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ON-THE-JOB SEARCH: AMOUNT, REGIONAL, AND CYCLICAL VARIATION. EVIDENCE FROM GREAT BRITAIN

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ON-THE-JOB SEARCH: AMOUNT, REGIONAL, AND CYCLICAL VARIATION EVIDENCE FROM GREAT BRITAIN*

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Abstract
Theoretical and empirical job search models include on-the-job search and implicitly or explicitly assume that on-the-job search increases in periods of growth and decreases in economic downturns. Because of lack of suitable data, however, such assumptions have not yet been tested empirically.
This paper uses individual data from the British Labour Force Survey to estimate the number and the proportion of employed people engaging in on-the-job search, how these vary across regions, levels of education, and over the business cycle. These measures of on-the-job search are also compared to proxy measures commonly used in the literature, such as job-to-job moves.

Keywords: On-the-job search; job-to-job moves; business cycle
JEL: J20, R20

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1. Introduction

The theoretical and empirical literature on job search and job matching often include on-the-job search as one of the relevant variables and implicitly or explicitly assume that on-the-job search depends on the conditions of the local labour market (e.g. Burgess 1993; Anderson and Burgess 2000). According to theoretical models, such as Pissarides (1994), the proportion of employed people engaging in on-the-job search is expected to increase in periods of growth, when the probabilities of getting a job and higher wages increase. For similar reasons, in economic downturns on-the-job search should decrease.

Unfortunately, aggregate data on the amount or proportion of on-the-job search is generally not produced; information on on-the-job search is often not even available from micro data. In the literature there are two commonly used proxies for on-the-job search. The first estimates on-the-job search as a function of the stock of employed and/or of unemployed people (Burgess 1993; Sunde 2007); the second is a measure derived from job-to-job moves (Jovanovic 1987; Pissarides 1994; Anderson and Burgess 2000). Clearly, none of these is a good proxy. The stock of unemployed is likely to vary over the business cycle in a way which is inconsistent with how the literature assumes on-the-job search should vary, and the proportion of employed people engaging in on-the-job search is generally unknown. Job-to-job moves exclude all unsuccessful employed job seekers, the amount of which might also vary in a way inconsistent with the business cycle.

Most authors, nevertheless, often draw conclusions on cyclical variations of on-the-job search on the basis of data on job-to-job moves, thus relying on the rather strong assumption that the stock of employed people engaging in on-the-job search and the flow of those who are successful in their search move in a similar way.

The first contribution of this paper consists in a new approach to measure on-the-job search. It shows how individual data can be used to estimate on-the-job search as the proportion of employed people actively looking for a job. Based on this data, the second contribution of the paper focuses on three empirical questions of interest. First, is the empirical relevance of on-the-job search. Second, is the test of the assumption that on-the-job search increases in periods of growth and decreases during downturns. Third, is the comparison of this novel way of measuring on-the-

job search (the proportion of employed people searching for a job) to what commonly used in the literature: job-to-job moves.

Descriptive statistics show that on-the-job search is numerically relevant: around six/seven percent of employed workers search for a new job, and the proportion of job seekers who are employed – as opposed to unemployed – can in some periods be higher than 50 percent. As expected, on-the-job search is systematically lower when it is measured by job-to-job moves, amounting to only three percent of employed people. The empirical estimates suggest that job-to-job moves do seem to vary in a cyclical way; however, the proportion of employed people searching on-the-job seems to vary in the opposite direction, thus casting doubts on the assumptions commonly made in the literature.

2. Data and descriptive statistics

2.1. The British Labour Force Survey

Although this paper aims at analysing on-the-job search from an aggregate point of view, the main source is individual data from the British Labour Force Survey (LFS). The LFS is a nationally representative household survey conducted by the Office for National Statistics, and collects data on a large number of individual and household characteristics, employment status, education, and job characteristics. The LFS data have been collected biannually from 1975 to 1981, annually from 1983 to 1991 and quarterly since 1992; this paper uses only data from 1984 onwards since prior to 1984 unemployment was not defined according to the ILO standard. The most recent data used for this analysis refers to the fourth quarter of 2009.

The LFS asks a series of questions on job search to all respondents, not only to unemployed, but also to employed people and to those classified as inactive. For the purpose of this analysis, job seekers are only those who satisfy all the following conditions: (1) answer that they are looking for paid employment; those saying they are looking for business opportunities, and those who say they have no preference over the two kinds of jobs are coded as not searching; (2) answer that they have been looking for work in the last four weeks; (3) mention at least one method of job search

they use.[1] It is worth mentioning that these are rather similar to the conditions that a job seeker who is out of work should satisfy to be classified as ILO unemployed. Almost all those classified as unemployed in the LFS do satisfy all three conditions.

Once the dummy for those who are looking for a job has been created, it can be aggregated to the population level using the sample weights provided with the data. Such weights are computed to compensate for differential non-response among the subgroups of the population, and to produce estimates for the entire population (see Office for National Statistics 2007 Vol. 1 for more details). Hence, using weights it is possible to estimate aggregates at the national or regional level, and even separately by levels of education, such as the number and proportions of unemployed people, of people engaging in on-the-job search, or of inactive people searching for a job (when computed using quarterly data, these variables are aggregated by calendar year). Although using individual data to compute aggregates is rather uncommon in the academic literature, it is worth noting that official statistics for the unemployment rate are often computed from the LFS.

Although this method of identifying on-the-job search is consistent to what used by Pissarides and Wadsworth (1994) in their individual-level analysis of the determinant of on-the-job search, it has never been used to compute aggregated variables. For comparison with the literature, a second measure of on-the-job search is computed from job-to-job moves. Job-to-job moves can be computed starting from 1992, by exploiting the rotating panel structure of the quarterly data: from 1992 people are interviewed for up to five successive quarters, thus allowing the identification of changes in the situation of the respondent. Job-to-job moves are computed here by identifying those respondents who were employed in two consecutive quarters (t and $t+1$), but for whom the new job (in $t+1$) started between the two successive interviews (i.e. between t and $t+1$).[2] These people would then be classified as searching at time t. This would generate miscoding of those who had a short spell of non-employment which lasted less than three months and a possible overestimation of job-to-job moves. However, this needs not be a problem for this analysis, since the focus is on the estimation and analysis of on-the-job search.

[1] Because of changes in the data collection mode, a large number of answers to this question could not be coded for the second quarter of 1994. When this would contribute to the computation of artificially low proportions of job seekers, this quarter has been excluded from the analysis.

[2] In the empirical analysis, however, only observations from the first wave (i.e. one observation per person) are included.

Estimating on-the-job search by job-to-job moves always generates lower proportions than when on-the-job search is estimated by the questions on job search activities.

Despite the restrictions imposed for the definition of employed job seekers, if some people' search effort is very low, measuring on-the-job search by the number of people engaging in on-the-job search might slightly overestimate the number of employed job seekers. On the other hand, because only a proportion of job seekers are successful in their job search, job-to-job moves are likely to underestimate on-the-job search. If the proportion of employees saying they are looking for a job overestimates on-the-job search, while job-to-job moves underestimate it, we can interpret these two measures as upper and lower bounds of the 'true' amount of on-the-job search.

2.2. On-the-job search: amount and regional variations

The LFS data show that on-the-job search is numerically relevant. In 1984, for example, there were more than 2.7 million unemployed and about 1.2 million employed job seekers (satisfying the three search conditions mentioned above). Those unemployed were 69.2 percent of job seekers, while those employed were 30.1 percent (the remaining 0.7 percent of job seekers were either self-employed or classified as inactive). In 2009 unemployed job seekers were 1.2 million (51.2 percent) while employed job seekers were 1.0 million (41.1 percent).

Figure 1 compares the proportion of employed and unemployed job seekers between 1984 and 2009. The sharp drop in the proportion of employed job seekers in the most recent years is due to the fast increase in the unemployment rate following the financial crisis of 2007/2008. The proportion of unemployed job seekers decreases between 1984 and 1998, while the proportion of employed job seekers increases; over the period 1999–2005 there were more employed than unemployed job seekers.

Despite such variations in the proportion of employed and unemployed job seekers, if we look at the total number of job seekers the picture looks rather different. Figure 2 shows an estimation of the total number of job seekers who are either employed or unemployed. The figure clearly shows that the number of employed people engaging in on-the-job search is remarkably stable over time, and that most of the changes in the proportions shown in Figure 1 are due to a decrease in the number of unemployed job seekers. This already casts doubts on the assumption that on-the-

job search increases in periods of growth and decreases during recessions (e.g. Mumford and Smith 1999; Anderson and Burgess 2000).

FIGURE 1 AND FIGURE 2 ABOUT HERE

Table 1 shows descriptive statistics computed over time and across the nine Government Office Regions of England, plus Scotland and Wales, and three levels of education. The proportion of job seekers unemployed varies from less than 5 percent to more than 87 percent, while the proportion of job seekers who are employed ranges from less than 8 to more than 90 percent, thus suggesting that the search behaviour of employed people might differ significantly across regions and by education. Unweighted averages over the whole period suggest that on-the-job search is higher among workers with a university degree or higher, than among those with no qualifications.

TABLE 1 ABOUT HERE

2.3. Comparing definitions of on-the-job search

The proportion employed workers engaging in on-the-job search was 5.9 percent in 1992 and 6.4 percent in 2009. If on-the-job search was measured by job-to-job moves these proportions would be only 2.6 in 1992 and only 1.2 in 2009. Table 1 shows how these proportions vary over time and across combinations of regions and education. The proportion of employees engaging in on-the-job search has an average of ten percent, with a minimum of 0.4, and a maximum of 31.8 percent. The proportion of employed people moving from job to job is much lower, with a mean of only 3 percent, a minimum of almost zero, and a maximum of only 6.2 percent.

Figure 3 plots the national unemployment rate over the 1992-2009 period, together with the estimate of the proportion of job seekers derived from the two methods of measuring on-the-job search. The unemployment rate clearly shows counter-cyclical variations between 1992 and 2009, while the cyclical variation of the two measures of on-the-job search is much less clear. Interestingly, although the proportion of employees engaging in on-the-job search is always much higher than the proportion of employees moving across jobs, the distance between the two measures, at least when they are computed at the national level, seems to remain

relatively stable over time, with the exception of the most recent quarters. The correlation between the two ways of measuring job search is only 0.270.

FIGURE 3 ABOUT HERE

3. Theoretical background and modelling strategy

Although empirical and theoretical literatures assume that on-the-job search should vary over the business cycle (e.g. Mumford and Smith 1999; Burgess and Turon 2005), there is no clear guidance on the nature of such relationship. Pissarides (1994) suggests that on-the-job search is related to the unemployment rate, and it seems reasonable to assume that employed people can more easily observe unemployment than GDP. The models below relate on-the-job search to both the level and the change in the unemployment rate, as growth and downturns are related to both.

For the sake of completeness, the models are estimated in levels and in first differences:

$$OTJS_{ert} = U_{ert} + \Delta_{t-1,t}\, U_{ert} + \mathbf{X}_{ert}'\beta + \mathbf{D}_{ert} + \varepsilon_{1ert} \quad (1)$$

$$\Delta_{t-1,t}\, OTJS_{ert} = U_{ert} + \Delta_{t-1,t}\, U_{ert} + \Delta_{t-1,t}\, \mathbf{X}_{ert}'\beta + \mathbf{D}_{ert} + \varepsilon_{2ert} \quad (2)$$

where the dependent variable is a measure of on-the-job search at time *t* for workers with education level *e*, living in region *r* ($OTJS_{ert}$). On-the-job search is measured alternatively by the proportion of employed workers engaging in on-the-job search or by the proportion of employed workers who will move across jobs. The explanatory variable identifying the business cycle is the unemployment rate (U_{ert}). Because of the little guidance offered by the literature, the models include both the level and the change in the unemployment rate. The vector $\mathbf{X}_{ert}$ includes the proportion of temporary jobs and the proportion of women in the local labour market, while $\mathbf{D}_{ert}$ includes dummies for levels of education, regions, and years. The model is estimated by means of OLS, with robust standard errors. To avoid bias, the dependent variable is rescaled using a logistic transformation: ${}_2OTJS_{ert} = \log (OTJS_{ert} / (1 - OTJS_{ert})$.

4. Empirical results

4.1. Job search and the business cycle

The results of the estimations of model (1) are shown in the first two columns of Table 2, while the results of the estimations of model (2) are shown in the last two columns. The top panel of Table 2 refers to the models in which the dependent variable is the proportion of employed people engaging in on-the-job search.

The results are rather counterintuitive: a higher unemployment rate is associated to a higher proportion of employed workers engaging in on-the-job search, although, to some extent, an increase in the unemployment rate reduces such proportion. In terms of changes, the level of the unemployment rate does not seem to be related to a change in the proportion of employed workers engaging in on-the-job search, while an increase in the unemployment rate seems associated to an increase in job-search activities of employed people. Higher job search activities of employed people when unemployment is high or increasing might be explained by an increase in the fear or probability of losing their job. Nevertheless, this is inconsistent with the common assumption that on-the-job search increases in periods of growth and decreases during downturns. It is worth remembering that most of the previous literature draws this conclusion from data on job moves rather than on job search activities of employed workers. The bottom panel of Table 2 estimates similar models, in which the dependent variable is the proportion of employed people moving across jobs.

When the dependent variable is the proportion of employed people moving across jobs the regression coefficients show the expected signs: high and increasing unemployment rates are associated with lower job search (job moves). In terms of changes, the table suggest that job search decreases when the unemployment rate increases. Note however, that these results are rather weak, as the coefficients become statistically insignificant when dummies for education, region, and time are included in the models.

TABLE 2 ABOUT HERE

It is perhaps not that surprising that it is job moves – rather than the proportion of employed engaging in on-the-job search – that vary over the business cycle, with

changing decisions of employers in terms of hirings. Job moves include only those employed job seekers who find a suitable job, while it excludes all those who are unsuccessful in their job search, and who might – or might not – be affected by the condition of the labour market in their decision whether to search for a new job.

The conclusion from Table 2 is that job-to-job moves are a questionable way of measuring on-the-job search and it should not be used to draw conclusions on on-the-job search activities. While job-to-job moves do variy in a cyclical way, contrary to what previously assumed, on-the-job search moves counter-cyclically.

4.2. Sensitivity analysis

The results reported in Table 2 are rather robust to changes in the model specification (the models are not shown here, but are available on request). First of all, it might be argued that segmenting the labour market by education is a somewhat arbitrary choice as people with different levels of education might – to some extent – be substitute to each other. Nevertheless, the results and conclusions are essentially the same when the models pool workers with different levels of education, and identify the labour market only by regions and time.

Models (1) and (2) include as explanatory variables both the level and the change of the unemployment rate. The exclusion of $\Delta_{t-1,t}\ U_{ert}$ from model (1) and of U_{ert} from model (2) have no impact on the results. Similarly, if job search reacts to unemployment with a lag, models (1) and (2) might be misspecified. Nevertheless, models with different combinations of contemporaneous and lagged explanatory variables lead to the same conclusions.

Finally, models have been estimated in which the dependent variable is the number of employed people engaging in on-the-job search or the number of people moving across jobs, rather than their proportions over total employment. Once again, the results do not change when the models are estimated on the amounts rather than on the proportions.

4.3. Correlations between the two measures of job search

A simple way to assess the correlation between the two ways of measuring search on the job consists in estimating models (1) and (2) in which the dependent variable is the proportion of employed people engaging in on-the-job search, and the explanatory

variables include the proportion of employed people moving across jobs, and its year on year change. The results of such model are shown in Table 3. A higher proportion of job-to-job moves is associated with higher on-the-job search, while an increase of such moves seems to be associated to lower on-the-job search. When the dependent variable is the change in the proportion of employed people engaging in on-the-job search, neither job-to-job moves, nor the unemployment rate seem to have an effect.

TABLE 3 ABOUT HERE

5. Summary and conclusions

This paper tests the assumption commonly made in the job search literature that the amount of on-the-job search depends on the conditions of the local labour market; i.e. the proportion of employed people engaging in on-the-job search increases in periods of growth and decreases during economic downturns. These conclusions are generally based on aggregate data on job moves. Using individual data from the Labour Force Survey for Great Britain, two aggregate measures of on-the-job search are computed and compared. The first is the proportion of employed workers engaging in on-the-job search; the second is the proportion of employed workers who will be moving from job to job in the following quarter.

The results suggest that the two ways of measuring on-the-job search lead to the estimation of different amounts of on-the-job search: while on average six percent of employed workers engage in on-the-job search, only three percent actually will move from job to job. While job-to-job moves do seem to be related to the business cycle (measured by the unemployment rate), the evidence for the proportion of employed workers engaging in on-the-job search is apparently counterintuitive. Although job-to-job moves do seem to be cyclical, the proportion of people searching on-the-job moves in the opposite direction, thus suggesting that the assumptions made in the job search literature might not be correct.

Finally this paper has shown that an appropriate use of datasets collecting information at the individual level, such as Labour Force Surveys or censuses can go a long way to reduce problems related to lack of aggregate data.

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Tables and Figures

Table 1: Summary statistics across regions and education

Variable	Mean	Min	Max
Unemployment rate *(N = 858)*	7.8	1.0	24.9
Proportion job seekers employed *(N = 806)*	44.0	7.8	90.1
Proportion job seekers unemployed *(N = 806)*	48.8	4.9	87.2
Proportion job seekers others *(N = 806)*	7.2	0.1	24.1
Proportion employees looking for a job *(N = 825)*	9.4	0.4	31.8
Proportion employees moving from job to job *(N = 561)*	3.0	0.0	6.2

Table 2: Variation of job search over the business cycle

	(1) Levels[+]	(2) Levels[+]	(3) Changes[++]	(4) Changes[++]
On-the-job search measured by the proportion of employees looking for a new job				
Unemployment rate	0.014***	0.071***	0.001	0.001
	(0.004)	(0.008)	(0.002)	(0.007)
Δ unemployment rate	-0.002	-0.029***	0.030***	0.032***
	(0.011)	(0.010)	(0.007)	(0.009)
Adjusted R^2	0.541	0.783	0.046	0.070
Observations	792	792	759	759
On-the-job search measured by the proportion of employees moving between jobs				
Unemployment rate	-0.011***	-0.010	0.003	0.015
	(0.004)	(0.011)	(0.004)	(0.015)
Δ unemployment rate	-0.062***	-0.010	-0.061***	-0.027*
	(0.012)	(0.011)	(0.013)	(0.014)
Adjusted R^2	0.137	0.534	0.080	0.202
Observations	559	559	526	526
Education dummies	No	Yes	No	Yes
Regional dummies	No	Yes	No	Yes
Time dummies	No	Yes	No	Yes

Robust standard errors in parenthesis; * Significant at 10%, ** Significant at 5%, *** Significant at 1%

[+] Other explanatory variables: proportion of temporary jobs and proportion of women

[++] Other explanatory variables: change in the proportion of temporary jobs and in the proportion of women

Table 3: Correlations between the two measures of job search

Dependent variable: Proportion employees looking for job	(1) Levels[+]	(2) Levels[+]	(3) Changes[++]	(4) Changes[++]
Prop employees moving between jobs	9.125***	8.984***	1.011	2.591
	(2.007)	(3.116)	(1.936)	(3.647)
Δ Prop employees moving between jobs	-7.496***	-5.951***	-1.611	-2.445
	(1.823)	(1.967)	(2.259)	(2.834)
Unemployment rate	-0.030***	0.019**	0.004	0.006
	(0.003)	(0.010)	(0.003)	(0.015)
Δ unemployment rate	0.029***	-0.003	0.022*	0.018
	(0.011)	(0.009)	(0.012)	(0.013)
Adjusted R^2	0.456	0.652	0.016	0.032
Observations	528	528	495	495
Education dummies	No	Yes	No	Yes
Regional dummies	No	Yes	No	Yes
Time dummies	No	Yes	No	Yes

Robust standard errors in parenthesis; * Significant at 10%, ** Significant at 5%, *** Significant at 1%

[+] Other explanatory variables: proportion of temporary jobs and proportion of women

[++] Other explanatory variables: change in the proportion of temporary jobs and in the proportion of women

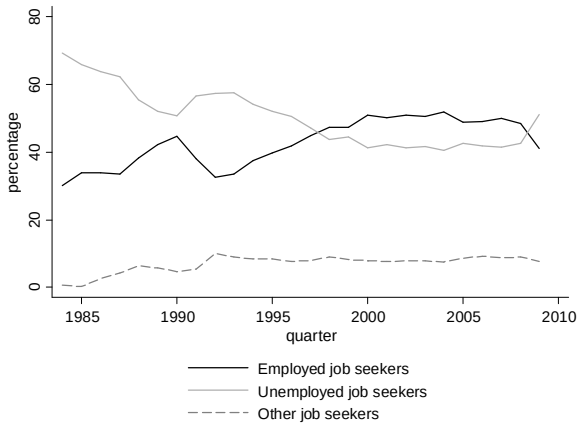

Figure 1: Proportion of employed and unemployed job seekers

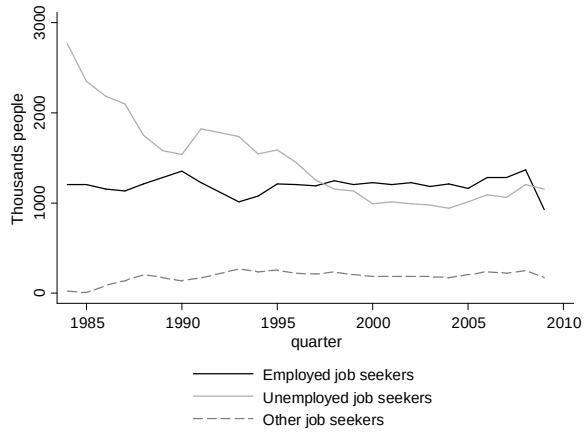

Figure 2: Amount of employed and unemployed job seekers

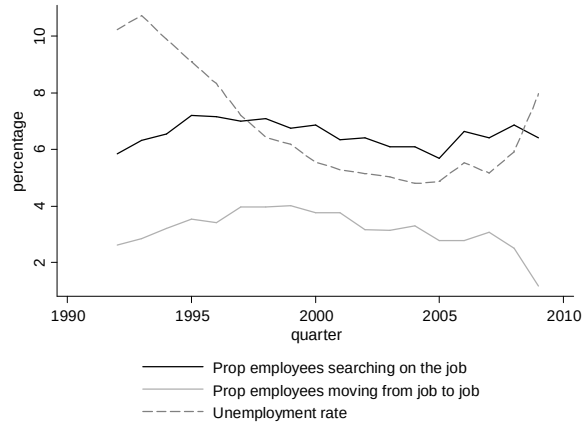

Figure 3: Comparison between different measures of job search