Find it very difficult.

Age

The base age range in the regressions is 25-49, then we use dummies for young (16-24) and elderly (50-64) people. The sample is restricted to all people in working wage, that is 16-64 for males and 16-59 for females.

Disability Benefits

This is a dummy which selects people getting incapacity benefits or severe disablement allowance. In 1996 the incapacity benefit assembled under a unified system invalidity and sickness benefits.

Pension

This dummy takes one if respondent gets NI retirement pension or private pension or annuity.

Full-time education

This dummy identifies people who are in full-time education.

Relation with head of household

This identifies the relation between the respondent and the head of household. The BHPS uses the concept of Household Reference Person (HRP), defined as the person legally or financially responsible for the accommodation, or the eldest of two people equally responsible. The head of household (hoh) is defined in general (for example by the General Household Survey) as the principal owner or renter of the property, where (if there is more than one) the male takes precedence, and (if there is more than one potential hoh of the same sex) the eldest takes precedence. The BHPS HRP definition is similar except that only the age criterion is used to distinguish multiple potential HRPs. In our analysis we use the hoh definition which requires only minor replacements by sex with respect to the HRP definition. We identify three other categories: (1) lawful spouse or live-in partner; (2) children: hoh's child (natural, adopted, foster, step-child), partner's child, daughter/son-in-law, any grand-child, any nephew; (3) other living within the household, whether or not member's relatives. The base group in the regressions is made of head of households, then we include 3 dummies in the regression to control for the other categories.

Duration since last job

We created five categories depending on time past since last occupation: from now to 6 months ago, from 6 to 12 months, from 1 to 3 years, from 3 years or more, and the last refers to people who have never had a job. The base category in the regressions is the first.

Education

These are 7 levels of education attained: (1) first or higher degree; (2) HND, HNC, teaching qualification; (3) GCE a level; (4) GCE o level;

(5) cse; (6) other qualification; (7) no qualification. The base category is the last.

Regional dummies

Regions are 19: (1) Inner London; (2) Outer London; (3) Rest of South East; (4) South West; (5) East Anglia; (6) East Midlands; (7) West Midlands Conurb (8) Rest of West Midlands; (9) Greater Manchester; (10) Merseyside; (11) Rest of North West; (12) South Yorkshire; (13) West Yorkshire; (14) Rest of Yorks & Humber; (15) Tyne & Wear; (16) Rest of North; (17) Wales; (18) Scotland; (19) Northern Ireland.

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Tables

Table 1

UNEMPLOYED: SEARCH LAST WEEK OR LAST 4 WEEKS

	(1)	(2)	(3)	(4)
owner (out. or mort.)	9.1**	7.6*		
mortgager			11.2**	9.1*
outright owner			1.7	3.3
housing costs		3.1*		2.5
equivalized hh income	1.1	-0.0	0.7	-0.1
hh size	0.3	-0.1	0.3	-0.1
dep. child	-0.3	-0.3	-0.7	-0.6
claimant	18.3***	18.9***	18.4***	18.8***
financial sit.	7.3***	7.0***	7.2***	7.0***
female	-8.8**	-9.0***	-8.6**	-8.9**
young (16-24)	-7.1	-7.7	-7.3	-7.8
elderly (50-64)	7.7	8.3	9.3	9.0
disability benf.	-26.0***	-25.4***	-25.9***	-25.4***
pension	46.0	46.8	46.4	46.8
full-time education	-35.4***	-36.9***	-35.7***	-36.8***
relation with HoH				
spouse or live-in partner	-0.6	-0.4	-0.8	-0.5
child	12.8**	14.4**	13.7**	14.6**
other	2.8	-3.7	3.1	0.3
duration since last job				
6-12 months	-15.2**	-15.2**	-15.2**	-15.2**
1-3 years	-21.3***	-20.6***	-21.0***	-20.5***
3 years or more	-30.0***	-29.4***	-29.9***	-29.4***
never had job	-11.5*	-11.0*	-11.4*	-10.9*
education				
1st degree or higher	21.9***	22.2***	22.5***	22.8***
hnd, hnc, teaching qf	14.1	12.9	14.4	13.3**
a level	12.1*	11.0*	12.3**	11.3*
o level	14.4***	14.5***	14.5***	14.6***
cse	5.3	5.0	5.0	4.9
other qlf	2.3	1.7	2.3	1.8
regional dummies	✓	✓	✓	✓
time dummies	✓	✓	✓	✓
number of observations	7124	7062	7124	7062
ρ	9.8***	9.1***	9.8***	9.1***

Notes:

1. * significant at 10%; ** significant at 5%; *** significant at 1%.
2. The Table reports marginal effects (at regressors means) from the random effects probit. Coefficients are expressed in percentage points, expect for housing costs and equivalized household income for which we report semi-elasticities.
3. Sample: people in working age without job who searched in last four weeks. Dependent variable: search in the last week or in the last four but not in the last. The last row reports the likelihood ratio test for the presence of unobserved heterogeneity; the ρ statistic is the portion of variance of the composite error due to the variance of the unobserved heterogeneity.
4. For dummies which capture the relation with the head of household, the omitted category is just the head of household; for duration since last job dummies it is from 0 to 6 months ago; for education dummies it is no qualification.

Table 2

UNEMPLOYED: SEARCH METHODS

	(1)	(2)	(3)	(4)
owner (out. or mort.)	14.3***	13.1***		
mortgager			17.3***	15.3***
outright owner			3.8	6.7
housing costs		0.0**		0.0
equivalized hh income	0.0	0.0	-0.0	-0.0
hh size	-0.5	-0.5	-0.6	-0.5
dep. child	-5.9	-5.5	-6.5	-5.9
claimant	26.9***	28.2***	27.2***	28.1***
financial sit.	10.2***	10.1***	10.1***	10.0***
female	-24.7***	-24.4***	-24.5***	-24.3***
young (16-24)	11.4**	11.1**	11.2**	11.0**
elderly (50-64)	-17.9***	-15.9**	-15.7**	-14.8**
disability benf.	-35.3***	-34.1***	-35.1***	-34.1***
pension	54.6**	55.0**	56.3**	55.8**
full-time education	-44.6***	-45.2***	-44.9***	-45.1***
relation with HoH				
spouse or live-in partner	5.9	5.4	5.7	5.4
child	-11.4*	-10.5*	-10.2*	-10.1
other	-3.1	-6.1	-2.6	-5.2
duration since last job				
6-12 months	-26.4***	-25.9***	-26.4***	-26.1***
1-3 years	-31.2***	-31.0***	-31.0***	-31.0***
3 years or more	-56.3***	-55.2***	-56.1***	-55.3***
never had job	-29.3***	-28.7***	-29.3***	-28.6***
education				
1st degree or higher	24.9***	24.8***	26.0***	25.7***
hnd, hnc, teaching qf	15.3	13.5	16.1	14.2
a level	9.2	7.9	9.4	8.4
o level	11.0**	10.2*	11.2**	10.4*
cse	-13.7**	-14.2*	-13.8*	-14.3*
other qlf	2.1	1.9	2.2	2.0
regional dummies	✓	✓	✓	✓
time dummies	✓	✓	✓	✓
number of observations	4651	4591	4651	4591
ρ	19.0***	18.0***	19.1***	18.1***

Notes:

1. * significant at 10%; ** significant at 5%; *** significant at 1%.
2. The estimated model is a random effects ordered probit. The calculation is run by using the `reoprob` Stata package. Reported coefficients are those of the index function thus do not have a straight economic interpretation.
3. Sample: people in working age without job who searched in last four weeks. Dependent variable: number of search methods, 6 categories (0-5). Since the question on search methods is asked only since 1996, the sample shrinks to 12 waves, that is from 6 to 17 waves. The last row reports the likelihood ratio test for the presence of unobserved heterogeneity; the ρ statistic is the portion of variance of the composite error due to the variance of the unobserved heterogeneity.
4. For dummies which capture the relation with the head of household, the omitted category is just the head of household; for duration since last job dummies it is from 0 to 6 months ago; for education dummies it is no qualification.

Table 3

UNEMPLOYED: DUMMY FOR SEARCH METHODS

	(1)	(2)	(3)	(4)
owner (out. or mort.)	11.6**	10.5**		
mortgager			12.2**	9.6*
outright owner			9.8	13.3
housing costs		3.6*		4.0*
equivalized hh income	3.0	1.9	2.9	1.9
hh size	-1.2	-1.0	-1.1	-1.0
dep. child	-10.2*	-10.4*	-10.3*	-10.2*
claimant	34.6***	35.5***	34.6***	35.5***
financial sit.	9.6***	9.4***	9.6***	9.5***
female	-26.8**	-26.0***	-26.8***	-26.1***
young (16-24)	6.0	6.3	6.0	6.3
elderly (50-64)	-16.0**	-14.2*	-15.6*	-14.6*
disability benf.	-31.1***	-31.4***	-31.1***	-31.4***
pension	60.1*	60.6*	60.3*	60.4*
full-time education	-49.1***	-50.6***	-49.2***	-50.6***
relation with HoH				
spouse or live-in partner	7.3	6.3	7.3	6.4
child	-7.8	-7.8	-7.6	-8.0
other	-1.9	-5.4	-1.8	-5.9
duration since last job				
6-12 months	-38.5***	-38.3***	-38.5***	-38.3***
1-3 years	-34.5***	-34.1***	-34.5***	-34.0***
3 years or more	-61.0***	-60.4***	-60.9***	-60.4***
never had job	-31.6***	-30.6***	-31.6***	-30.6***
education				
1st degree or higher	26.3***	26.6***	26.5***	26.2***
hnd, hnc, teaching qf	21.1*	19.5	21.2*	19.3
a level	11.4	10.0	11.4	9.8
o level	15.0**	14.8**	15.1**	14.7**
cse	-18.1**	-19.3**	-18.2**	-19.3**
other qlf	-0.1	-0.5	-0.1	-0.5
regional dummies	✓	✓	✓	✓
time dummies	✓	✓	✓	✓
number of observations	4651	4591	4651	4591
ρ	17.5***	16.5***	17.6***	16.5***

Notes:

1. * significant at 10%; ** significant at 5%; *** significant at 1%.
2. The Table reports marginal effects (at regressors means) from the random effects probit. Coefficients are expressed in percentage points, expect for housing costs and equivalized household income for which we report semi-elasticities.
3. Sample: people in working age without job who searched in last four weeks. Dependent variable: dummy which takes 1 for numbers of methods between 3 and 5 and takes 0 for numbers between 0 and 2. As in Table 2 the sample includes only from 6 to 17 waves. The last row reports the likelihood ratio test for the presence of unobserved heterogeneity; the ρ statistic is the portion of variance of the composite error due to the variance of the unobserved heterogeneity.
4. For dummies which capture the relation with the head of household, the omitted category is just the head of household; for duration since last job dummies it is from 0 to 6 months ago; for education dummies it is no qualification.

Table 4
THE CHOICE OF SEARCH

	(1)	(2)	(3)	(4)
owner (out. or mort.)	5.6*	5.0		
mortgager			15.2***	14.4***
outright owner			-23.2***	-21.2***
housing costs		3.6***		1.8**
equivalized hh income	-4.7***	-5.6***	-6.1***	-6.3***
hh size	-5.3***	-5.9***	-5.5***	-5.8***
dep. child	-5.9*	-5.1	-8.2***	-7.5**
claimant	51.6***	52.8***	51.1***	52.0***
financial sit.	18.6***	18.5***	18.1***	18.1***
female	-69.6***	-69.0***	-69.7***	-69.2***
young (16-24)	35.4***	35.7***	34.5***	35.1***
elderly (50-64)	-77.7***	-75.3***	-70.5***	-69.6***
disability benf.	-94.7***	-94.8***	-95.4***	-95.7***
pension	-42.9***	-41.3***	-38.4***	-37.7***
full-time education	-98.7***	-100.9***	-100.4***	-101.8***
relation with HoH				
spouse or live-in partner	5.5	4.6	3.9	3.3
child	65.0***	67.1***	67.9***	68.7***
other	31.5***	27.0***	31.6***	29.4***
duration since last job				
6-12 months	-28.6***	-28.6***	-28.4***	-28.5***
1-3 years	-70.9***	-70.7***	-69.8***	-70.0***
3 years or more	-99.6***	-99.2***	-98.9***	-98.8***
never had job	-65.9***	-65.8***	-65.0***	-65.1***
education				
1st degree or higher	47.3***	45.9***	49.5***	48.6***
hnd, hnc, teaching qf	32.2***	33.1***	33.7***	34.9***
a level	21.8***	20.1***	22.5***	21.7***
o level	31.8***	30.9***	31.5***	31.0***
cse	18.0***	17.8***	17.2***	17.4***
other qlf	8.5	8.9	8.7	9.2
regional dummies	✓	✓	✓	✓
time dummies	✓	✓	✓	✓
number of observations	40184	39876	40184	39876
ρ	40.7***	40.6***	40.6***	40.6***

Notes:

1. * significant at 10%; ** significant at 5%; *** significant at 1%.
2. The Table reports marginal effects (at regressors means) from the random effects probit. Coefficients are expressed in percentage points, expect for housing costs and equivalized household income for which we report semi-elasticities.
3. Sample: all people in working age without job. Dependent variable: dummy which takes 1 if searched in last four weeks and 0 if not. The last row reports the likelihood ratio test for the presence of unobserved heterogeneity; the ρ statistic is the portion of variance of the composite error due to the variance of the unobserved heterogeneity.
4. For dummies which capture the relation with the head of household, the omitted category is just the head of household; for duration since last job dummies it is from 0 to 6 months ago; for education dummies it is no qualification.

Table 5

FT EDUCATION, RETIREMENT PENSION, DISABILITY BENEFITS

	all sample		FT educ		pension		disab. ben.	
	freq.	%	freq.	%	freq.	%	freq.	%
employed	124,699	74.8%	4,893	40.3%	542	42.6%	1,089	11.9%
unemployed	7,411	4.5%	1,130	9.3%	34	2.7%	346	3.8%
inactive	34,532	20.7%	6,113	50.4%	695	54.7%	7,730	84.3%
Total	166,642	100%	12,136	100%	1,271	100%	9,165	100%

Notes:

1. The sample refers to all 17 waves and is made of all respondents in working age.

Table 6

NON-EMPLOYED: SEARCH LAST WEEK, SEARCH LAST 4 WEEKS OR NO SEARCH

	(1)	(2)	(3)	(4)
owner (out. or mort.)	6.7**	5.9**		
mortgager			15.9***	14.8***
outright owner			-21.2***	-19.2***
housing costs		0.0***		0.0***
equivalized hh income	-0.0***	-0.0***	-0.0***	-0.0***
hh size	-4.9***	-5.5***	-5.1***	-5.5***
dep. child	-4.9	-4.1	-7.0**	-6.3**
claimant	50.3***	51.6***	49.9***	50.8***
financial sit.	18.5***	18.4***	18.0***	18.0***
female	-65.6***	-65.1***	-65.6***	-65.1***
young (16-24)	31.0***	31.1***	30.2***	30.6***
elderly (50-64)	-73.5***	-71.1***	-66.4***	-65.6***
disability benf.	-92.0***	-92.1***	-92.7***	-93.0***
pension	-40.0***	-38.4***	-35.6***	-35.0***
full-time education	-94.7***	-96.9***	-96.2***	-98.0***
relation with HoH				
spouse or live-in partner	4.2	3.3	2.7	2.2
child	61.0***	63.2***	63.7***	64.6***
other	28.0***	23.3***	28.0***	25.5***
duration since last job				
6-12 months	-27.7***	-27.6***	-27.5***	-27.6***
1-3 years	-68.1***	-67.8***	-67.0***	-67.1***
3 years or more	-97.0***	-96.4***	-96.1***	-96.0***
never had job	-61.8***	-61.6***	-61.0***	-60.9***
education				
1st degree or higher	48.1***	46.8***	50.2***	49.4***
hnd, hnc, teaching qf	33.5***	34.0***	34.9***	35.8***
a level	23.8***	22.2***	24.4***	23.5***
o level	32.8***	31.9***	32.4***	31.9***
cse	17.8***	17.7***	17.0***	17.2***
other qlf	9.0	9.3	9.3	9.7
regional dummies	✓	✓	✓	✓
time dummies	✓	✓	✓	✓
number of observations	40236	39927	40236	39927
ρ	39.2***	39.0***	39.0***	39.1***

Notes:

1. * significant at 10%; ** significant at 5%; *** significant at 1%.
2. The estimated model is a random effects ordered probit. The calculation is run by using the `reoprob` Stata package. Reported coefficients are those of the index function thus do not have a straight economic interpretation.
3. Sample: all non-employed people in working age. The dependent variable is ordinal with three categories: search in the last week, search in the last four but not in the last, no search in the last four. The last row reports the likelihood ratio test for the presence of unobserved heterogeneity; the ρ statistic is the portion of variance of the composite error due to the variance of the unobserved heterogeneity.
4. For dummies which capture the relation with the head of household, the omitted category is just the head of household; for duration since last job dummies it is from 0 to 6 months ago; for education dummies it is no qualification.

Table 7

NON-EMPLOYED: SEARCH METHODS

	(1)	(2)	(3)	(4)
owner (out. or mort.)	7.2**	6.2*		
mortgager			16.8***	15.4***
outright owner			-21.4***	-18.1***
housing costs		0.0***		0.0**
equivalized hh income	-0.0**	-0.0***	-0.0***	-0.0***
hh size	-5.1***	-5.8***	-5.4***	-5.8***
dep. child	-4.9	-4.0	-6.9**	-6.0*
claimant	45.8***	48.1***	45.4***	47.0***
financial sit.	19.5***	19.3***	18.9***	18.9***
female	-62.1***	-61.4***	-62.2***	-61.4***
young (16-24)	35.4***	35.0***	34.2***	34.4***
elderly (50-64)	-72.2***	-68.2***	-64.8***	-63.4***
disability benf.	-88.5***	-88.2***	-89.0***	-89.1***
pension	-45.9***	-43.2***	-40.9***	-40.0***
full-time education	-85.5***	-87.5***	-86.6***	-87.4***
relation with HoH				
spouse or live-in partner	3.5	2.3	2.0	1.5
child	45.2***	47.7***	47.8***	48.4***
other	22.1***	15.3*	22.2***	19.0**
duration since last job				
6-12 months	-29.4***	-28.9***	-29.0***	-28.8***
1-3 years	-68.2***	-67.4***	-67.1***	-67.0***
3 years or more	-101.7***	-100.3***	-100.9***	-100.1***
never had job	-68.6***	-67.8***	-67.4***	-67.0***
education				
1st degree or higher	53.2***	51.3***	55.4***	54.3***
hnd, hnc, teaching qf	31.1***	30.8***	32.6***	32.9***
a level	23.9***	21.7***	24.4***	23.3***
o level	33.8***	32.6***	33.8***	33.1***
cse	10.5*	10.5*	10.3*	10.5*
other qlf	8.8	9.1	9.1	9.5
regional dummies	✓	✓	✓	✓
time dummies	✓	✓	✓	✓
number of observations	30639	30344	30639	30344
ρ	38.0***	37.7***	37.7***	37.6***

Notes:

1. * significant at 10%; ** significant at 5%; *** significant at 1%.
2. The estimated model is a random effects ordered probit. The calculation is run by using the `reoprob` Stata package. Reported coefficients are those of the index function thus do not have a straight economic interpretation.
3. Sample: all non-employed people in working age. Dependent variable: number of search methods, 6 categories (0-5). As in Table 2 and 3 the sample includes only from 6 to 17 waves. The last row reports the likelihood ratio test for the presence of unobserved heterogeneity; the ρ statistic is the portion of variance of the composite error due to the variance of the unobserved heterogeneity.
4. For dummies which capture the relation with the head of household, the omitted category is just the head of household; for duration since last job dummies it is from 0 to 6 months ago; for education dummies it is no qualification.

Table 8

NON-EMPLOYED: DUMMY FOR SEARCH METHODS

	(1)	(2)	(3)	(4)
owner (out. or mort.)	10.2**	8.9**		
mortgager			18.3***	16.2***
outright owner			-13.5**	-10.0*
housing costs		5.5***		3.3**
equivalized hh income	-2.3	-4.2*	-3.4	-4.3*
hh size	-5.4***	-6.0***	-5.7***	-6.0***
dep. child	-11.5***	-11.0***	-13.1***	-12.5***
claimant	54.7***	56.5***	54.4***	55.7***
financial sit.	19.5***	19.3***	19.0***	19.0***
female	-65.1***	-64.1***	-65.1***	-64.2***
young (16-24)	28.1***	-28.1***	27.0***	27.6***
elderly (50-64)	-63.1***	-59.2***	-56.9***	-55.4***
disability benf.	-87.4***	-87.4***	-87.8***	-88.1***
pension	-31.0*	-28.5*	-26.7	-25.8
full-time education	-96.7***	-99.7***	-97.6***	-99.5***
relation with HoH				
spouse or live-in partner	7.8*	6.5	6.6	5.8
child	36.7***	38.7***	39.1***	39.5***
other	27.2***	20.2**	27.5***	23.3**
duration since last job				
6-12 months	-43.1***	-42.5***	-42.6***	-42.4***
1-3 years	-72.1***	-71.5***	-71.3***	-71.1***
3 years or more	-114.1***	-112.8***	-113.4***	-112.8***
never had job	-73.3***	-72.0***	-72.2***	-71.4***
education				
1st degree or higher	53.9***	52.4***	55.8***	54.8***
hnd, hnc, teaching qf	33.3***	33.3***	34.5***	34.8***
a level	26.9***	24.8***	27.3***	25.9***
o level	34.7***	33.9***	34.9***	34.4***
cse	3.0	2.4	3.0	2.6
other qlf	9.0	9.1	9.4	9.5
regional dummies	✓	✓	✓	✓
time dummies	✓	✓	✓	✓
number of observations	30639	30344	30639	30344
ρ	32.4***	32.0***	32.1***	31.9***

Notes:

1. * significant at 10%; ** significant at 5%; *** significant at 1%.
2. The Table reports marginal effects (at regressors means) from the random effects probit. Coefficients are expressed in percentage points, expect for housing costs and equivalized household income for which we report semi-elasticities.
3. Sample: all non-employed people in working age. Dependent variable: dummy which takes 1 for numbers of methods between 3 and 5 and takes 0 for numbers between 0 and 2. As in Table 2, 3 and 7 the sample includes only from 6 to 17 waves. The last row reports the likelihood ratio test for the presence of unobserved heterogeneity; the ρ statistic is the portion of variance of the composite error due to the variance of the unobserved heterogeneity.
4. For dummies which capture the relation with the head of household, the omitted category is just the head of household; for duration since last job dummies it is from 0 to 6 months ago; for education dummies it is no qualification.

Table 9
MORTGAGERS VS OUTRIGHT VS SOCIAL RENTERS VS PRIVATE RENTERS

	unemployed		non-employed		
	I last week, last 4 weeks	II search methods	III the choice of search	IV last week, last 4 weeks, no search	V search methods
mortgager	12.3**	17.0***	4.0	5.5	6.3
outright owner	7.0	8.6	-32.4***	-29.1***	-28.2***
social renters	4.9	2.6	-16.1***	-14.4***	-14.3***
housing costs	2.7	0.0*	1.4*	0.0**	0.0**
equivalized hh income	-0.1	-0.0	-6.2***	-0.0***	-0.0***
hh size	-0.1	-0.6	-5.8***	-5.4***	-5.7***
dep. child	-1.1	-6.2	-5.9*	-4.9	-4.7
claimant	18.8***	28.1***	52.4***	51.1***	47.3***
financial sit.	7.0***	10.1***	18.2***	18.0***	18.9***
female	-8.8**	-24.2***	-69.2***	-65.2***	-61.5***
young (16-24)	-7.4	11.1**	34.0***	29.6***	33.5***
elderly (50-64)	8.6	-15.0**	-68.6***	-64.7***	-62.6***
disability benf.	-25.6***	-34.2***	-95.3***	-92.5***	-88.7***
pension	46.8	55.7**	-37.9***	-35.0***	-40.2***
full-time education	-36.1***	-44.8***	-103.7***	-99.2***	-88.9***
relation with HoH					
spouse or live-in partner	-0.6	5.3	3.4	2.3	1.6
child	13.8**	-10.5*	71.5***	67.1***	50.6***
other	0.7	-5.0	27.3***	23.7***	17.5**
duration since last job					
6-12 months	-15.3**	-26.1***	-28.5***	-27.6***	-28.8***
1-3 years	-20.5***	-31.0***	-70.0***	-67.1***	-67.0***
3 years or more	-29.5***	-55.3***	-98.4***	-95.7***	-99.9***
never had job	-10.9*	-28.6***	-65.2***	-61.1***	-67.2***
education					
1st degree or higher	23.6***	26.2***	45.9***	46.9***	52.0***
hnd, hnc, teaching qf	13.8	14.5	33.0***	34.1***	31.1***
a level	11.8**	8.6	19.5***	21.6***	21.5***
o level	14.8***	10.6*	29.9***	31.0***	31.1***
cse	5.1	-14.2**	16.9***	16.8***	10.2
other qlf	1.9	2.1	8.5	8.5	8.9
regional dummies	✓	✓	✓	✓	✓
time dummies	✓	✓	✓	✓	✓
number of observations	7062	4591	39876	39927	30344
ρ	9.0***	18.1***	40.6***	39.0***	37.5***

Notes:

1. * significant at 10%; ** significant at 5%; *** significant at 1%.
2. For model I and III, coefficients reported are marginal effects evaluated at means, for the other models they are straight coefficients of the index function.
3. Model I: see Table 1; model II: see Table 2; model III: see Table 4; model IV: see Table 6; model V: see Table 7.