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AN EMPIRICAL ANALYSIS OF ON-THE-JOB SEARCH AND JOB-TO-JOB TRANSITIONS

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An Empirical Analysis of On-the-Job Search and Job-to-Job Transitions*

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Abstract

This paper provides a set of simple stylized facts regarding on-the-job search and job-to-job transitions using the UK Labour Force Survey (LFS). The LFS is unique in that it asks employed workers whether they search on the job and, if so, why. I find that workers search on the job for very different reasons, which lead to different outcomes in both mobility and wage growth. A nontrivial fraction of workers engage in on-the-job search due to a fear of losing their job. This group mimics many known features of unemployed workers, such as wage losses upon finding a job. Workers also search on the job because they are unsatisfied with their job. The unsatisfied workers are roughly equally split into "unsatisfied with pay" and "unsatisfied with other aspects." These two groups differ significantly with respect to their wage outcome upon job-to-job transitions. These findings suggest that it is important to explicitly consider the heterogeneity of OJS for studying the aggregate wage distribution as well as the individual wage evolution.

JEL codes: J31, J63, J64.
Keywords: On-the-job search, job-to-job transitions.

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1 Introduction

Job-to-job transitions are considered one of the key economic processes whereby labor is reallocated toward more productive uses: A seminal work by Topel and Ward (1992) shows that job-to-job transitions play key a role for wage growth of individual workers. Traditional labor search models assume that job search is a distinct activity and thus "unemployment" is the only state in which a worker can look for a job. Researchers have long recognized the limitation of this approach. Recent literature puts more and more emphasis on on-the-job search (OJS) and job-to-job transitions by extending the traditional approach. One reason for this trend is the simple fact that job-to-job transitions account for a majority of labor market transitions. However, one missing piece in the literature, in my view, is the *direct* empirical assessment of OJS behavior and its relationship to observed job-to-job transitions. This paper fills this important gap by providing a comprehensive picture of OJS and job-to-job transitions using the UK Labour Force Survey (LFS). This data set is unique in that it asks employed workers every quarter whether they engage in OJS and, if so, why.

There is now a rich literature that brings together search models with OJS and the labor market data. This paper provides essential pieces of information for calibrating or estimating these models. For example, as far as I know, none of the existing papers consider basic moments such as what fraction of employed workers are looking for a job for what reason, and what the average job finding rate of these workers are. Moreover, relating the reasons for OJS with wage outcomes upon job-to-job transitions reveals the important information for understanding the wage distribution as well as the evolution of individual wages.[1]

This paper is mainly related to the empirical literature that analyzes labor market flows.[2] For the US, Fallick and Fleischman (2004) present the first comprehensive results on job-to-job transitions based on the Current Population Survey (CPS). They also present a one-shot picture of the OJS behavior of employed workers, using the CPS's supplemental data. This data set, however, covers only a short sample period and is limited in its contents. Nagypál (2008) measures job-to-job transitions using the Survey of Income and Program Participation (SIPP). She breaks down job-to-job transitions by the different reasons for transitions. However, the SIPP does not include information regarding OJS behavior.[3] For

[1] There are many papers that try to understand the shape of the wage distribution using the search-matching model with OJS. One branch of literature has evolved from Burdett and Mortensen (1998) who assume that firms are able to commit to their wage offers. Moscarini (2005) studies the wage distribution in a version of the Mortensen and Pissarides (1994) model, where wages are set by continuous bilateral renegotiation.

[2] The discussion here focuses on the research that pays at least some attention to job-to-job transitions.

[3] Another related paper for the US labor market includes Bjelland et al. (2008).

the UK, Bell and Smith (2002) and Gomes (2012) also use the LFS and do present some basic facts on OJS and job-to-job transitions observed in the LFS. However, these papers are meant to provide an overview of the UK labor market and thus do not undertake an in-depth analysis of OJS and job-to-job transitions. This paper examines broader issues, relative to these earlier studies. One issue I pay a close attention to is the implications of OJS on workers' wage transitions. This is important because, as found by a seminal paper by Topel and Ward (1992), job-to-job transitions explain a significant portion of earnings growth over workers' career. They argue that their finding suggests the importance of search frictions in labor market allocation. Linking OJS behavior with wage transitions allows me to shed further light on this important finding.

The next section first presents the basic facts regarding OJS and associated worker transitions after describing the underlying data, the LFS. On average, roughly 4% of the working-age population in the UK engaged in OJS over the period between 2002Q2 and 2009Q1. Among those who search on the job, roughly 12% do so because they are afraid of losing their job; 50% do so because they are unsatisfied with their job.[4] Importantly, this group is further split roughly *equally* into two groups: those who are unsatisfied with pay and those who are unsatisfied with other (nonpecuniary) aspects. Throughout this paper, I emphasize how different the outcomes of OJS are between these different groups of workers.

In Section 3, I run multinomial regressions for transition outcomes (job-to-job transitions, stay at the same firm, become unemployed, and drop out of the labor force) using the sample of employed workers, controlling for workers' observable characteristics including their OJS status by reasons. First, I examine how transition outcomes differ with respect to the presence of OJS. Note that job-to-job transitions can occur without OJS. But I find that the job-to-job transition rate of those who search is dramatically higher than that without OJS. This finding, together with the fact that a relative small fraction of employed workers undertake OJS, is consistent with the idea that OJS is a costly process. I also show that the job loss rate (the employment-to-unemployment transition rate) is significantly higher for those who engage in OJS. This is true not only for afraid OJS workers but also for unsatisfied OJS workers. The regressions allow me to estimate how the relationship between the OJS status and mobility pattern differs by these observable characteristics, among which I focus on firm tenure and firm size. It is known that worker separation rates decline with firm tenure (e.g., Anderson and Meyer (1994)). I find the same relationship among on-the-job seekers, but the relationship is much more pronounced. Short-tenure workers who are engaged in OJS have very low job retaining probabilities: OJS workers with a fear of losing their job

[4]The remaining fraction corresponds to "other reasons." This paper concentrates on the afraid group and the unsatisfied group.

have the lowest job retaining probability (e.g., 35% for workers with a tenure of less than 3 months). The same is true for unsatisfied OJS workers. Their job retaining probability is much higher (e.g., 65% for workers with a tenure of less than 3 months) compared with afraid OJS workers but is much lower than that of those who do not search (which is roughly 90% when tenure is less than 3 months). Recent theories of OJS often use differences in firm productivities as a driver of job-to-job transitions. The LFS does not include information on firm productivities. However, it does ask about each worker's firm size. I show that OJS workers at smaller firms have higher separation probabilities.

Section 4 conducts the analysis of wage transition and consists of two parts. First, I attempt to draw implications of undertaking an OJS for wage changes of *job stayers*. This analysis is motivated by some theories of OJS, in which firms can respond to offers made to their workers. In particular, a worker can reject the outside offer, as a result of a pay raise at the current firm. It is not possible for me to directly test this implication, since the LFS does not contain any information regarding job offers. However, the data allow me to ask the following question: *Are stayers with a recent history of continuous OJS systematically paid better than stayers without OJS?* The results appear to be more in line with the anecdotal evidence that firms tend not to respond to outside offers.

Next, I examine wage changes of job-to-job movers (relative to stayers). I first show that job-to-job movers experience large wage gains relative to the stayers, confirming the finding by Topel and Ward (1992). However, I also find large systematic heterogeneity between different groups of job-to-job movers. First, job-to-job transitions associated with a fear of job loss result in wage loss, which is consistent with the findings in the literature that looks at the earnings transitions of job losers (e.g., Ruhm (1991) and Jacobson et al. (1993)). Second, the wage gains of the two groups within unsatisfied OJS workers differ considerably. Not surprisingly, the workers who are unsatisfied with their pay experience large wage gains. While those unsatisfied with nonpecuniary aspects also experience wage gains, the size is roughly 40% lower than those of the former group. Further, wage gains associated with job-to-job transitions without OJS are found to be even smaller.[5]

The literature has found that search models with OJS have difficulties accounting for observed wage losses upon job-to-job transitions (e.g., Postel-Vinay and Robin (2002) and Connolly and Gottschalk (2008)). One explanation offered in the literature is that a worker accepts a temporary wage cut upon a job-to-job transition, when moving to a more productive firm that offers a larger room for future pay increases. This paper, however, offers a complementary explanation that those workers with a fear of losing their job or who are

[5]This last finding conflicts with a view that very talented workers move to high-paying jobs without an explicit OJS.

unsatisfied with the nonpecuniary value are willing to accept a lower wage because these workers are likely to have a lower reservation wage. In fact, the fraction of workers who experience wage cuts upon job-to-job transitions is shown to be higher among these workers. Section 5 concludes the paper by summarizing the key results and their implications.

2 Data and Basic Facts

2.1 Data

Analysis of this paper uses the Labour Force Survey (LFS) for the UK. The LFS polls around 50,000 private households every quarter regarding various socioeconomic and employment issues, including age, ethnicity, gender, employment status, tenure, occupation, industry, and whether and why an individual is looking for a new job. The last two pieces of information are the key ingredients of this paper. The survey is conducted by the Office of National Statistics (ONS). The quarterly survey generally covers a sample of around 120,000 individuals and is used for the UK official monthly labor market statistics such as the unemployment rate.

An important feature of the LFS is that respondents continue to partake in the questionnaire for five consecutive quarters.[6] While the main use of the LFS is to provide monthly labor market statistics for the UK using the cross-sectional information, the ONS recognizes the usefulness of the longitudinal aspect of the survey and thus releases two- and five-quarter linked data sets, on which my results are based. Every cross-sectional data set is matched with the data set one or four quarters ahead using a personal identification variable. The individuals that could not be matched are dropped from the longitudinal data sets. Population weights are calculated separately for each longitudinal data set so that each data set is nationally representative on its own.[7] Each of the two-quarter and five-quarter longitudinal data sets includes roughly 45,000 and 7,500 observations, respectively. Most of the analyses below restrict the sample to males who are 25 years of age or older. Note that earnings are asked only in the incoming and outgoing quarters (i.e., respondents' first and fifth interviews). My analysis in Section 4 uses the five-quarter datas sets since wage transitions are the main focus of that section. The two-quarter data set is used in the rest of the paper. The sample period starts in 2002Q2 for both data sets, since the consistent information is available from that point on without any breaks in the data. The last observations for the

[6]There are five rotation groups in the survey. Within each rotation group, respondents are distributed uniformly across the three-month period. Each respondent participates in the survey every three months.

[7]Clarke and Tate (1999) discuss various measurement issues in constructing the longitudinal data sets and how the ONS deals with them.

Table 1: Labor Market Status

	Employed		Unemployed	Out of
	No Search	Search		Labor Force
Total	0.705	0.041	0.042	0.212
		(0.055)		
Male, 25 or older	0.789	0.043	0.038	0.136
		(0.050)		

Notes: Expressed as a fraction to the working-age population. Fraction to total employment is in parentheses. Based on two-quarter longitudinal data set of the Labour Force Survey. Sample period: 2002Q2–2009Q1. Sample size: 1,172,930 (all), 501,158 (25+ males).

two-quarter and five-quarter longitudinal data sets are for 2009Q1 and 2009Q4, respectively.

2.2 Basic Facts on OJS

In this section, I provide some basic statistics. Since the overall picture of worker flows in the UK is already well known (e.g., see Bell and Smith (2002), Gomes (2012), and Smith (2011)), I focus exclusively on transitions relevant to the OJS behavior.

First, Table 1 presents the population weights of the four labor market statuses: searching while employed, employed with no search, unemployed, and out of the labor force. According to the data, roughly 4% of the working-age population in the UK engage in active job search while employed. One way to appreciate the size of this group may be to compare it with the size of the unemployment pool. From this perspective, it is roughly the same size as the unemployment pool. The direct implication of the fact that only a small fraction of workers engage in OJS is that OJS is quite costly. If OJS were not costly, then everybody would always engage in OJS, seeking better opportunities.

As mentioned above, there is no official data source in the US that regularly asks about OJS activities. But the supplements to the February 1997 and February 1999 CPS (Current Population Survey) collected some information regarding OJS behavior. Using the information, Fallick and Fleischman (2004) report that 4.4% of employed workers search on the job. The corresponding share for the UK is 5.5%. Given the differences in the sample periods between the two data sets, the two numbers are largely in line with each other. Also observe in Table 1 that males who are 25 years of age or older have a somewhat smaller share of on-the-job seekers relative to employment. This makes sense in that this group typically has a stronger attachment to their employer.

Table 2: Distribution of Reasons for On-the-Job Search

	Afraid of losing job	Unsatisfied with pay	Unsatisfied with other	Other reasons
Total	0.124	0.210	0.267	0.399
Male, 25 or older	0.132	0.239	0.279	0.349

Notes: The "unsatisfied with other" category includes (i) journey unsatisfactory in present job, and (ii) other aspects of present job unsatisfactory. The "other reasons" category includes (i) present job to fill time before finding another, (ii) wants longer hours than in present job, and (iii) wants shorter hours than in present job. Sample period: 2002Q1–2009Q1. Sample size: 44,512 (all), 19,465 (25+ males).

Next, Table 2 presents the breakdown of OJS by reasons. The on-the-job seekers are split into four categories, depending the reason for search.[8] There are a couple of interesting facts. First, a nontrivial fraction of workers engage in OJS because they are afraid of losing their job. This reason is economically very different from the other groups of on-the-job seekers. For example, the reservation wage of these workers would be lower. This issue will be discussed in Section 4. Existing theories of OJS and job-to-job transitions do not deal with these economically different workers. Another important piece of information in this table is that the group of unsatisfied on-the-job seekers is roughly equally split into those who are unhappy about pay and those who are unhappy about the nonpecuniary aspects of their job. Existing theoretical models of labor turnover typically abstract away from the fact that workers can trade off wages for amenities or vice versa.[9] Throughout this paper, I will elaborate on the heterogeneities between on-the-job seekers and nonseekers and between the different groups of workers within on-the-job seekers.

I now estimate transition probabilities using the multinomial logit regression, controlling for workers' observable characteristics. I then discuss how the transition probabilities vary systematically with some of the important observable characteristics by computing average predicted probabilities. I use the two-quarter longitudinal data set and the sample of males of 25 years of age or older who are employed in the first period t of the two. The dependent variable is the labor market status in $t+1$. Let $s_i \in \{E^s, E^n, U, N\}$ be the labor market state of individual i in $t+1$. Each element represents (i) employed at the same job, (ii) employed at a different job, (iii) unemployed, and (iv) not in the labor force, respectively. I

[8] The original choices includes seven reasons. See notes to Table 2 for how I reclassify them.

[9] Of course, it is not that the literature completely ignores the importance of nonpecuniary aspects. I will discuss this later in the paper.

Table 3: Average Predicted Transition Rates: No Search vs. Search

Status in t	Outcome in $t+1$			
	Same Job	New Job	Unemployed	Inactive
Not Searching	0.968	0.016	0.008	0.009
	(0.002)	(0.001)	(0.001)	(0.001)
Searching	0.861	0.092	0.032	0.016
	(0.007)	(0.006)	(0.003)	(0.002)

Notes: Males, 25 years of age or older. Averages of all workers' predicted transition rates in the sample. Standard errors are in parentheses and calculated by the delta method applied to the robust standard errors in the multinomial regression. R^2= 0.103; sample size: 312,438; sample period: 2002Q2 to 2009Q1.

estimate the following multinomial logit regression with the four outcomes:

$$p_{ij} = \Pr(s_i = j) = \frac{e^{X_i' \phi_j}}{\sum_{s_i=j} e^{X_i' \phi_j}}, \tag{1}$$

where X_i is a vector of observable characteristics in the first period, including the worker's search status and ϕ_j is a vector of coefficients on X_i for outcome j. The variables in X_i are: time dummies, education dummies (7 categories), firm size (5 categories), firm tenure (8 categories), age, age squared, industry dummies (10 categories), and occupation dummies (9 categories). First, to illustrate the heterogeneity that I pointed out in the previous section, I first estimate the regression splitting the employed workers into only two groups, those who engage in OJS and those who do not in t, and then estimate the regression where the OJS group is split into three groups: (i) those who are afraid of losing their job, (ii) those who are unsatisfied with their job, and (iii) those who engage in OJS for other reasons. Here, those who are unsatisfied with pay and other aspects are lumped together since there were no noticeable differences between these two groups in terms of average predicted transition probabilities.

3 Transition Rates

3.1 Effects of OJS on Transition Rates

Table 3 reports the average predicted transition probabilities together with the standard errors across all male employed workers who are 25 or older. The reported numbers represent

Table 4: Predicted Average Transition Rates by Reasons for OJS

Status in t		Outcome in $t+1$: Same Job	New Job	Unemployed	Inactive
Not Searching		0.968	0.016	0.008	0.009
		(0.002)	(0.001)	(0.001)	(0.000)
Search	Afraid	0.714	0.155	0.099	0.032
		(0.015)	(0.012)	(0.009)	(0.004)
	Unsatisfied	0.885	0.085	0.020	0.011
		(0.007)	(0.006)	(0.002)	(0.001)
	Other Reasons	0.879	0.080	0.023	0.019
		(0.007)	(0.006)	(0.004)	(0.002)

Notes: Male, 25 years or older. Averages of all workers' predicted transition rates in the sample. Standard errors are in parentheses and calculated by the delta method applied to the robust standard errors in the multinomial regression. $R^2 = 0.107$; sample size: 312,438; sample period: 2002Q2 to 2009Q1.

the quarterly transition rates of each type of workers in each row into the labor market status in each column.[10] The regression that underlies Table 3 distinguishes employed workers only in terms of whether they are engaged in OJS or not. First, observe that the job finding rates for these two groups greatly differ from each other (9.2 % vs. 1.6%). This implies that the search intensity (search vs. no search) plays an important role in job finding. Another interesting fact is that the transition rates into unemployment are also higher for those who search on the job. This pattern can be consistent with a situation in which the current match quality (or productivity) evolves over time with history dependence. Suppose that the match quality deteriorates gradually over time and that the worker starts looking for a job elsewhere. In this case, it is possible that before finding a new job, the match quality deteriorates further to the point where separation into unemployment occurs. Note, however, that this type of evolution of match productivity is often excluded in the literature: In the literature, the persistence of match productivity is introduced by way of occasional switches of productivity to a new level that is independent of the previous level (i.e., switching to a new productivity level occurs at some Poisson rate).

Table 4 presents the results when on-the-job seekers are further distinguished by the underlying reasons. Note first that that the higher transition rate into unemployment for all on-the-job seekers discussed in the previous paragraph does not simply result from the higher

[10]Note that the numbers in Table 3 are calculated as averages of predicted probabilities of individual workers from the multinomial logit regression. They differ from predicted transition probabilities of the average worker due to the nonlinearity of the multinomial logit regression.

employment-to-unemployment transition rate of afraid workers. Even among unsatisfied on-the-job seekers, this pattern holds. Next, observe that afraid workers not only have a higher transition rate into unemployment but also a higher transition rate into a new job, compared to the other groups.[11] There are at least two possible explanations for this result. First, reservation wages for afraid workers are lower and consequently, new job offers are more likely to be accepted. Another contributing factor could be that search intensity of these workers is higher.

Lastly, recall that there are two groups within unsatisfied workers (unsatisfied with pay and other aspects). Those two groups are treated as one group in this regression. The reason is that those two groups are found to have similar transition rates when I estimate the regression by including the underlying two groups separately. Remember, however, that these two groups differ significantly with respect to their wage transitions.

Note also that researchers often associate a connection between quitting a job and job-to-job transitions, and between layoffs and employment-to-unemployment transitions. The results in Tables 3 and 4 cast doubt on these connections.[12] For example, workers who are afraid of losing their job make job-to-job transitions at a much higher rate than other groups. It is unclear whether these workers can be considered "quitters." Similarly, those who look for another job while employed have a much higher chance that they separate into unemployment. This flow corresponds to "quits into unemployment."[13]

3.2 Effects of Tenure and Firm Size

Having estimated the multinomial logit regression, I now examine how the transition probabilities vary with observable characteristics. I focus on the two variables: firm tenure and firm size. It is well known that the job separation rate declines with firm tenure (Anderson and Meyer (1994)). I further look into how this empirical regularity is related to OJS. Note also that recent theories of OJS emphasize that job-to-job transitions entail that workers move from low productivity firms to high productivity firms (e.g, Postel-Vinay and Robin (2002)). Because the theories often have a tight link between the productivity level and firm

[11] This result is consistent with the "abandon-ship" effect discussed by Faberman and Nagypál (2008).

[12] See also Nagypál (2008) who makes a similar point based on the reasons for job separations using the SIPP data for the US.

[13] Throughout this paper, I focus on labor market transitions based on the changes in the labor market status rather than quits and layoffs. While there is a clear distinction between quits and layoffs in the survey data, this distinction is arbitrary in popular labor market models such as Mortensen and Pissarides (1994) in which wages are determined by Nash bargaining. See Section 3.3 in Den Haan et al. (2005) for more discussions on distinguishing quits and layoffs theoretically. McLaughlin (1991) develops a model in which well-defined quits and layoffs occur as efficient outcomes.

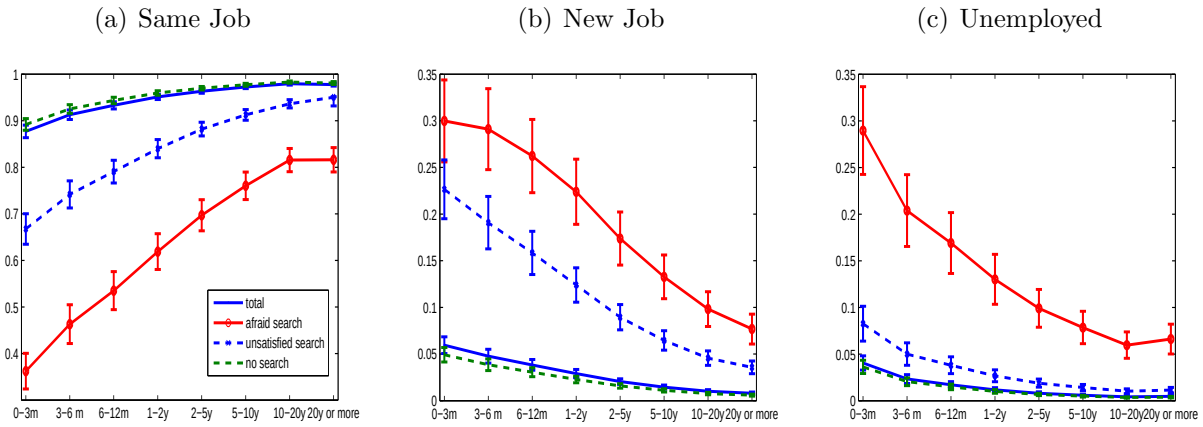

Figure 1: Predicted Transition Rates by Firm Tenure

Notes: Predicted average transition rates for each group of workers. The bars around the lines represent the 95% confidence intervals. Also see notes to Table 4. "Total" refers to all employed workers.

size (e.g., Moscarini and Postel-Vinay (2008)), I use the firm-size variable to see how strong the link between firm-size variable and the job-to-job transitions is. The analysis focuses on the following three transition probabilities: (a) stay at the same firm, (b) move to a new job, and (c) become unemployed.

First, Figure 1 presents three transition rates by tenure. Panel (a) shows that the probability of staying at (leaving) the firm increases (declines) almost monotonically, as Anderson and Meyer (1994) report for the US labor market. However, underlying this pattern are large differences between workers who are engaged in OJS and who are not engaged in OJS, and within the group of on-the-job seekers. In particular, short-tenure workers that are afraid of losing their job are retained at very low probabilities. For example, the job retention rate of the afraid workers with tenure of less than 3 months is less than 40%. The same is true for unsatisfied low-tenure workers although the retention rates are higher across all tenure lengths.

The papers that rely on administrative records, including Anderson and Meyer (1994), often do not distinguish between the different types of separations (e.g., job-to-job transitions vs. employment-to-unemployment transitions). Panels (b) and (c) of Figure 1 graph two of the three components of separations: separation into a new job and separation into unemployment. The two panels show that very high separation rates among short-tenure workers who are afraid are divided roughly equally into job-to-job transition rates and employment-to-unemployment transition rates. On the other hand, the separation rates among the unsatisfied OJS workers disproportionately come from job-to-job transition rates.

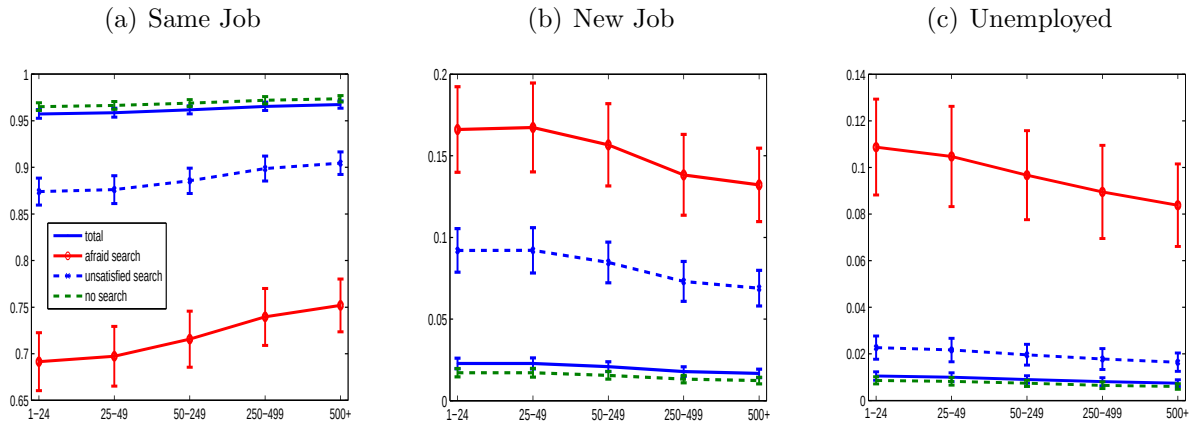

Figure 2: Predicted Transition Rates by Firm Size

Notes: Predicted average transition rates for each group of workers. The bars around the lines represent the 95% confidence intervals. Also see notes to Table 4.

As a summary of Figure 1, I would like to stress one important point. As I mentioned before, the existing empirical literature has already shown the monotonic increase in the retention rates as job tenure becomes longer. However, the upward trend in the retention rate is much more dramatic among those who search on the job. Observe that the blue solid line, which represents the retention rates for all employed workers, is quite close to the green dashed line, which represents the retention rates for workers who do not search. This implies that, in terms of the size of turnover, separations associated with workers without OJS are dominant. However, if the OJS activity embodies a resource cost necessary for a more efficient labor allocation, worker transitions resulting from OJS would be more economically relevant than those without OJS. In this regard, the dramatic differences in the retention rates among on-the-job seekers across all tenures entails an economically important finding. Furthermore, as I will show in Section 4, the wage transitions of workers with OJS are considerably different from those of workers who are not involved in OJS.

Figure 2 breaks down the transition rates by firm size. Overall, the relationship between transition rates and firm size is not as tight as the relationship in the previous figure, as indicated by wider error bands.[14] Nevertheless, one can see that workers at smaller establishments are likely to separate (whether into a new job or unemployment). This pattern holds for all reasons of OJS and for those who do not search. I will show in the next section

[14] Anderson and Meyer (1994) also look at the firm-size effect estimating the linear probability models and find that, relative to the largest firm-size category (2,000 workers or more), workers at smaller firms have higher separation rates that are statistically significant. However, within the categories comparable to the size categories available in the LFS, the firm-size effects are quite small. My result is therefore consistent with theirs.

that there is a strong firm effect on wage transitions of job-to-job movers. Therefore, the result here is in line with the view that job-to-job transitions are associated with workers moving to a larger firm that pays a higher wage (Moscarini and Postel-Vinay (2008)).

4 Implications on Wages

I now turn to the analysis of the implications of OJS on wages. An influential contribution by Topel and Ward (1992) finds the importance of job-to-job transitions in accounting for earnings growth, especially early in workers' career. They also argue that their findings are consistent with labor search models with OJS. In the following analysis, I examine how OJS and associated job-to-job transitions are related to a worker's wage growth. I also attempt to infer the effect of OJS on stayers' wages.

4.1 A Brief Review of Theories with OJS

Before discussing the empirical analysis, it is probably useful to review some of the leading theories of OJS and job-to-job transitions. In particular, I focus on a branch of the literature has evolved from Burdett and Mortensen (1998) who develop a random on-the-job search model; in their model, firms post and commit wages ex ante (i.e., before the match is formed) and workers who happen to receive the offer decide whether to accept it or not. The worker makes a job-to-job transition if and only if the offered wage is higher than the wage earned at the present firm. In this model, while a job-to-job transition is directly tied to wage gains, on-the-job search has no consequence on stayers, whether they did not receive an offer or turned down the offer received. Postel-Vinay and Robin (2002) relax this last assumption and develop the so-called sequential auction model. The key extension is that it allows employers to make counteroffers when an employee receives an outside offer. When a worker receives an outside offer, the two employers bid against each other (i.e., Bertrand bidding war), and which employer wins the bid depends on the relative productivity levels of the two employers. The model offers two new insights relative to the original Burdett-Mortensen model that are relevant to this paper. First, it generates job-to-job movers that accept lower wages at a new firm.[15] Second, workers who receive an outside offer that could have resulted in a job-to-job transition in the absence of the possibility of a counteroffer may decide to stay with the current employer as a result of the pay raise. One reason for the latter result being

[15]This situation arises when an outside offer comes from a firm with higher productivity. The worker may accept the lower pay, counting on future wage increases at the more productive firm, which could result from outside offers received at the new firm.

important is that it is consistent with an upward-sloping wage-tenure profile. Human capital theory interprets the positively sloped wage-tenure profile as resulting from accumulation of match-specific human capital. However, according to the sequential auction model, it reflects the competitive pressure between the two employers making offers to the worker.[16] Cahuc et al. (2006) modify the wage setting mechanism in the sequential auction model. They consider an environment in which the wage of the worker with an outside offer is determined by the three-party bargaining mechanism instead of the Bertrand competition between the two employers. The two implications discussed above with respect to the wage evolution of movers and stayers continue to hold in this model.

4.2 More on the Data

The analysis in the previous sections relied on the two-quarter longitudinal data of the LFS. However, in the LFS, respondents report earnings only in the first interview and last (fifth) interview. The ONS provides the five-quarter longitudinal data set with population weights calculated for this data set. I therefore use this data set for the analysis in this section. To avoid changes in hours worked affecting the results, I use hourly wage as a measure of earnings. I deflate it by the CPI to obtain real hourly wages. My entire data set consists of 26 overlapping panels, each of which starts every quarter between 2002Q2 and 2008Q3 and covers every five-quarter period from each starting quarter.[17] As in the analysis in the previous section, I focus on male workers who are 25 years of age or older. The following regression analysis always uses a first-difference specification, where the dependent variable is the log real wage change. To avoid outliers from affecting the results, I exclude the observations that correspond to the top and bottom 1% of the distribution of log wage changes. All regression results below include time dummies along with other variables, which I discuss below.

4.3 Stayers

This subsection focuses on the workers that are employed at the same firm throughout the five-quarter survey period. The regressions are guided by the theoretical implications

[16] Burdett and Coles (2003) and Shi (2009) also extend the Burdett and Mortensen model and derive an upward-sloping wage-tenure profile as an optimal contract. But these papers do not allow firms to make a counteroffer and thus receiving an outside offer per se does not cause a pay raise even when the worker decides to stay at the current firm.

[17] The last interview of the last panel is, therefore, conducted in 2009Q4.

discussed above. I start with the following simple Mincer-style wage regression.

$$\ln w_{ijt} = \mu_i + \gamma_j + \theta_{ij} + \alpha_1 x_{ijt} + \alpha_2 x_{ijt}^2 + \beta_1 y_{it} + \beta_2 y_{it}^2 + \varepsilon_{ijt}, \tag{2}$$

where w_{ijt} refers to the real hourly wage of an individual i at a firm j at time t, μ_i represents the time-invariant worker-specific component, γ_{ij} represents the time-invariant firm-specific component, θ_{ij} refers to the match-specific component, α_1 and α_2 measure the effects of firm tenure x_{ijt}, β_1 and β_2 measure the effects of age y_{it}, and ε_{ijt} is the error term. Given that the sample consists of workers who stayed at the same employer, taking the first difference of equation (2) conveniently eliminates all time-invariant components, resulting in the following simple expression:

$$\Delta \ln w_{ijt+1} = c + \hat{\alpha} x_{ijt} + \hat{\beta} y_{ijt} + \Delta \varepsilon_{ijt+1} \tag{3}$$

where $c \equiv \alpha_1 + \alpha_2 + \beta_1 + \beta_2$ and $\hat{\alpha} \equiv 2\alpha_2$ and $\hat{\beta} \equiv 2\beta_2$.

My main interest is to test the implications of the counteroffer model for the wage growth of stayers. The main challenge is that the LFS does not have the information on whether or not a worker received offers. Nor does it include the information on the offered wage or a worker's reservation wage.[18] In other words, we do not know if those stayers in my sample indeed received offers and rejected them. Despite this weakness, the worker's search status provides a useful piece of information: I can identify the stayers who have a recent history of OJS. Specifically, among the stayers, I select the workers who searched in either the first one, two, or three quarter(s) and then never searched in the subsequent four, three, and two quarters, respectively. The idea is to select the group of workers that stayed after OJS. Remember that the analysis in Section 3 showed that the job-to-job transition rate of the on-the-job seekers is dramatically higher than those without OJS. It is therefore quite likely that the job offer arrival rates for the on-the-job seekers are also higher than for those without OJS. Also note that by selecting those who report continuous OJS and subsequent continuous no search, I exclude those workers who engage in OJS randomly (e.g., a worker who searches in the first and third quarters). Then I ask the following question: *Are stayers with a recent history of continuous OJS activity systematically paid better than those who did not search?* The answer to this question would be "yes" in OJS models with the possibility of counteroffers. I am interested in whether this prediction is strong enough to show up in a representative data set like the LFS.

[18] One data source that provides such valuable information is the 1981 panel of the NLSY. See Holzer (1987) for the analysis that uses this data set. But this data set has other limitations for my purposes.

Augmenting equation (3) with the worker's search status results in:

$$\Delta \ln w_{ijt+1} = c + \hat{\alpha} x_{ijt} + \hat{\beta} y_{ijt} + \rho S_{it} + \Delta \varepsilon_{ijt+1}, \tag{4}$$

where S_{it} is the dummy variable indicating worker's search status (i.e., 1 if engaging in OJS and 0 otherwise). I could consider several different specifications with respect to reasons of OJS. Specifically, I consider three different reasons of OJS: (i) unsatisfied with pay, (ii) unsatisfied with other aspects, and (iii) for other reasons. I exclude afraid OJS because this situation is outside of the existing theories. First, I estimate equation (4), in which only the search status information is captured by one dummy variable. Second, I lump together the first two cases as "unsatisfied search" to focus on the group of workers who appear to have clear reasons for OJS. In this second specification, ρS_{it} is replaced by $\rho^u S^u_{it}$ where S^u_{it} takes 1 when workers engage in OJS for reasons either (i) or (ii). Lastly, the three reasons enter the regression separately, in which case ρS_{it} is replaced by $\rho^p S^p_{it} + \rho^{np} S^{np} + \rho^r S^r$, where superscripts p, np, and r, respectively, represent (i) unsatisfied with pay, (ii) unsatisfied with other aspects, and (iii) other reasons.

The results are presented in Table 5. In the first column, the OJS-to-no-OJS transition is associated with a 1.2% gain in hourly wage on average relative to those who never searched on the job during their interview period. However, this estimate is not statistically significant. In the next regression, presented in the second column, I exclude those who searched for "other reasons" to focus on the unsatisfied group. Excluding this group not only raises the size of the wage gain to 2.3%, but it also makes the point estimate statistically significant at the 5% level. The third column presents the results from a regression that includes dummies for three groups separately. In this case, the point estimates of the first two coefficients ρ^p and ρ^{np} are at levels in line with the previous regression, and the coefficient on "OJS for other reasons" is essentially zero. Interestingly, when the unsatisfied OJS group is split into two subgroups, neither of them are statistically significant.

One concern is that the transition from search to no search may be induced by other factors that result in wage gains. One plausible suspect is changing firm conditions. I address this issue by estimating the same regressions using the subsample of workers who report that firm size has increased between the first and fifth interviews. This is done by identifying those who move up the seven firm-size categories.[19] The results with this restricted sample are presented in the third through sixth columns of Table 5. Overall, as

[19]These categories are (i) $1-10$, (ii) $11-19$, (iii) $20-24$, (iv) $25-49$, (v) $50-249$, (vi) $250-499$, and (vii) 500 or more. In the previous section, the conditioning was symmetric in the sense that I consider both increase and decline in the firm size. But for the regressions in this section, the appropriate conditioning is to consider only the increases in firm size.

Table 5: Wage Regressions: Stayers

Parameters to estimate	(1)	(2)	(3)	(4)	(5)	(6)
ρ	0.012			0.022		
	(0.098)			(0.032)		
ρ^u		0.023**			0.031	
		(0.012)			(0.038)	
ρ^p			0.025			−0.041
			(0.020)			(0.047)
ρ^{np}			0.021			0.112**
			(0.014)			(0.055)
ρ^r			−0.008			0.005
			(0.016)			(0.005)
# of Obs.	30,290	30,290	30,290	3,207	3,207	3,207
$\hat{R}^2$	0.008	0.008	0.009	0.050	0.050	0.052

Notes: Results of the regressions expressed by equation (4). Top and bottom 1% of the wage growth distribution are excluded. Estimates for the constant term, $\hat{\alpha}$, and $\hat{\beta}$ are suppressed. ρs are coefficients on dummies for workers who quit searching after OJS. ρ: OJS total (excl. afraid search), ρ^u: OJS unsatisfied (pay plus other aspects), ρ^p: OJS unsatisfied with pay, ρ^{np}: OJS unsatisfied with other aspects, ρ^r: OJS other reasons. Specifications (4) through (6) restrict the samples to those who report that their firm-size category changed to a larger category between the first interview and fifth interview. Robust standard errors are in parentheses. Stars next to point estimates indicate statistical significance at 1% (***), 5% (**), and 10%(*) levels.

expected, the conditioning makes positive relationships statistically weaker. In particular, the statistical significance when I focus on the unsatisfied OJS group goes away when the regression uses the sample of employees at expanding firms.

In summary, the results here appear to suggest that the prediction of the counteroffer model sketched at the beginning of this section is supported only weakly, although the identification used to test the prediction is hampered by the fact that the LFS does not contain the information regarding the job offer itself. Nevertheless, the difficulties of finding clear evidence for the presence of counteroffers may be an indication that firms are reluctant to respond to the outside offers.[20]

[20]An often-mentioned theoretical reason for the "non-response" policy is that offer matching encourages inefficient rent seeking OJS, as pointed out by Mortensen (1978). My finding does not exclude the possibility of offer matching in certain occupations or industries. The evidence presented by Barron et al. (2006) shows that more than 40% of personnel managers and business owners who are surveyed say that they *consider* counteroffers. However, this number is based on the survey to employers (not to employees) and thus

4.4 Job-to-Job Movers

I move on to estimating regressions that include job-to-job movers in the sample. The intention is to measure the effects of a job-to-job transition on wage growth relative to that of stayers. Remember that the previous section analyzed the wage differentials among stayers depending on whether a worker engaged in OJS or not. Here I exclude those who have any experience of OJS during the interview period from the comparison group (the comparison group is, therefore, stayers those who never engage in OJS during the entire interview period).

I start with the wage equation (2) except that I drop the square terms to simplify the notation. The results below are little affected by omitting the square terms. The log wage change of a job-to-job mover i working at a firm k in $t+1$ is written as:

$$\ln w_{ikt+1} - \ln w_{ijt} = \beta + \gamma_k - \gamma_j + \theta_{ik} - \theta_{ij} - \alpha x_{ijt} + \varepsilon_{ikt+1} - \varepsilon_{ijt}. \tag{5}$$

Combining this with the corresponding wage growth equation for stayers results in:

$$\ln w_{ikt+1} - \ln w_{ijt} = \beta + (\gamma_k - \gamma_j)J_i + (\theta_{ik} - \theta_{ij})J_i + \alpha[1 - J_i(x_{ijt} + 1)] + \varepsilon_{ikt+1} - \varepsilon_{ijt} \tag{6}$$

where J_i is a dummy variable that takes a value 1 when $j \neq k$ and 0 when $j = k$. The first term on the right hand side measures the effect of age on wage growth. The second term $\gamma_k - \gamma_j$ measures the differences in the firm effect. This term is zero when the worker stays in the same firm.[21] Similarly, the third term drops out for stayers and reflects the change in the match-specific component. The last term captures the effect due to the firm tenure reset to zero when a job-to-job transition occurs, otherwise reflects an additional year of firm tenure.

To distinguish between the changes in the firm component and the match-specific component, I approximate the firm effect by the firm-size variable. I can then identify the improvement (or deterioration) of the match quality $\theta_{ik} - \theta_{ij}$ through the incidence of job-to-job transitions. There are seven firm-size categories in the LFS as mentioned above. Let f_{lt} be a dummy variable taking a value 1 when a worker is in the firm-size category l in

represents the possibility of counteroffers to *any employees within a firm.* The number of workers who actually receive counteroffers can be substantially smaller.

[21] I mentioned in the regressions for stayers the issue of omitting the time-varying firm effects in the wage equation (2). This assumption is maintained here, and thus this term is zero when the worker stays at the same firm. However, when a job-to-job transition occurs, this term is in general nonzero, reflecting the difference in time-invariant firm effects.

period t. I can then rewrite equation (6) as:

$$\ln w_{ikt+1} - \ln w_{ijt} = \beta + \sum_{l=2}^{7} \phi_l (f_{lt+1} - f_{lt}) J_i + \lambda J_i + \alpha[1 - J_i(x_{ijt} + 1)] + \varepsilon_{ikt+1} - \varepsilon_{ijt} \quad (7)$$

where $\lambda \equiv \theta_{ik} - \theta_{ij}$. Note that the terms inside the summation identify the firm effect using the information on the changes in firm-size categories before and after the job-to-job transition. For those who stay in the same size category, $f_{lt+1} - f_{lt} = 0$ for all l. The worker who changes the size category has 1 in the category that he moves into, -1 in the category that he moves out from, and 0 in the remaining four categories.

My main interest in this section is in the estimates of λ. As I did in the previous section, I split the movers into several different groups. The first specification distinguishes only those who made a job-to-job transition with and without OJS, whose effects are measured by $\lambda^s S^s$ and $\lambda^{ns} S^{ns}$, respectively. The second specification splits the OJS group into three subgroups whose effects are summarized by the terms: $\lambda^a S^a$ (afraid OJS), $\lambda^u S^u$ (unsatisfied OJS), and $\lambda^r S^s$ (OJS for other reasons). The third specification further splits the unsatisfied OJS group into those who are unsatisfied with pay and those who are unsatisfied with other aspects of their job, measured by $\lambda^p S^p$ and $\lambda^{np} S^{ns}$, respectively. Successively splitting the sample into smaller groups allows me to tease out heterogeneity involved in the different types of OJS.

Table 6 presents the results. The first column presents the results when job-to-job transitions are split only into two groups, those with and without OJS. This regression does not include the firm-size variables. First of all, the result confirms the idea that the job-to-job transitions play a role in improving the worker's earnings. The job-to-job transition raises a worker's wage by 4% to 6% (relative to the wage growth of stayers who never search). More specifically, the interpretation in the context of my regression is that the match quality improves upon the job-to-job transitions, which is consistent with Topel and Ward's (1992) claim. The result indicates that a job-to-job transition with OJS is associated with larger wage gains on average, although the differences are not statistically significant. This finding is interesting for a couple of reasons. First, it is consistent with the idea that OJS is "directed." One can imagine an environment in which OJS is costless but finding a good match involves directing job search into jobs that are suitable for a worker's skills or other characteristics. The second possibility is that OJS is costly (which is logically a plausible presumption). In this case, wage gains associated with OJS job-to-job transitions should reflect this cost. Lastly, the fact that job-to-job transitions without OJS are associated with smaller wage gains is surprising, given the view that it results from headhunting, where

Table 6: Wage Regressions: Movers

Parameters	(1)	(2)	(3)	(4)	(5)	(6)
λ^{ns}	0.044***	0.043***	0.042***	0.041***	0.041***	0.041***
	(0.010)	(0.011)	(0.010)	(0.011)	(0.010)	(0.011)
λ^{s}	0.059***	0.061**				
	(0.013)	(0.014)				
λ^{a}			−0.050*	−0.043*	−0.050*	−0.042
			(0.027)	(0.028)	(0.027)	(0.028)
λ^{u}			0.073***	0.081***		
			(0.017)	(0.019)		
λ^{up}					0.099***	0.100***
					(0.027)	(0.029)
λ^{uo}					0.054***	0.065***
					(0.020)	(0.022)
λ^{r}			0.091***	0.080***	0.091***	0.080***
			(0.022)	(0.023)	(0.022)	(0.023)
ϕ_2		−0.009		−0.008		−0.009
		(0.019)		(0.019)		(0.019)
ϕ_3		0.025		0.023		0.023
		(0.026)		(0.027)		(0.027)
ϕ_4		0.017		0.016		0.016
		(0.019)		(0.020)		(0.020)
ϕ_5		0.064***		0.063***		0.062***
		(0.017)		(0.017)		(0.017)
ϕ_6		0.069***		0.065***		0.065***
		(0.022)		(0.022)		(0.022)
ϕ_7		0.081***		0.079***		0.079***
		(0.023)		(0.023)		(0.023)
β	0.005***	0.005**	0.005***	0.005***	0.005***	0.005***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
# of Obs.	34,427	31,365	34,427	31,365	34,427	31,365
$\hat{R}^2$	0.008	0.009	0.009	0.010	0.009	0.010

Notes: λ's measure effects of job-to-job transitions relative to job stayers (with no history of OJS). λ^{ns}: no search, λ^{s}: OJS (total), λ^{a}: OJS afraid, λ^{u}: OJS unsatisfied (total), λ^{up}: OJS unsatisfied with pay, λ^{up}: OJS unsatisfied with other aspects, λ^{r}: OJS other reasons. ϕ's measure firm-size fixed effects relative to the smallest size category (1-10 workers) using the changes of firm size associated with job-to-job transitions. ϕ_2: 11−19, ϕ_3: 20−24, ϕ_4: 25−49, ϕ_5: 50−249, ϕ_6: 250−499, and ϕ_7: 500+. β measures the firm-tenure effect. Robust standard errors are in parenthesis. ***, **, and * indicate statistical significance at 1%, 5%, and 10% levels, respectively.

talented workers move to high-paying jobs without explicit OJS. The result here suggests that such anecdotal evidence is not warranted at least in the representative sample such as the LFS. Distinguishing these stories is beyond the scope of this paper but splitting OJS job-to-job transitions into different reasons shed some further light on these issues.

The second column adds the firm-size variables to the regressions. This is important in that wage gains associated with job-to-job transitions may reflect that workers are moving from smaller firms to larger firms (which pay more). The result indeed indicates the presence of the fairly large firm effect. In particular, the coefficients on the largest three firm-size categories show statistically significant positive effects. The presence of the firm effect here conform to the earlier result on job-to-job transitions that separation rates are higher (lower) at smaller (larger) firms. Note, however, that Adding the firm-size variables, however, hardly affects the coefficients on job-to-job transitions, suggesting that the improvement of job-match quality plays an important role in the worker wage profile beyond changes in the firm effect.

The third and fourth columns present the results when OJS workers are split into the three groups, respectively, with and without firm-size information. Large heterogeneity exists between the three groups in terms of the effects of OJS. In particular, OJS caused by the fear of losing a job is accompanied by significant wage losses (5%). Of course, this makes sense given that the outside option for these workers is to become unemployed. There is long-standing literature on the earnings losses of job losers (or displaced workers) pioneered by Ruhm (1991) and Jacobson et al. (1993). The result here collaborates well with this literature.[22]

Note also that the existing theoretical literature on OJS has had a difficult time in accounting for wage losses upon job-to-job transitions that exist in the data. For example, one of the key themes of Postel-Vinay and Robin (2002) is to develop a model of OJS that generates earnings losses upon job-to-job transitions. Their model indeed generates wage losses through differences in firm productivity, but this mechanism fails to generate enough "negative" job-to-job transitions observed in their data. A similar idea is also explored by Connolly and Gottschalk (2008). The point of these existing papers is that even though a worker accepts a job that pays less now, a present discounted value of earnings from the new job should be higher. This statement does not need to hold for those who make job-to-job transitions as a result of fear of losing their job. Remember that a nontrivial fraction of on-the-job seekers report this as a main reason for OJS. This clearly constitutes one of the

[22]The average earnings losses here appear much smaller than those reported in these earlier studies. But this is not surprising. These earlier studies often consider the displaced workers, which represent a more limited group of workers that are strongly adversely affected by their job losses.

reasons for the "negative" job-to-job transitions.

The opposite side of the negative job-to-job transitions is that when workers report that they are unsatisfied with their current jobs, they enjoy larger wage gains, which amount to 7% to 8%, depending on whether the firm-size variables are included or not. The differences from no-search job-to-job movers expand to 3-4 percentage points. It is somewhat puzzling that OJS with "other reasons" results in larger gains than the unsatisfied group. This puzzling result largely disappears as I refine the specification, as I discuss shortly.

The fifth and sixth columns further split the unsatisfied OJS group into the two subgroups. This highlights another important heterogeneity underlying the average wage gains associated with job-to-job transitions. That is, these two groups are associated with considerably different outcomes in terms of wage gains upon job-to-job transitions; when workers are unsatisfied with pay, wage gains amount to 10%, whereas when workers are unhappy with nonpecuniary aspects, wage gains are reduced to roughly 6%. Again, this result is not surprising, yet important in that it suggests that workers accept a lower wage offer as far as overall job satisfaction is expected to improve. Note that the importance of nonpecuniary aspects of a job may be another reason for wage cuts upon job-to-job transitions. I will come back to this in the following subsection.

In the regression (6), I did not take into account the fact that different industries and occupations have different levels of wages. A concern similar to the one made with respect to the firm-size effect applies here as well: The pattern of job-to-job transitions may be systematically correlated with inter-industry or inter-occupation wage differentials. I augment (6) with industry and occupation dummies as I did to control for the firm-size effect in (7).[23]

The same set of six regressions are estimated with industry and occupation dummies. The results, which are presented in Table 7, are largely unaffected by the inclusion of the industry and occupation dummies. One noticeable change is that coefficients on OJS for other reasons, λ^r, are reduced by roughly 1.5 percentage points when compared with corresponding estimates in Table 6. This change makes the overall results more intuitive.

4.5 Wage Cuts and Job-to-Job Transitions

To look more closely at the relationship between wage cuts upon job-to-job transitions and reasons for OJS, Table 8 presents, for each reason for OJS, the unconditional wage growth distribution as well as the share of those who experience wage losses upon job-to-job transitions. First, note that job-to-job movers with a fear of losing their job suffer the largest wage

[23]Each regression includes nine major industries and nine major occupations. See the notes to Table 7 for the list of industries and occupations.

Table 7: Wage Regressions: Movers (with Industry and Occupation Dummies)

Parameters	(1)	(2)	(3)	(4)	(5)	(6)
λ^{ns}	0.040***	0.040***	0.038***	0.038***	0.038***	0.038***
	(0.010)	(0.011)	(0.010)	(0.011)	(0.010)	(0.011)
λ^{s}	0.053***	0.054***				
	(0.013)	(0.014)				
λ^{a}			−0.046*	−0.041	−0.047*	−0.041
			(0.027)	(0.028)	(0.027)	(0.028)
λ^{u}			0.068***	0.076***		
			(0.017)	(0.019)		
λ^{up}					0.097***	0.097***
					(0.028)	(0.030)
λ^{uo}					0.046**	0.058***
					(0.020)	(0.021)
λ^{r}			0.076***	0.067***	0.075***	0.066***
			(0.022)	(0.023)	(0.022)	(0.023)
ϕ_2		−0.011		−0.010		−0.011
		(0.019)		(0.019)		(0.019)
ϕ_3		0.027		0.025		0.025
		(0.026)		(0.026)		(0.026)
ϕ_4		0.018		0.017		0.017
		(0.019)		(0.019)		(0.019)
ϕ_5		0.066***		0.065***		0.064***
		(0.017)		(0.017)		(0.017)
ϕ_6		0.070***		0.067***		0.066***
		(0.022)		(0.022)		(0.022)
ϕ_7		0.086***		0.083***		0.083***
		(0.023)		(0.023)		(0.023)
β	0.005***	0.004***	0.004***	0.004***	0.004***	0.004***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
# of Obs.	34,397	31,336	34,397	31,336	34,397	31,336
$\hat{R}^2$	0.011	0.012	0.012	0.013	0.012	0.013

Notes: See notes to Table 6. Industries included: agriculture and fishing, energy and water, manufacturing, construction, distribution, hotels and restaurants, transport and communication, banking, finance and insurance, public administration, education and health, and other services. Occupations included: managers and senior officials; professional occupations; associate professional and technical occupations; administrative and secretarial occupations; skilled trades occupations; personal service occupations; sales and customer service occupation; process, plant, and machine operatives; and elementary occupations.

Table 8: Unconditional Wage Growth Distributions

	Percentiles			Mean	Share of
	25%	50%	75%		$\Delta \ln w < 0$
No search	−0.131	0.027	0.199	0.026	0.451
Afraid	−0.271	−0.021	0.117	−0.080	0.535
Unsatisfied (pay)	−0.037	0.126	0.276	0.089	0.305
Unsatisfied (other)	−0.119	0.031	0.221	0.054	0.456
Other reasons	−0.082	0.054	0.239	0.059	0.376

Notes: Based on the sample of 2,511 job-to-job transitions. See Subsection 4.2 for more information about the data.

cuts as expected. The fraction of the incidence of the wage cuts is 53%. The wage growth distribution dramatically improves when workers make job-to-job transitions explicitly for improving their pay. Not only are wage gains larger at all percentiles but also the fraction of the wage cuts is much lower at 31%. Relative to these workers, wage gains are much more muted when workers are unhappy about nonpecuniary aspects and a much larger fraction of workers (46%) accept wage cuts. As mentioned above, the literature finds it difficult to generate a large number of wage cuts present in the data. The results in Table 8 provides some explanations for it.

The labor search literature has put much less emphasis on the importance of nonpecuniary aspects in the job acceptance decision. However, there are a few notable recent papers that take the nonpecuniary aspects of a job seriously. For example, Nosal and Rupert (2007) develop a model that explicitly includes job amenity in the worker's job acceptance decision. This paper is largely theoretical but provides some empirical evidence that goes against the prediction of the theories by Postel-Vinay and Robin (2002) and Connolly and Gottschalk (2008): They find in the PSID data that there is very little difference between wage growth before and after the employer change for those who experienced wage cuts upon job-to-job transitions. My results collaborate well with theirs. A paper by Bonhomme and Jolivet (2009) develops and estimates an OJS model in which the value of a job depends on job amenities as well as wages. They find strong influence of job amenities on job-to-job transitions.[24] This paper's findings, along with these existing studies, point to a fruitful direction of future research.

[24]Nagypál (2007) develops a model in which jobs are heterogeneous with respect to their amenity values. However, the wage determination mechanism used in the paper does not allow for the two margins to interact with each other and thus there is no substitutability between pecuniary and non-pecuniary values of the job.

5 Conclusion

Many competing theoretical models of OJS have been developed in recent years. This paper provides a set of stylized facts based on the dataset that directly looks at workers' OJS behavior. The simple facts presented in this paper, such as fraction of job seekers and their transition rates, would constitute a useful reference point for calibrating or estimating search models with OJS.

I also show that there is large difference in the worker transition pattern (e.g., separation into unemployment and into a new job) depending on the reason for OJS and that the difference in the worker transition pattern is systematically related to the wage outcome upon a job-to-job transition. In particular, job-to-job transitions after OJS due to a fear of losing the job and unsatisfied with nonpecuniary aspect of the job are shown to result in much smaller wage gains (or even wage cuts).

Recall that Topel and Ward (1992) find that workers experience wage increases upon job-to-job transitions, which is interpreted as the improvement of the match quality. My findings, however, suggest that there is large ex-ante heterogeneity for the wage outcome even within this component. It is therefore important to explicitly consider the heterogeneity of OJS for studying the aggregate wage distribution and individual wage evolution.

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