On-the-Job Search over the Business Cycle: Evidence from the United Kingdom

Anthony Papac*

December 17, 2022

Abstract

Little is known about the cyclical properties of on-the-job search (OJS) effort of employed workers. This paper provides new evidence that aggregate OJS effort rises during a recession, as more workers start searching on-the-job and average search intensity increases when unemployment is higher. To explore this further, this paper leverages the panel structure of the UK Labour Force Survey to account for compositional changes in the pool of employed workers and job seekers over the business cycle. In particular, this paper finds that higher unemployment increases the probability that a worker engages in OJS due to fear of job loss and the probability that a worker engages in OJS for an additional job. It also finds that higher unemployment increases the number of methods that job seekers use to search for another job. Results have important macroeconomic implications, as they suggest that employed workers are crowding out the job search of unemployed workers during a recession.

Keywords: on-the-job search, business cycles, precautionary on-the-job search

JEL Codes: E24, E32, J62, J64

*Department of Economics, University of California Los Angeles. Email: anthonypapac@ucla.edu.

1 Introduction

On-the-job search (OJS) plays an important role in how an economy exits from a recession. In particular, it affects the speed with which workers are reallocated to different sectors and the speed with which the unemployment rate declines after a recession, as employed workers compete with unemployed workers for a limited number of job openings. Despite the importance of OJS in understanding labor market dynamics, little is known about OJS behavior of workers over the business cycle. This is largely due to the scarcity of surveys asking *employed* workers about their job search activity. While many surveys ask unemployed workers about job search activity, few surveys ask employed workers about job search, and those that do tend to be cross-sectional in nature, span a limited number of years, and do not ask workers about their motives for searching for another job.

This paper studies the cyclical properties of OJS with data that overcomes these shortcomings. More specifically, this paper analyzes the cyclicality of OJS using data from the UK Labour Force Survey (LFS), which follows workers for up to five quarters, spans three recessions over three decades, and asks workers *why* they are searching for another job, allowing for an analysis of how reasons for OJS change over the business cycle. As such, this paper documents new evidence on the top reasons for OJS and their prominence during recessions and booms. In particular, this paper finds that the top three reasons for OJS are OJS for better pay, OJS for better nonpay amenities, and OJS due to fear of job loss. While the precautionary motive represents the third most popular reason for OJS, it plays a much more prominent role during recessions, as the share of workers searching due to fear of job loss nearly matches the share of workers searching for better pay.[1]

This paper analyzes the overall cyclicality of OJS along two margins: the extensive and intensive margins. While the extensive margin represents the share of employed workers who decide to engage in OJS, the intensive margin reflects how intensely employed job seekers search for another job. This paper shows that the search effort of employed workers is largely countercyclical along both margins. That is, the share of workers searching for another job increases when unemployment is higher, driven by an increase in the share of workers who engage in OJS due to fear of job loss. Moreover, this paper shows that average search intensity of workers spikes during a recession. Finally, this paper constructs a measure of aggregate search effort by combining the extensive and intensive margins and finds that aggregate search effort of employed workers is countercyclical, increasing when unemployment increases and decreasing when unemployment falls.

1 Fujita (2010) first showed evidence of the precautionary motive of OJS in the UK using data from the LFS from 2002 to 2009. The present paper documents new evidence concerning the path and prominence of the precautionary motive over the business cycle.

Next, this paper seeks to disentangle the forces driving the countercyclicality of the aggregate time series. More specifically, it is possible that the aggregate results simply reflect changes in the composition of employed workers and job seekers over the business cycle rather than behavioral changes workers are making in response to changing economic conditions. For example, the share of workers engaging in OJS may rise during a recession simply because the pool of employed workers remaining during a recession has a higher propensity for job search. Similarly, the observed increase in average search intensity during a recession may simply reflect that the types of workers who search for another job during a recession have higher search intensities on average.

This paper leverages the panel structure of the UK LFS to determine whether the countercyclicality of aggregate OJS is due to changes in the composition of workers and job seekers over the business cycle or due to actual behavioral changes workers are making in response to changing unemployment conditions. First, this paper finds that workers are more likely to engage in OJS when unemployment increases during their time in the panel. This result is driven by workers who decide to engage in OJS due to fear of job loss and OJS for an additional job. In contrast, workers are no more likely to engage in OJS for better pay or better amenities. In addition, this paper finds that employed job seekers increase their search intensity when unemployment increases during their time in the panel. While all job seekers increase the intensity with which they search during a recession, workers searching due to fear of job loss and workers searching for an additional job increase their search intensity the most. These workers arguably have the most to lose if they do not find another job, as they seek to avoid the threat of unemployment and maintain financial security during a recession.

This paper adds to the small empirical literature analyzing job search behavior of workers over the business cycle. In particular, Shimer (2004) was the first to point out that the job search effort of unemployed workers appears to be countercyclical. Mukoyama et al. (2018) corroborate and expand on this finding by linking individuals' responses in the US Current Population Survey to their diary responses in the American Time Use Survey (ATUS). Similar to the results of this paper, they find that unemployed workers are more likely to engage in job search during a recession and that unemployed workers search more intensely during a recession. In addition, Ahn and Shao (2021) are the first to study the cyclicality of job search effort of *employed* workers. Using cross-sectional data from the ATUS from 2003 to 2015, these authors find suggestive evidence that OJS increases during a recession. This paper similarly finds that OJS is countercyclical, but unlike Ahn and Shao (2021), this paper is able to discern whether the countercyclicality is due to a changing composition of workers or actual behavioral changes workers are making in response to changing economic conditions. Furthermore, this paper is able to track how different reasons for OJS change

over the business cycle, which proves essential when explaining fluctuations in total OJS.

In addition, this paper contributes to the large theoretical literature using search models to analyze the labor market. Canonical models of OJS, such as those outlined in Mortensen (1986) and that proposed by Christensen et al. (2005), have historically focused on one type of OJS: search for better pay. However, the descriptive results of this paper reveal that more workers actually search for better nonpay amenities at any point over the business cycle, and the share of workers searching due to fear of job loss nearly matches the share searching for better pay during a recession. As such, this paper highlights the need for future search models to better reflect the true search motives of workers. While studies, such as those by Bonhomme and Jolivet (2009), Sullivan and To (2014), and Hall and Mueller (2018), have recently started incorporating search for better nonwage amenities into search models, few models have incorporated a precautionary motive of OJS.[2]

The finding that OJS is countercyclical is important for several reasons. First, the countercyclicality of OJS suggests that employed workers are crowding out the job search of unemployed workers during a recession. The high level of congestion in the labor market during a recession can contribute to longer unemployment spells of workers, as unemployed workers struggle to compete with employed workers for a limited number of job openings. Furthermore, congestion in the labor market affects the speed with which an economy exits from a recession, since the unemployment rate may take a longer time to fall if employed workers are out-competing unemployed workers when firms hire for open positions.

Second, the macro search literature has suffered from a long-standing inability to generate high enough volatility in unemployment, vacancies, and labor productivity over the business cycle. Because of this, recent studies, such as Krause and Lubik (2010), Martin and Pierrard (2014), and Eeckhout and Lindenlaub (2019), have proposed that procyclical OJS be used as an amplification mechanism to generate higher volatility in these measures. In particular, they argue that there is a strategic complementarity between OJS by workers and vacancy posting by firms. In other words, employed workers are more likely to search for jobs when there are numerous vacancies, and firms are more likely to post vacancies when there are many employed workers searching for jobs. In this way, vacancies remain low and unemployment remains high during a recession until OJS and vacancy posting pick up once an economy exits from a recession. While job to job transitions of workers are procyclical[3], this paper finds strong empirical evidence that OJS behavior is not.[4] Consequently, this

2 Notably, Jarosch (2021) proposes and estimates a model in which jobs differ in terms of unemployment risk and pay, and workers search to improve their position in the job ladder by achieving higher pay and/or greater job security.

3 Fallick and Fleischman (2004) show that job to job transitions are highly procyclical in the US. Carrillo-Tudela et al. (2016) similarly show that job to job transitions are procyclical in the UK.

4 Indeed, the findings of this paper suggest that OJS and vacancy posting by firms act more as substitutes,

paper's findings suggest that search models should turn toward other mechanisms (perhaps countercyclical OJS) to generate more realistic volatility in macroeconomic measures.

Finally, the results of this paper point to important considerations when setting unemployment insurance (UI) policy. In particular, this paper finds that many workers start searching for other jobs because they fear falling into unemployment during a recession. Since the generosity of UI benefits affects the size of the threat of job loss, it is possible that generous UI benefits can discourage workers from searching for other jobs. Indeed, Light and Omori (2004) found early evidence that an increase in UI benefits was associated with a small but significant drop in job to job transitions motivated by quits among respondents of the 1979 National Longitudinal Survey of Youth. Moreover, Gutierrez (2016) found evidence that an increase in the potential replacement rate of UI significantly decreased the probability that older Americans at risk of job loss reported searching for another job. These studies, combined with this paper's finding that precautionary OJS represents a large fraction of total OJS, underscore the potential impacts that UI can have on both OJS behavior and the unemployment rate over the business cycle.

The rest of this paper is organized as follows. Section 2 discusses the data and how it is used in the time series and empirical analysis. Section 3 shows how key OJS measures vary over the business cycle. Section 4 outlines the empirical strategy, and Section 5 discusses the empirical results. Finally, Section 6 concludes and offers ideas for future research.

2 Data

The Labour Force Survey (LFS) is the largest household survey conducted in the UK and is the basis for official reporting on employment and unemployment by the Office for National Statistics (ONS). The survey consists of a rotating panel in which respondents are followed for up to five consecutive quarters and new respondents are added each quarter to replace those who have exited the survey. The LFS has been conducted on a quarterly basis since 1992: Q2 and asks respondents about employment and unemployment activities as well as job search behavior. The samples used for the analysis of this paper are restricted to 18 to 64 year old respondents to focus on the job search behavior of prime, working-age individuals.

This paper makes use of two separate data files provided by the ONS: the Quarterly Labour Force Survey data and the Two Quarter Longitudinal Labour Force Survey data. While the Quarterly Labour Force Survey data consists of all individuals who appear at least once in the survey, the Two Quarter Longitudinal Labour Force Survey data consists of all individuals who respond to at least two quarters up to a maximum of five quarters of

as OJS activity tends to fall when vacancy posting by firms rises.

the survey. The first data file contains more observations and is used for the aggregate time series analysis to depict time trends of job search behavior and demographic characteristics of workers with greater precision. The second data file is used in the individual-level regression analysis to take advantage of the panel structure.

Table 1 details the main demographic and labor market characteristics of individuals in the Quarterly Labour Force Survey and the Two Quarter Longitudinal Labour Force Survey. Overall, there are few differences in the characteristics of respondents in each data file, suggesting that survey attrition is not leading to significant changes in the composition of employed workers or job searchers across data files. Table 1 does, however, point to significant differences in the characteristics of employed workers and employed job seekers. On average, job seekers tend to be younger, less tenured, and more educated than the average worker. They also tend to earn lower wages than workers not searching for another job.[5]

Table 1: LFS Sample Summary Statistics

	Quarterly LFS *(Aggregate Analysis)*		Longitudinal LFS *(Individual Analysis)*	
	Workers	Job Seekers	Workers	Job Seekers
Male	0.54	0.54	0.54	0.54
Married	0.57	0.43	0.56	0.42
Nonwhite	0.09	0.12	0.08	0.12
Degree or higher education	0.35	0.40	0.37	0.42
GCE A level or equiv.	0.24	0.24	0.25	0.24
GCSE grades A*-C or equiv	0.21	0.20	0.20	0.19
No/Other qualification	0.20	0.16	0.18	0.15
18-34 years old	0.37	0.52	0.38	0.53
35-49 years old	0.38	0.35	0.37	0.34
50-64 years old	0.25	0.14	0.25	0.13
0-2 years of tenure	0.28	0.45	0.29	0.45
2-10 years of tenure	0.41	0.42	0.40	0.42
10+ years of tenure	0.31	0.13	0.31	0.13
Full time	0.77	0.68	0.76	0.67
Mean hourly wage	12.5	10.8	12.6	11.0
Mean OJS rate	0.065	1.00	0.066	1.00
Mean no. of search methods used	–	3.15	–	3.25
Mean no. of quarters in the panel	–	–	4.1	4.0
Sample Size	6,146,705	330,642	4,620,814	238,103

Samples are restricted to 18-64 year old respondents. Sample weights used.

Each quarter employed respondents are asked if they looked for a different or additional

5 This is consistent with Mueller (2010) and Faberman et al. (2022) who show that OJS is highly elastic with respect to a worker's wage and that individuals who earn lower wages are more likely to be searching for another job.

paid job during the week before the survey. If the respondents answer affirmatively, respondents are then asked to indicate up to three reasons why they are searching for another job, with the reasons being recorded in the order given by respondents.[6] Table 2 lists the 10 possible reasons for OJS. The options indicating "change occupation" and "change sector" were added in 2008 and 2011, respectively. About 72% of respondents providing a reason for job search listed just one reason, while the remaining respondents provided either two or three reasons. This paper chooses to use the first reason listed by respondents for the analysis because this allows the share of workers searching for each reason to sum to the total share of workers searching for another job. Figure A1 in the appendix shows that plotting OJS reasons using the first reason listed by respondents versus any reason listed by respondents yields qualitatively similar results, as both methods depict the same narrative of how OJS reasons vary over the business cycle.

Table 2 shows that the top three reasons for OJS are better pay, better nonpay aspects of job, and fear of losing one's current job. For simplicity, search for a better commute, more working hours, fewer working hours, and better nonpay aspects of one's job are classified as search for better nonwage amenities. As Table 2 shows, there are a number of reasons for job search that are unclear in motives. For example, workers searching to change their occupation may want to change their occupation to increase their pay, improve their nonpay amenities, or decrease their risk of job loss. Because the time series analysis in this paper seeks to understand how reasons for OJS fluctuate over the business cycle, reasons with unclear motives, including "change occupation", "change sector", "current job to fill time before next job", and "other", are reapportioned to the top three job search reasons, which have very distinct, clear motives.

Two apportionment schemes were used to reclassify reasons with unclear motives to the top three job search reasons. In the first scheme, next quarter (clear motive) responses by individuals who listed unclear search reasons in the prior quarter were used to infer the respondents' motives for job search. In the second scheme, second or third (clear motive) reasons for job search were used to apportion individuals who listed an unclear first reason to the top three job search reasons. Figure A2 in the appendix shows that both schemes lead to similar qualitative results, with both yielding the same narrative of how OJS reasons fluctuate over the business cycle. Inconsequentially, this paper uses the first scheme to apportion job seekers with unclear motives to the top three job search reasons, as the sample sizes used in this scheme were much larger.

6 About 12% of job seekers indicate they are searching for an additional job, while 88% indicate they are searching for a job to replace their existing one. Unfortunately, respondents who indicate that they are searching for an additional job are not asked why they are searching for an additional job.

Table 2: Reasons for OJS

OJS Reason	Share of Job Seekers Listing Reason
Fear losing current job	0.15
Want better pay	0.22
Want better nonpay amenities	0.33
Improve commute to work	0.04
Want more hours	0.06
Want fewer hours	0.03
Improve nonpay aspects of job	0.19
Present job to fill time before next job	0.09
Change occupation	0.05
Change sector	0.01
Other	0.16
Sample Size	328,090

Sample weights used. First listed OJS reason is reported.

Finally, respondents are asked which methods they used to search for another job during the last four weeks. In particular, they are asked to indicate one or more methods they used from a list of 11 possible search methods. Table 3 reveals the proportion of employed job seekers who used each of the 11 search methods. The most common search methods were studying vacancies in newspapers, journals, or on the internet, responding to job advertisements, and asking friends and family about job openings. On average, employed job seekers used 3.25 methods in their job search efforts.

Table 3: Search Methods Used by Employed Job Seekers

Job Search Method	Share of Job Seekers Using Method
Visit a job center	0.15
Visit a career office	0.02
Visit a job club	0.01
Use a private employment agency	0.23
Advertise in newspapers, journals, or on the internet	0.09
Respond to ads in newspapers, journals, or on the internet	0.52
Study vacancies in newspapers, journals, or on the internet	0.83
Apply directly to employers	0.41
Ask friends or relatives about jobs	0.43
Wait for results of a job application	0.35
Do anything else to find work	0.08
Mean number of methods used	3.25
Mean number of active methods used	2.40
Sample Size	238,103

Sample weights used.

The total number of methods used by job seekers serves as a measure of job search

intensity in this paper. This follows in the tradition of papers that have used the number of search methods used by unemployed job seekers as a measure of job search intensity, including Shimer (2004) and Mukoyama et al. (2018).[7] One concern with using the number of search methods used is that it might not accurately reflect changes in the intensity of job search if workers substitute from more active forms of job search to more passive forms of job search at different points in the business cycle. For example, workers may be more likely to browse vacancies online but equally less likely to apply directly to employers, keeping the average number of methods used unchanged but search intensity has arguably fallen. To address this concern, this paper also uses the number of active search methods used as a measure of job search intensity.[8] Nonetheless, only results using the total number of search methods are reported in this paper, as results using the number of active search methods are qualitatively similar.

3 Time Series Analysis

This paper studies the job search behavior of employed workers over the business cycle along two margins: the extensive margin and the intensive margin. While the extensive margin describes the share of employed workers who decide to engage in OJS, the intensive margin describes how intensely employed workers search for another job, conditional on having decided to search. Finally, this paper combines the extensive and intensive margins of OJS to create a measure of aggregate job search effort of employed workers in the UK economy.

3.1 Extensive Margin of OJS

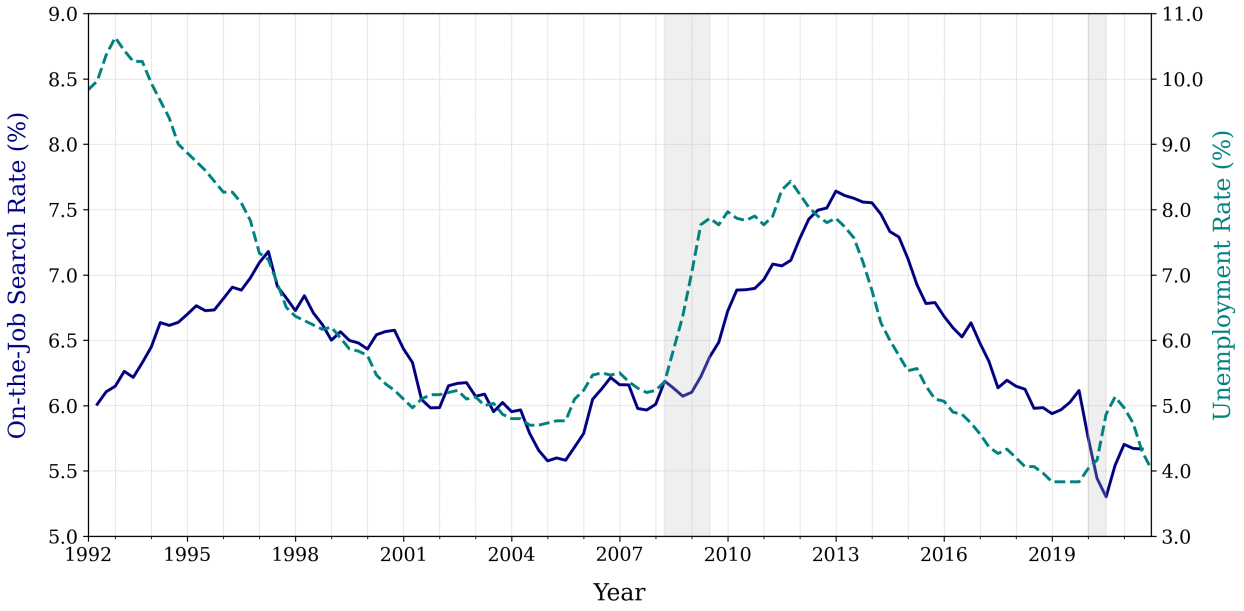
Figure 1 plots the evolution of the extensive margin of OJS along with the UK unemployment rate from 1992 to 2021. Overall, the figure shows that the share of workers searching for another job tends to fall at the beginning of a recession but then quickly rises as unemployment increases. Interestingly, the share of workers engaging in OJS continues to rise for three to four years after peak unemployment is reached in the early 1990's recession, while the share of workers engaging in OJS continues to rise for one year after peak unemployment

7 Mukoyama et al. (2018) relate the number of search methods used to the time spent searching for a job by linking survey responses of individuals who participated in the Current Population Survey and the American Time Use Survey. They show a very close relationship between the two search intensity measures, with average time spent searching for a job increasing almost linearly with the number of search methods used by respondents.

8 Active search methods include all listed methods, except "studying vacancies in newspapers, journals, or on the internet" and "other", which is consistent with the classification of active and passive search methods in the CPS.

is reached after the Great Recession. One to four years after unemployment peaks, the share of workers searching for another job then quickly falls as the unemployment rate falls.

Figure 1: On-the-Job Search Over the Business Cycle



Notes: Graph starts in 1992: Q2 and ends in 2021: Q4. All tick marks reflect the first quarter of the year represented, except the first tick mark. Sample weights used. The three quarter moving average of OJS is plotted to smooth OJS seasonality.

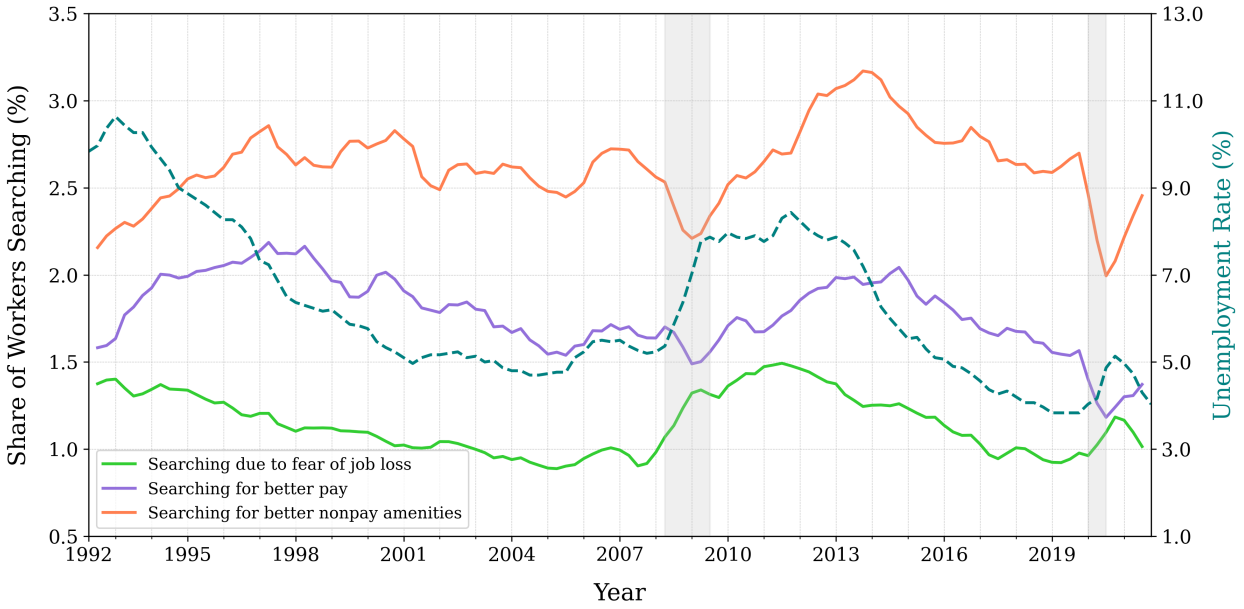
Overall, the extensive margin of OJS appears to follow the path of the unemployment rate but with a lag. However, explanations for why the OJS rate behaves in this manner cannot be discerned from Figure 1 alone. This is because, by construction, the share of workers engaging in OJS at a particular time depends in part on the pool of workers who are employed during a particular time. Because unemployment risk does not uniformly affect all workers during a recession, the composition of the pool of employed workers changes over the business cycle. Thus, a rising OJS rate does not necessarily signify that workers are changing their OJS behavior over the business cycle; a rising OJS rate could simply reflect the fact that the pool of employed workers is shifting toward workers who typically have higher propensities for job search. Consequently, the empirical part of this paper seeks to discern whether the rising OJS rate during a recession is due purely to compositional changes in the pool of employed workers or if there are actual changes in job search behavior of workers that are happening in response to changing economic conditions.

Figure 2 further explores the extensive margin by breaking OJS down by search reason.[9]

9 Figure 2 reflects only workers who are searching for a different job, as workers searching for an additional job are not asked why they are searching for another job. Figure A4 in the appendix plots the share of workers searching for an additional job over the business cycle, revealing that OJS for an additional job is also countercyclical.

First, Figure 2 documents evidence of a significant precautionary motive of OJS that is highly countercyclical. While most search models assume that workers only search for better pay or better amenities, Figure 2 shows that the share of workers searching due to fear of job loss rises significantly during a recession to the point where the share of workers searching due to fear of job loss nearly matches the share searching for better pay. This highlights the need for existing search models to incorporate precautionary OJS to better reflect the true motives of many workers seeking to change jobs over the business cycle.

Figure 2: On-the-Job Search by Reason Over the Business Cycle



Notes: Graph starts in 1992: Q2 and ends in 2021: Q4. All tick marks reflect the first quarter of the year represented, except the first tick mark. Sample weights used. The three quarter moving averages of OJS rates are plotted to smooth seasonality.

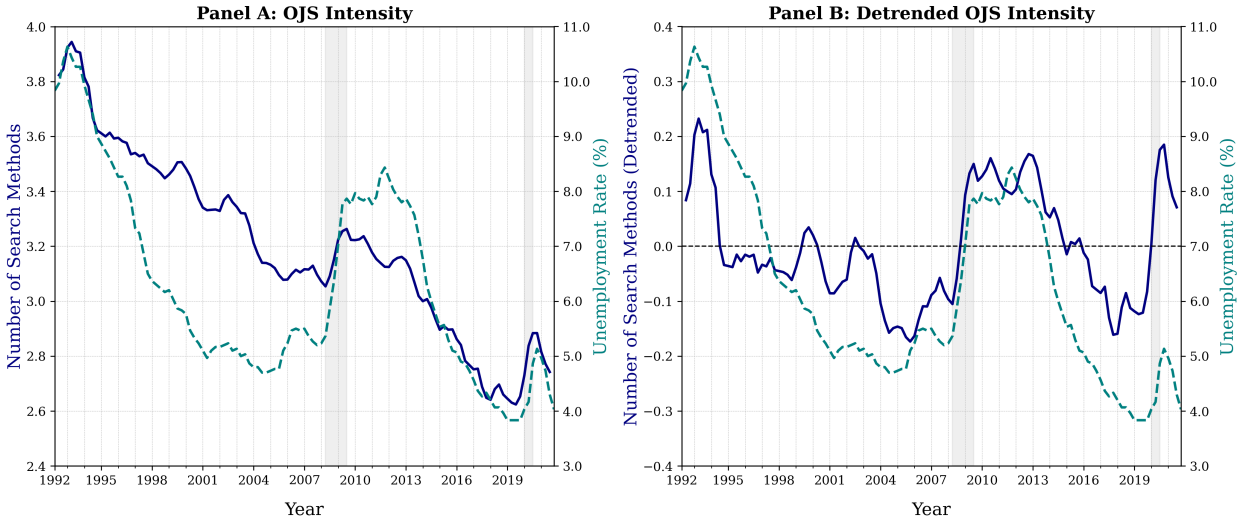
Next, Figure 2 illustrates that a large share of workers engage in OJS for traditional job ladder reasons over the business cycle. While the shares of workers searching for better pay and better nonpay amenities fall at the beginning of a recession, they quickly rise as more workers seek to improve their position in the job ladder. A few years after unemployment peaks, the shares of workers searching for better pay and better amenities then fall as unemployment continues to fall. Whether these time trends reflect changes in job search behavior or compositional changes in the pool of employed workers over the business cycle is explored in the empirical section of this paper.

3.2 Intensive Margin of OJS

While the extensive margin shows how the share of workers engaging in OJS evolves over time, the intensive margin shows how the search intensity of employed job seekers evolves

over time. Figure 3 plots the number of search methods used by employed job seekers from 1992 to 2021 in the UK. Two observations stand out in Figure 3. First, the number of search methods used has steadily declined over time from about 3.8 methods to 2.8 methods. This is in large part due to workers ditching traditional in-person methods, such as visiting a job center, in favor of methods relying more on the internet, such as responding to job ads online. Indeed, Figure A4 in the appendix shows how the share of job seekers using each search method has changed since 1992. While use of most methods has decreased since 1992, methods relying more on the internet have experienced smaller declines or even increased in use over time. Because there is a strong downward trend in the number of search methods used over time, Figure 3 also plots the cyclical component of OJS intensity over the time period under consideration. In particular, the number of search methods was regressed on a linear time trend and the residual was taken as the cyclical component of OJS intensity.

Figure 3: On-the-Job Search Intensity Over the Business Cycle



Notes: Graphs start in 1992: Q2 and end in 2021: Q4. All tick marks reflect the first quarter of the year represented, except the first tick mark. Sample weights used. In Panel A, the three quarter moving average of OJS intensity is plotted to smooth seasonality. In Panel B, the number of search methods is regressed on a linear time trend and the cyclical component is plotted.

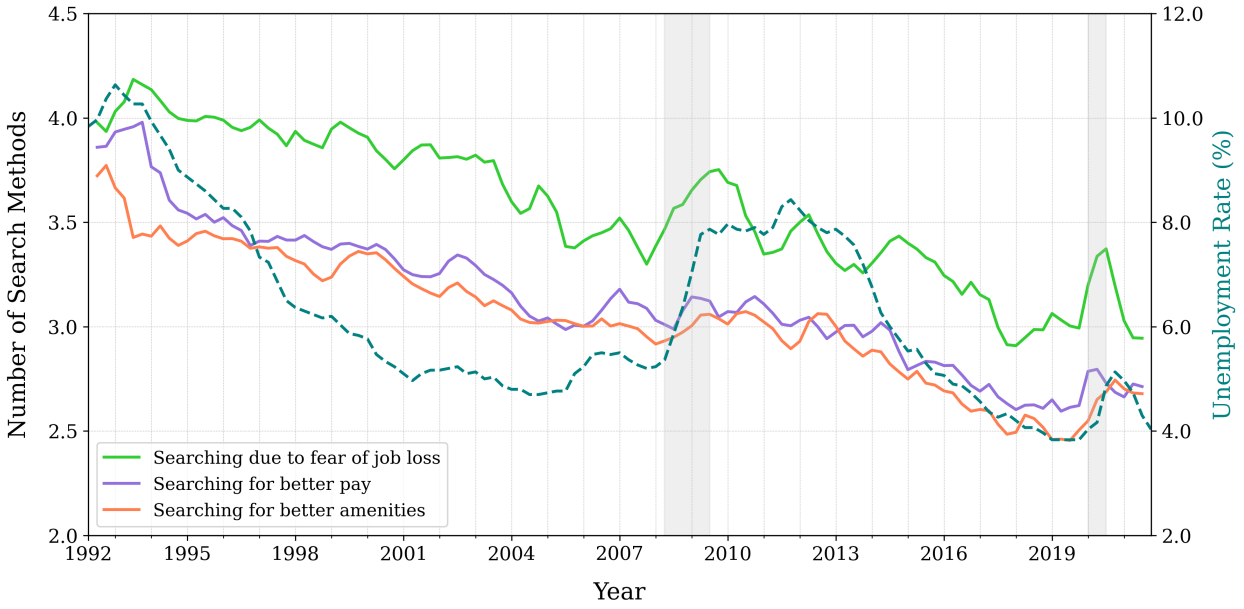
Both graphs in Figure 3 highlight that the number of search methods used by employed job seekers spikes during a recession.[10] Similar to the extensive margin results, it is possible that the rise in average search intensity of employed job seekers is due to compositional changes in the pool of employed job seekers over the business cycle. That is, Figure 3 may simply reflect the fact that the types of workers who engage in OJS during a recession have higher search intensity anyway. Consequently, the empirical section of this paper seeks to disentangle the sources of the increase in average search intensity during a recession. In

10 This finding is similar to that of Mukoyama et al. (2018) who find that search intensity of unemployed job seekers increases during recessions.

particular, it seeks to discern how much of the increase reflects compositional changes in the pool of job seekers and how much of the increase reflects actual increases in search intensity by job seekers during a recession.

Figure 4 plots the average search intensity of workers searching for different reasons over the business cycle. Again, two observations stand out. First, the average search intensity of job seekers who fear losing their job is about 15% higher than that of job seekers who search for better pay or better amenities. The impending threat of unemployment likely creates a sense of urgency in these workers to find a job quickly, leading them to search harder than job seekers motivated by job ladder reasons.[11] Second, while search intensity increases for all job seekers during a recession, search intensity increases most starkly for workers who search due to fear of job loss. With rising unemployment risk and fewer job openings to apply to, workers who fear losing their jobs must search harder to find a job to avoid falling into unemployment.

Figure 4: On-the-Job Search Intensity by Reason Over the Business Cycle



Notes: Graph starts in 1992: Q2 and ends in 2021: Q4. All tick marks reflect the first quarter of the year represented, except the first tick mark. Sample weights used. The three quarter moving average of OJS intensity is plotted to smooth seasonality.

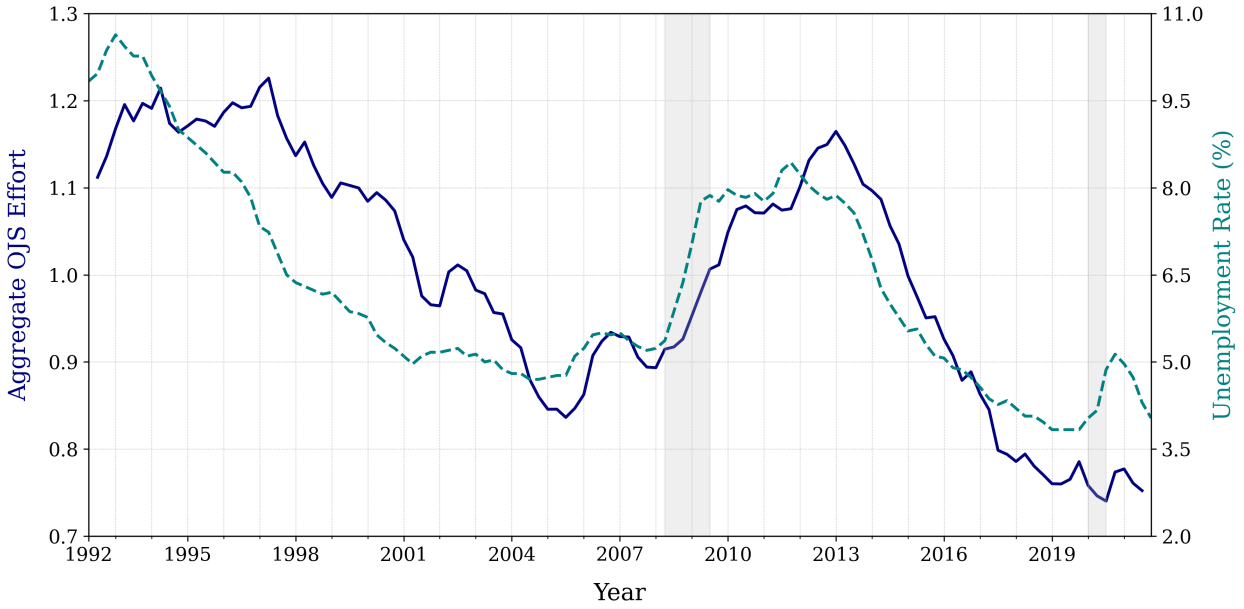
11 Employed job seekers who fear losing their job are about four times as likely to become unemployed the following quarter than job seekers motivated by job ladder reasons.

3.3 Aggregate Search Effort of Employed Workers

This paper defines the aggregate search effort of employed workers as the share of workers searching for another job multiplied by the average search intensity per job seeker plus the share of workers not searching for another job multiplied by the average search intensity per non-job seeker. Since non-job seekers do not exert any search effort by definition, the aggregate search effort of employed workers reduces to the extensive margin times the intensive margin.[12]

Figure 5 plots the total search effort of employed workers from 1992 to 2021, with the average of the time series normalized to 1. Figure 5 illustrates that the aggregate search effort of employed workers closely follows the unemployment rate. When unemployment increases, aggregate search effort of employed workers tends to increase. When unemployment falls, aggregate search effort of employed workers tends to fall.[13]

Figure 5: Aggregate On-the-Job Search Effort Over the Business Cycle



Notes: Aggregate OJS effort is defined as the extensive margin multiplied by the intensive margin. This represents the share of workers searching multiplied by the average search intensity per searcher plus the share of workers not searching multiplied by the average search intensity per non-searcher (0). Graph starts in 1992: Q2 and ends in 2021: Q4. All tick marks reflect the first quarter of the year represented, except the first tick mark. Sample weights used. The three quarter moving average of aggregate OJS effort is plotted to smooth seasonality.

The strong countercyclical nature of aggregate OJS effort is significant because it suggests that employed workers are crowding out the job search of unemployed workers when

12 This is similar to how Mukoyama et al. (2018) defines aggregate search effort of unemployed workers in the US.

13 Mukoyama et al. (2018) similarly find that aggregate search effort of unemployed workers increases during recessions.

unemployment is high. The high level of congestion in the labor market during a recession can contribute to longer unemployment spells of workers, as unemployed workers struggle to compete with employed workers for a limited number of job openings. Furthermore, congestion in the labor market affects the speed with which an economy exits from a recession, since the unemployment rate may take a longer time to fall if employed workers are out-competing unemployed workers when firms hire for open positions.

4 Empirical Strategy

While the extensive and intensive margins of OJS are found to be largely countercyclical, it is unclear whether the aggregate time series results are due to compositional changes in the pool of employed workers and job seekers or due to behavioral changes workers are making in response to changing economic conditions. One of the objectives of this paper is to empirically determine whether workers are changing their OJS behavior when unemployment rises and falls over the business cycle.

4.1 Extensive Margin of OJS

This paper estimates how an individual's probability of engaging in OJS changes with the unemployment rate. To do this, this paper estimates three empirical specifications, which are listed in the three equations below.

(1) *OLS:* $$1(\text{Engage in OJS})_{it} = \beta_0 + \beta_1(\text{UE Rate})_t + \beta_2 \text{t} + \tau_q + \epsilon_{it}$$

(2) *OLS with Controls:* $$1(\text{Engage in OJS})_{it} = \beta_0 + \beta_1(\text{UE Rate})_t + \beta_2 \text{X}_{it} + \beta_3 \text{t} + \tau_q + \epsilon_{it}$$

(3) *Fixed Effects:* $$1(\text{Engage in OJS})_{it} = \beta_0 + \beta_1(\text{UE Rate})_t + \beta_2 \text{X}_{it} + \beta_3 \text{t} + \tau_q + \alpha_i + \epsilon_{it}$$

First, this paper estimates a simple ordinary least squares (OLS) model with a linear time trend and quarter fixed effects to control for seasonality of job search.[14] While this specification yields a basic correlation between the unemployment rate and the decision to engage in OJS, part of the correlation will reflect changes in the composition of workers over the business cycle and part of the correlation will reflect changes in the probability of workers deciding to engage in OJS over the business cycle (if any).

This paper then estimates a second OLS model but with an extensive set of individual controls, including age, age squared, sex, ethnicity, marital status, educational attainment,

14 This paper finds that a higher share of workers search during the first quarter of the year, while a lower share of workers search during the last quarter of the year.

job tenure, full time status, and industry. This specification controls for a changing composition of workers with respect to observable characteristics of workers. However, it is likely that the coefficient on the unemployment rate will reflect a changing composition of workers with respect to unobservable characteristics, making it impossible to say something about how higher unemployment influences individuals' probability of searching for another job. For example, suppose that less productive workers are more likely to search for other jobs than more productive workers. In as much as worker productivity is not captured by the set of controls, it is possible that the pool of employed workers becomes more productive during a recession as less productive workers are more likely to be laid off by firms. In this case, the changing composition of workers would make the coefficient on the unemployment rate smaller (or more negative). Consequently, this specification is still unable to say something about how higher unemployment influences workers' decisions to engage in OJS.

Finally, this paper leverages the panel structure of the LFS to estimate a third model that controls for individual fixed effects. This model allows us to say something more about the behavioral changes workers are making in response to changing economic conditions during their time in the panel. In particular, the fixed effects allow us to abstract from compositional changes happening in the workforce and to focus on whether workers are becoming more or less likely to engage in OJS in response to a changing unemployment rate during their time in the panel.

4.2 Intensive Margin of OJS

Next, this paper estimates how job seekers change their search intensity in response to changing unemployment conditions over the business cycle. As in the time series analysis, the number of search methods used serves as a measure of a job seeker's search intensity, with a larger number of methods used signifying greater search intensity. Similar to the extensive margin, this paper estimates three empirical specifications to evaluate the intensive margin of OJS. The three specifications are outlined in the three equations below.

(1) *OLS:* $\text{Search Intensity}_{it} = \beta_0 + \beta_1(\text{UE Rate})_t + \beta_2 \text{t} + \tau_q + \epsilon_{it}$

(2) *OLS with Controls:* $\text{Search Intensity}_{it} = \beta_0 + \beta_1(\text{UE Rate})_t + \beta_2 \text{X}_{it} + \beta_3 \text{t} + \tau_q + \epsilon_{it}$

(3) *Fixed Effects:* $\text{Search Intensity}_{it} = \beta_0 + \beta_1(\text{UE Rate})_t + \beta_2 \text{X}_{it} + \beta_3 \text{t} + \tau_q + \alpha_i + \epsilon_{it}$

First, this paper estimates a simple OLS model with a linear time trend and quarter fixed effects to control for the general decline in search intensity over time and to control

for seasonal variation in the intensity of job search.[15] While this specification yields a basic correlation between the unemployment rate and search intensity, part of the correlation will reflect changes in the composition of job seekers over the business cycle and part of the correlation will reflect changes in the intensity with which job seekers search for another job over the business cycle (if any).

This paper then estimates a second OLS model but with the same extensive set of controls used in the second model of the extensive margin. This specification controls for a changing composition of job seekers with respect to basic observable characteristics. However, it is likely that the coefficient on the unemployment rate will reflect a changing composition of job seekers with respect to unobservable characteristics, making it impossible to say something about how higher unemployment influences job seekers' intensity of job search. For example, suppose that less productive workers search more intensely than more productive workers. If less productive workers face greater layoff risk during a recession and thus start searching for other jobs in greater numbers due to fear of job loss, it is possible that the pool of employed job seekers becomes relatively less productive during a recession. In this case, the changing composition of job seekers would make the coefficient on the unemployment rate larger (or more positive). Consequently, this specification is still unable to say something about how higher unemployment influences the intensity with which job seekers search for another job.

Finally, this paper exploits the rotating panel of the LFS to estimate a third model that controls for individual fixed effects. Similar to the third model in the extensive margin, this model allows us to say something more about the behavioral changes job seekers are making in response to changing economic conditions during their time in the panel. In particular, the fixed effects allow us to abstract from compositional changes happening in the pool of employed job seekers and to focus on whether job seekers are increasing (or decreasing) their search intensity in response to a changing unemployment rate during their time in the panel.

5 Empirical Results

This paper empirically estimates how unemployment conditions influence the job search behavior of employed workers. Section 5.1 evaluates whether a higher unemployment rate impacts workers' decisions to engage in OJS for different reasons. Section 5.2 assesses how higher unemployment affects the intensity with which employed workers search for another job. Finally, Section 5.3 explores heterogeneity in the empirical results, analyzing how different groups of workers change their job search behavior in response to changing unemployment

15 This paper finds that search intensity is typically highest during the first quarter of the year, while search intensity is lowest during the last quarter of the year.

conditions.

5.1 Extensive Margin of OJS

Table 4 summarizes the extensive margin results from the three specifications outlined in the empirical section. The first column gives the relationship between the unemployment rate and the probability of engaging in OJS for any reason. Columns two through six show the relationship between the unemployment rate and the probability of engaging in OJS for specific reasons, including fear of job loss, better pay, better amenities, desire for an additional job, and other reasons.

Table 4: Extensive Margin Regression Results

		OJS by Reason				
Dependent variable: *OJS Decision*	All OJS	Fear of Job Loss	Better Pay	Better Amenities	Add'l Job	Other Reasons
OLS Regression: Basic						
UE Rate	0.00240***	0.00096***	0.00013	-0.00004	0.00080***	0.00048***
	(0.00033)	(0.00005)	(0.00010)	(0.00012)	(0.00005)	(0.00011)
OLS Regression: Controls						
UE Rate	0.00357***	0.00114***	0.00037***	0.00029**	0.00095***	0.00076***
	(0.00032)	(0.00005)	(0.00012)	(0.00014)	(0.00006)	(0.00013)
Fixed Effect Regression						
UE Rate	0.00117*	0.00159***	-0.00017	-0.00029	0.00084***	0.00026
	(0.00062)	(0.00024)	(0.00027)	(0.00034)	(0.00026)	(0.00036)
Mean OJS Rate	0.065	0.008	0.012	0.018	0.009	0.017
Unique Persons	1,208,080	1,208,080	1,208,080	1,208,080	1,208,080	1,208,080
Observations	4,559,914	4,559,914	4,559,914	4,559,914	4,559,914	4,559,914

Standard errors are clustered by quarter in OLS regressions and individual for FE regressions. Quarter fixed effects and time trend included. Sample weights used. ***, **, and * show significance at the 1%, 5%, and 10% levels.

The first row reveals that the unemployment rate and decision to engage in OJS are positively related, but this result is driven by OJS due to fear of job loss and OJS for an additional job. Indeed, the correlations between the unemployment rate and search for better pay, better amenities, and other reasons are insignificant or smaller in magnitude. The second row of Table 4 shows that the correlation between the unemployment rate and the decision to engage in OJS is still positive after controlling for observable characteristics of workers. Finally, the fixed effects estimates reveal that workers are more likely to engage in OJS when unemployment increases during their time in the panel, but this result is again

driven by OJS due to fear of job loss and OJS for an additional job.

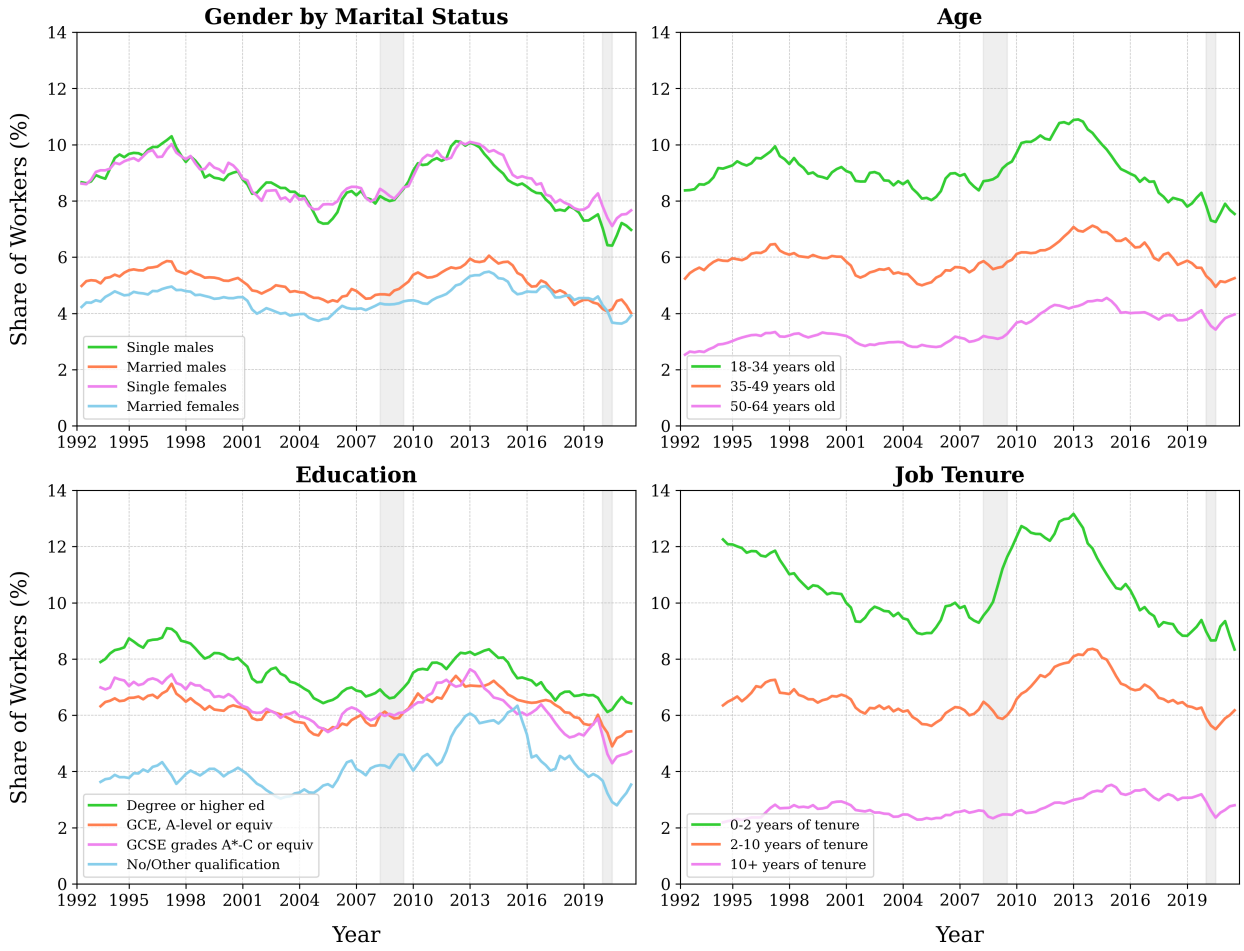
The fixed effects estimates are consistent with the types of job search that we would expect to play a more prominent role during a recession. As unemployment risk and liquidity constraints tend to rise during a recession, we would expect OJS due to fear of job loss and OJS for an additional job to increase during a recession as well. On the other hand, it is not clear why workers should become more likely to search for better pay or better amenities when unemployment is higher. Indeed, the fixed effects estimates show that workers are no more likely to engage in OJS for job ladder reasons when unemployment is high than they are when unemployment is low.

The differences in magnitudes of the coefficients going from the OLS regressions to the fixed effect regressions tell us about the potential role that changes in the composition of workers is playing in the time series results. Unemployment risk, of course, is not random, and different types of workers face different unemployment risks during a recession. Indeed, Figure A5 in the appendix illustrates that unemployment risk of workers is highly correlated with many observable characteristics of workers, including age, marital status, and job tenure. Most notably, workers who are lower tenured face significantly higher unemployment risks than other workers, consistent with many studies that have found that the last workers to join a firm are typically the first to go.

Figure A6 in the appendix depicts how the composition of workers across observable characteristics changes over the business cycle. More specifically, it shows that the pool of employed workers during a recession becomes slightly younger and substantially higher tenured. This is important because younger, lower tenured workers have much higher OJS propensities than other workers, illustrated by Figure 6. If workers with higher propensities of job search are dropping out of the pool of employed workers during a recession, then the pool of workers remaining has a lower average propensity to engage in OJS. This puts downward pressure on the coefficients of the basic OLS regression, as the pool of workers when unemployment is higher has on average lower search propensity. As expected, when we add the set of individual controls in the second specification, the OLS coefficients rise in magnitude as we control for compositional changes in the observable characteristics of workers that are related to both the unemployment rate and workers' probability of OJS.

Nonetheless, the coefficients in the second OLS specification are still biased because unobservable characteristics of workers, such as worker motivation or productivity, can be correlated with the unemployment rate and the decision to engage in OJS. For this reason, this paper prefers the fixed effect specification, as the fixed effect estimates tell us about the behavioral changes workers are making in response to higher unemployment. That is, they reveal that workers are more likely to engage in OJS due to fear of job loss and are more

Figure 6: OJS Rates by Worker Characteristics Over the Business Cycle



Notes: Graphs start in 1992: Q2 and end in 2021: Q4. All tick marks reflect the first quarter of the year represented, except the first tick mark. Sample weights used. The three quarter moving averages are plotted to smooth seasonality. Consistent education groupings are available from 1993:Q2 onward. Job tenure is available from 1994:Q2 onward.

likely to start searching for an additional job when the unemployment rate increases during their time in the panel.

5.2 Intensive Margin of OJS

Table 5 summarizes the intensive margin results from the three specifications outlined in the empirical section. The first column gives the relationship between the unemployment rate and search intensity for workers engaging in OJS for any reason. Columns two through six show the relationship between the unemployment rate and search intensity for workers who are searching for specific reasons, including fear of job loss, better pay, better amenities, desire for an additional job, and other reasons.

Table 5: Intensive Margin Regression Results

		Reason for OJS				
Dependent variable: *No. of Search Methods*	All OJS	Fear of Job Loss	Better Pay	Better Amenities	Add'l Job	Other Reasons
OLS Regression: Basic						
UE Rate	0.061***	0.064***	0.046***	0.045***	0.084***	0.058***
	(0.007)	(0.017)	(0.010)	(0.010)	(0.019)	(0.012)
OLS Regression: Controls						
UE Rate	0.055***	0.070***	0.036***	0.044***	0.078***	0.049***
	(0.007)	(0.017)	(0.011)	(0.011)	(0.019)	(0.013)
Fixed Effect Regression						
UE Rate	0.134***	0.242***	0.099	0.136**	0.269***	0.075
	(0.027)	(0.092)	(0.069)	(0.054)	(0.097)	(0.067)
Mean No. of Methods	3.39	3.72	3.31	3.17	3.23	3.40
Unique Persons	53,783	4,867	8,933	13,477	4,162	10,169
Observations	134,804	11,392	21,809	32,364	9,776	23,868

Standard errors are clustered by quarter in OLS regressions and individual for FE regressions. Quarter fixed effects and time trend included. Sample weights used. ***, **, and * show significance at the 1%, 5%, and 10% levels.

The first row reveals that the unemployment rate and search intensity are positively related for all job seekers, but the correlation is strongest for workers searching due to fear of job loss and workers searching for an additional job. The second row of Table 5 shows that the correlation between the unemployment rate and search intensity of job seekers is still positive after controlling for observable characteristics of job seekers. Finally, the fixed effect estimates reveal that job seekers increase their search intensity when unemployment increases during their time in the panel. In particular, job seekers increase the number of search methods that they use by 0.13 methods on average when the unemployment rate increases by 1 percentage point. This represents a 4% increase in search intensity for each percentage point increase in the unemployment rate, since the average number of search methods used by job seekers is 3.39 methods.

Unsurprisingly, the fixed effect estimates reveal that workers searching due to fear of job loss and workers searching for an additional job increase their search intensity the most during a recession. More specifically, workers searching due to fear of job loss increase their search intensity by 6.5% and workers searching for an additional job increase their search intensity by 8.3% for each percentage point increase in the unemployment rate. Given that unemployment risk rises during a recession, workers who fear losing their jobs face greater urgency in finding another job before they are let go by their firms, motivating these

workers to search harder to avoid the threat of unemployment. While it is unspecified why workers search for additional jobs, it is likely that workers search for additional jobs because their current job does not provide sufficient income. Because liquidity constraints are more prevalent in a recession, heightened financial stress likely motivates these workers to search harder for a second job to obtain greater financial security.

The differences in magnitudes of the coefficients going from the OLS regressions to the fixed effect regressions tell us about the potential role that changes in the composition of job seekers is playing in the time series results. As Figure A5 in the appendix shows, unemployment risk is highly correlated with observable characteristics of workers, with younger and lower tenured workers facing much higher layoff risks. Therefore, the pool of employed workers becomes relatively older and longer-tenured during a recession. However, the pool of job seekers does not change as starkly as the pool of employed workers over the business cycle. While the pool of employed workers is higher tenured during a recession, lower-tenured workers are much more likely to engage in OJS during a recession because they are the most at risk. Thus, their share in the pool of job seekers during a recession remains similar to their share in the pool of job seekers during a boom, even though they represent a much smaller share of workers during a recession. Indeed, Figure A7 in the appendix shows that the pool of employed job seekers changes little in terms of observable characteristics during a recession, with lower tenured workers representing a slightly larger share of job seekers when unemployment is higher.

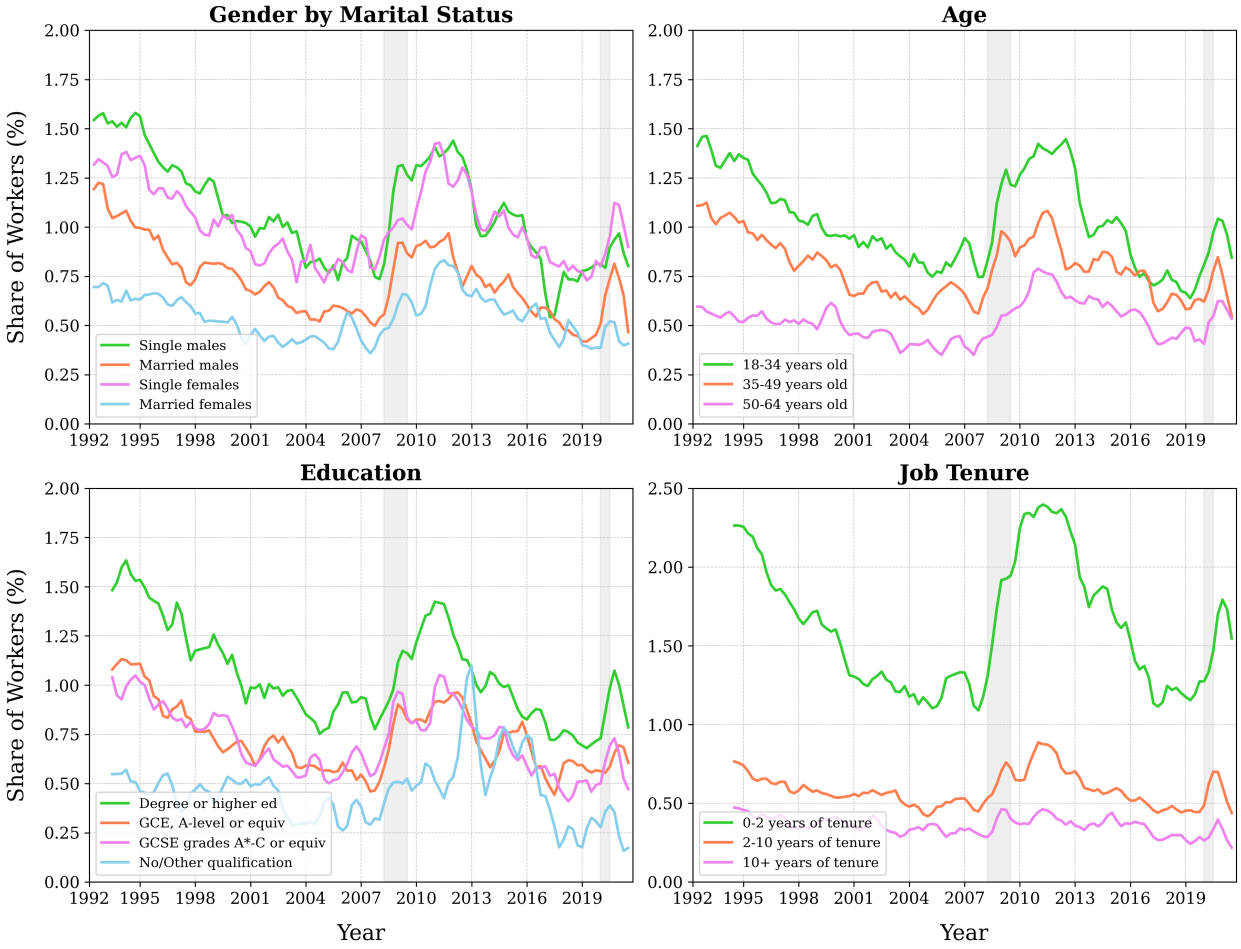
Because the composition of job seekers does not change significantly with respect to observable characteristics, adding the set of individual controls in the second OLS specification does not alter the magnitudes of the coefficients much. Nonetheless, the coefficients on the second OLS specification are still biased because unobservable characteristics of workers, such as worker motivation or productivity, can be correlated with the unemployment rate and search intensity. For this reason, this paper prefers the fixed effect specification, as the fixed effect estimates tell us about the behavioral changes workers are making in response to higher unemployment. That is, they reveal that most workers who engage in OJS increase their search intensity when the unemployment rate increases during their time in the panel, and this result becomes larger when workers are searching due to fear of job loss or for an additional job.

5.3 Heterogeneity Analysis

In the empirical analysis of the extensive margin, this paper finds that workers are more likely to engage in OJS due to fear of job loss when unemployment increases during their

time in the panel. This section explores the heterogeneous impact of the unemployment rate on the decision to engage in OJS due to fear of job loss among different groups of workers.

Figure 7: OJS due to Fear of Job Loss by Worker Characteristics Over the Business Cycle



Notes: Graphs start in 1992: Q2 and end in 2021: Q4. All tick marks reflect the first quarter of the year represented, except the first tick mark. Sample weights used. The three quarter moving averages are plotted to smooth seasonality. Consistent education groupings are available from 1993:Q2 onward. Job tenure is available from 1994:Q2 onward.

Figure 7 shows the share of workers engaging in OJS due to fear of job loss across several observable characteristics of workers. From the figure, we see that higher educated workers, younger workers, and shorter-tenured workers are more likely to search for another job due to fear of job loss at any point over the business cycle. The fact that younger and lower-tenured workers are more likely to engage in precautionary OJS is unsurprising given that these workers face much higher unemployment risks. In addition, the finding that educated workers are also more likely to engage in precautionary OJS is consistent with educated workers engaging more frequently in similar behaviors, such as precautionary

saving.[16] While these workers are more likely to engage in precautionary OJS in general, they are also the most likely to start searching for another job due to fear of job loss during a recession. Most strikingly, the share of low tenured workers searching due to fear of job loss jumps from about 1% in early 2008 to a peak of nearly 2.5% during the Great Recession.

Table 6: Heterogeneity Analysis: Extensive Margin Regression Results

Dependent variable: OJS Decision	(1)	(2)	(3)	(4)	(5)	(6)
UE Rate	0.00159***	0.00127***	0.00158***	0.00108**	0.00118***	0.00051
UE Rate Interactions						
Male		0.00064				0.00073*
Married		-0.00000				-0.00001
Degree or higher ed.			0.00080*			0.00079*
GCE, A level			0.00032			0.00031
GCSE grades A-C*			0.00044			0.00044
No/Other qualification			0.00022			0.00022
18-34 yrs old				0.00075*		0.00040
35-49 yrs old				0.00039		0.00026
0-2 yrs of tenure					0.00057*	0.00056
2-10 yrs of tenure					0.00017	0.00016
10+ yrs of tenure					-0.00085***	-0.00084***
R-squared	0.45242	0.45242	0.45280	0.45242	0.45242	0.45281
Unique Persons	1,208,080	1,208,080	1,208,080	1,208,080	1,208,080	1,208,080
Observations	4,559,914	4,559,914	4,559,914	4,559,914	4,559,914	4,559,914

Standard errors are clustered by individual. Quarter fixed effects and linear time trend included. Sample weights used. The excluded categories for education and tenure include observations with missing education and tenure information. The excluded category for age includes 50-64 year old respondents. *, **, and *** show significance at the 1%, 5%, and 10% levels.

Table 6 further explores the heterogeneous responses of workers to higher unemployment by interacting observable characteristics of workers with the unemployment rate in the fixed effect specification. When we interact education levels with the unemployment rate, we see that higher educated workers are significantly more likely to start searching on-the-job due to fear of job loss. Moreover, younger workers and lower tenured workers are also more likely to engage in OJS due to fear of job loss in response to higher unemployment. These results

16 Kennickell and Lusardi (2004) find that individuals with higher levels of education are more likely to report higher desired levels of precautionary savings after controlling for wealth, income levels, and demographic characteristics of workers.

highlight the fact that workers who are most likely to be concerned about job security are the most responsive to changes in unemployment risk. In particular, educated and lower tenured workers are more likely to engage in precautionary OJS when the unemployment rate increases during their time in the panel.

6 Conclusion

This paper studies the cyclicality of OJS using data from the UK LFS. First, this paper analyzes the aggregate OJS behavior of workers from 1992 to 2021. In particular, it finds that a higher share of workers tends to engage in OJS when unemployment is higher and average search intensity of employed job seekers is higher during a recession. This paper then combines the extensive and intensive margins of OJS to create an aggregate measure of job search effort and finds that aggregate search effort of employed workers closely follows the unemployment rate.

While this paper finds aggregate search effort to be countercyclical, it is not immediately clear from the time series whether the countercyclicality is due to compositional changes in the pool of employed workers and job seekers or due to behavioral changes workers are making in response to changing economic conditions. To this end, this paper leverages the panel structure of the LFS to estimate how changing unemployment conditions influence OJS behavior of workers during their time in the panel. Most notably, this paper finds that higher unemployment increases the probability that a worker engages in OJS due to fear of job loss and OJS for an additional job. In addition, this paper finds that higher unemployment increases the intensity with which workers search for another job.

Lastly, the findings of this paper open up new doors for future research. First, this paper documents the large presence of a precautionary motive of OJS and shows that this motive plays a heightened role in motivating job search during a recession. Future work can incorporate the precautionary motive of OJS into search models to better reflect motives for job mobility and to quantify the impacts that the precautionary motive has on the evolution of the unemployment rate over the business cycle. Second, the findings of this paper suggest that unemployment benefits can potentially influence the OJS behavior of workers, especially during a recession. More specifically, it is possible that UI benefits can reduce the threat of job loss, leading some workers to not search for another job and become unemployed. While Gutierrez (2016) finds that an increase in the UI replacement rate indeed decreases the probability of OJS among older Americans nearing retirement, future work is needed to determine if these results are generalizable to the broader population.

References

Ahn, H. J., & Shao, L. (2021). The cyclicality of on-the-job search effort. *The BE Journal of Macroeconomics*, *21*(1), 185–220.

Bonhomme, S., & Jolivet, G. (2009). The pervasive absence of compensating differentials. *Journal of Applied Econometrics*, *24*(5), 763–795.

Carrillo-Tudela, C., Hobijn, B., She, P., & Visschers, L. (2016). The extent and cyclicality of career changes: Evidence for the uk. *European Economic Review*, *84*, 18–41.

Christensen, B. J., Lentz, R., Mortensen, D. T., Neumann, G. R., & Werwatz, A. (2005). On-the-job search and the wage distribution. *Journal of Labor Economics*, *23*(1), 31–58.

Eeckhout, J., & Lindenlaub, I. (2019). Unemployment cycles. *American Economic Journal: Macroeconomics*, *11*(4), 175–234.

Faberman, R. J., Mueller, A. I., Şahin, A., & Topa, G. (2022). Job search behavior among the employed and non-employed. *Econometrica*, *90*(4), 1743–1779.

Fallick, B., & Fleischman, C. A. (2004). Employer-to-employer flows in the us labor market: The complete picture of gross worker flows. *Available at SSRN 594824*.

Fujita, S. (2010). An empirical analysis of on-the-job search and job-to-job transitions.

Gutierrez, I. A. (2016). Job insecurity, unemployment insurance and on-the-job search. evidence from older american workers. *Labour Economics*, *41*, 228–245.

Hall, R. E., & Mueller, A. I. (2018). Wage dispersion and search behavior: The importance of nonwage job values. *Journal of Political Economy*, *126*(4), 1594–1637.

Jarosch, G. (2021). *Searching for job security and the consequences of job loss* (tech. rep.). National Bureau of Economic Research.

Kennickell, A., & Lusardi, A. (2004). Disentangling the importance of the precautionary saving mode.

Krause, M. U., & Lubik, T. A. (2010). *On-the-job search and the cyclical dynamics of the labor market* (tech. rep.). Federal Reserve Bank of Richmond.

Light, A., & Omori, Y. (2004). Unemployment insurance and job quits. *Journal of Labor Economics*, *22*(1), 159–188.

Martin, D., & Pierrard, O. (2014). On-the-job search and cyclical unemployment: Crowding out vs. vacancy effects. *Journal of Economic Dynamics and Control*, *44*, 235–250.

Mortensen, D. T. (1986). Job search and labor market analysis. *Handbook of labor economics*, *2*, 849–919.

Mueller, A. (2010). On-the-job search and wage dispersion: New evidence from time use data. *Economics Letters*, *109*(2), 124–127.

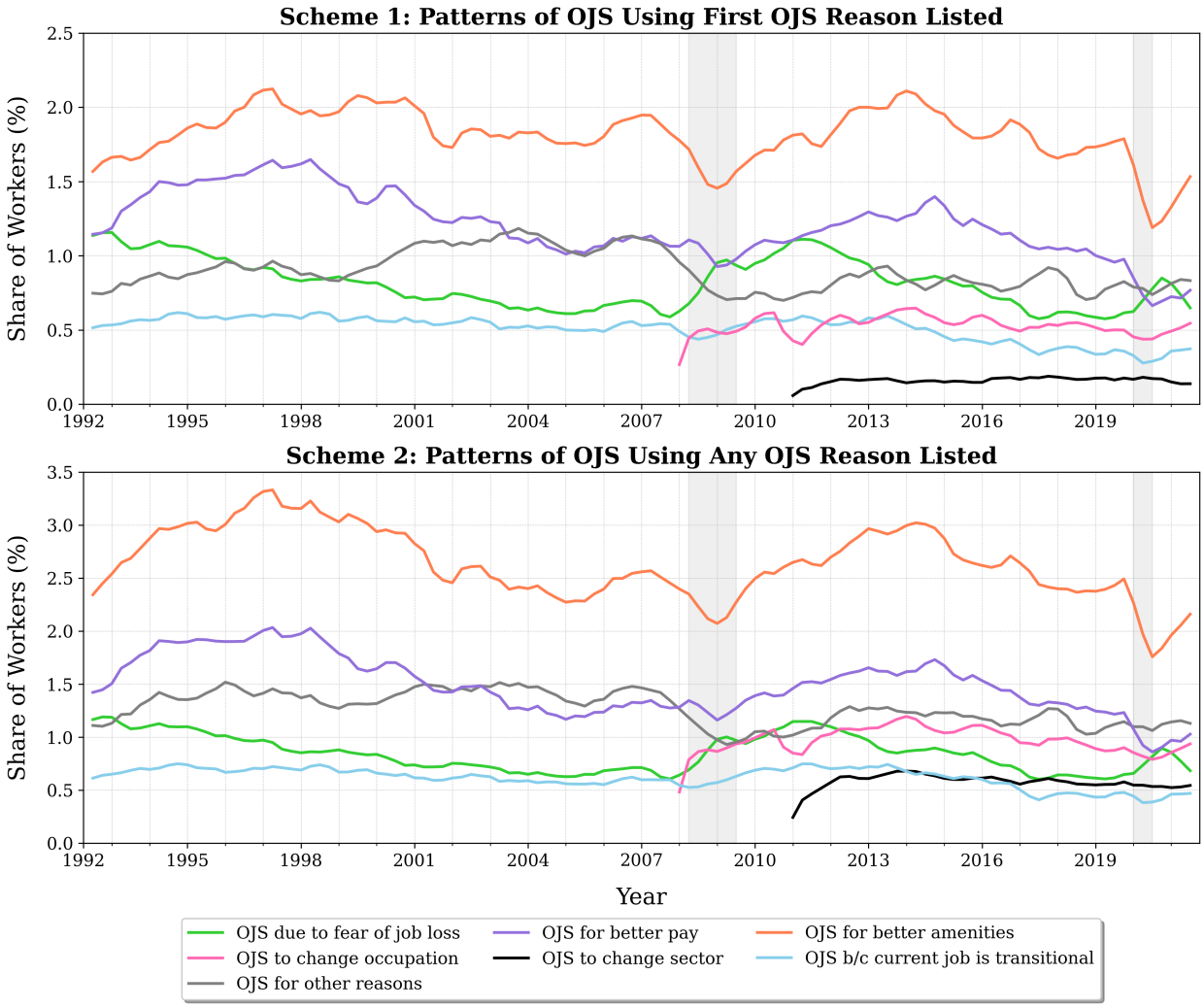
Mukoyama, T., Patterson, C., & Şahin, A. (2018). Job search behavior over the business cycle. *American Economic Journal: Macroeconomics*, *10*(1), 190–215.

Shimer, R. (2004). *Search intensity* (tech. rep.). Citeseer.

Sullivan, P., & To, T. (2014). Search and nonwage job characteristics. *Journal of Human Resources*, *49*(2), 472–507.

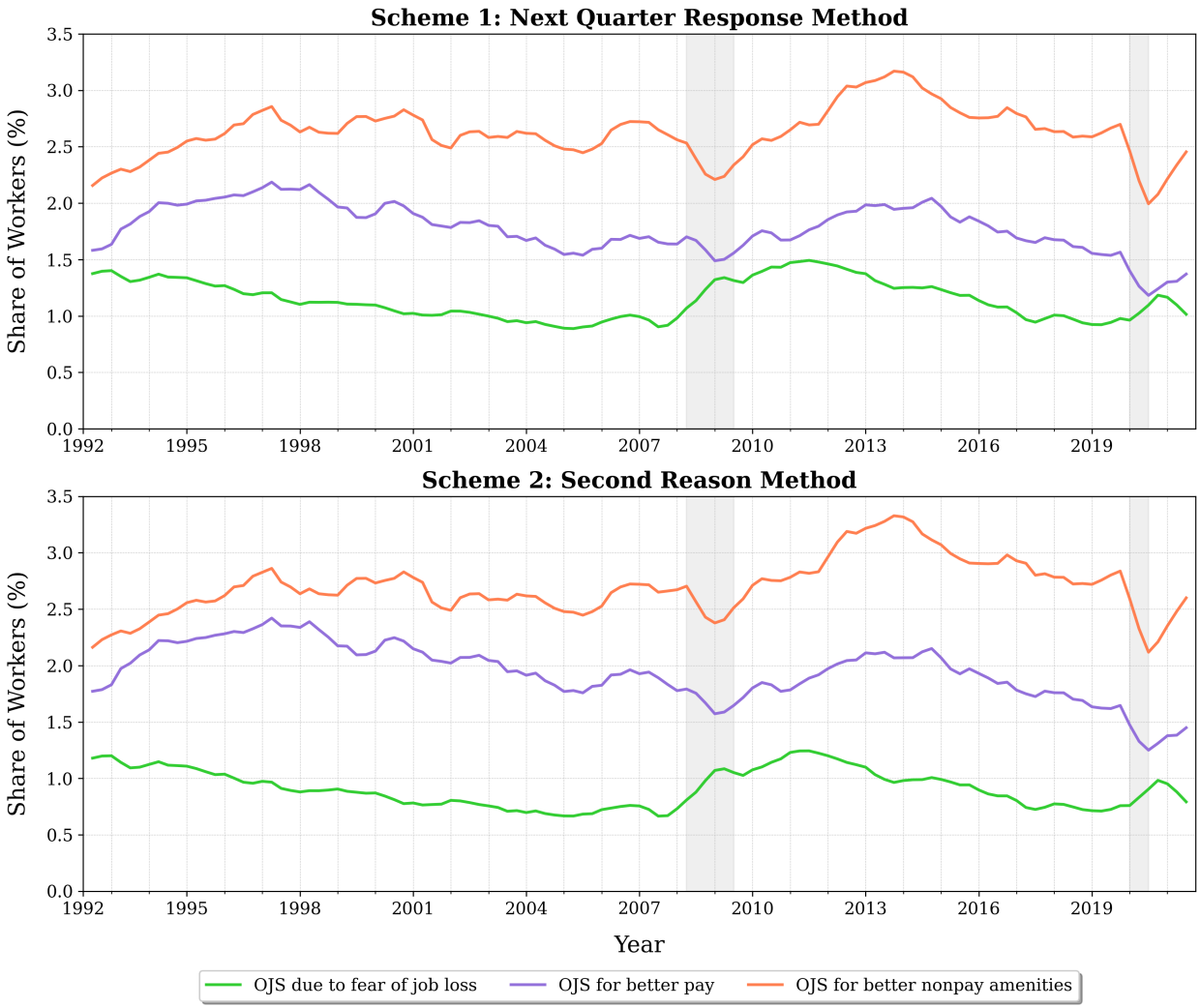
Appendix A: Figures

Figure A1: OJS Over the Business Cycle: First Listed Reason vs Any Listed Reason



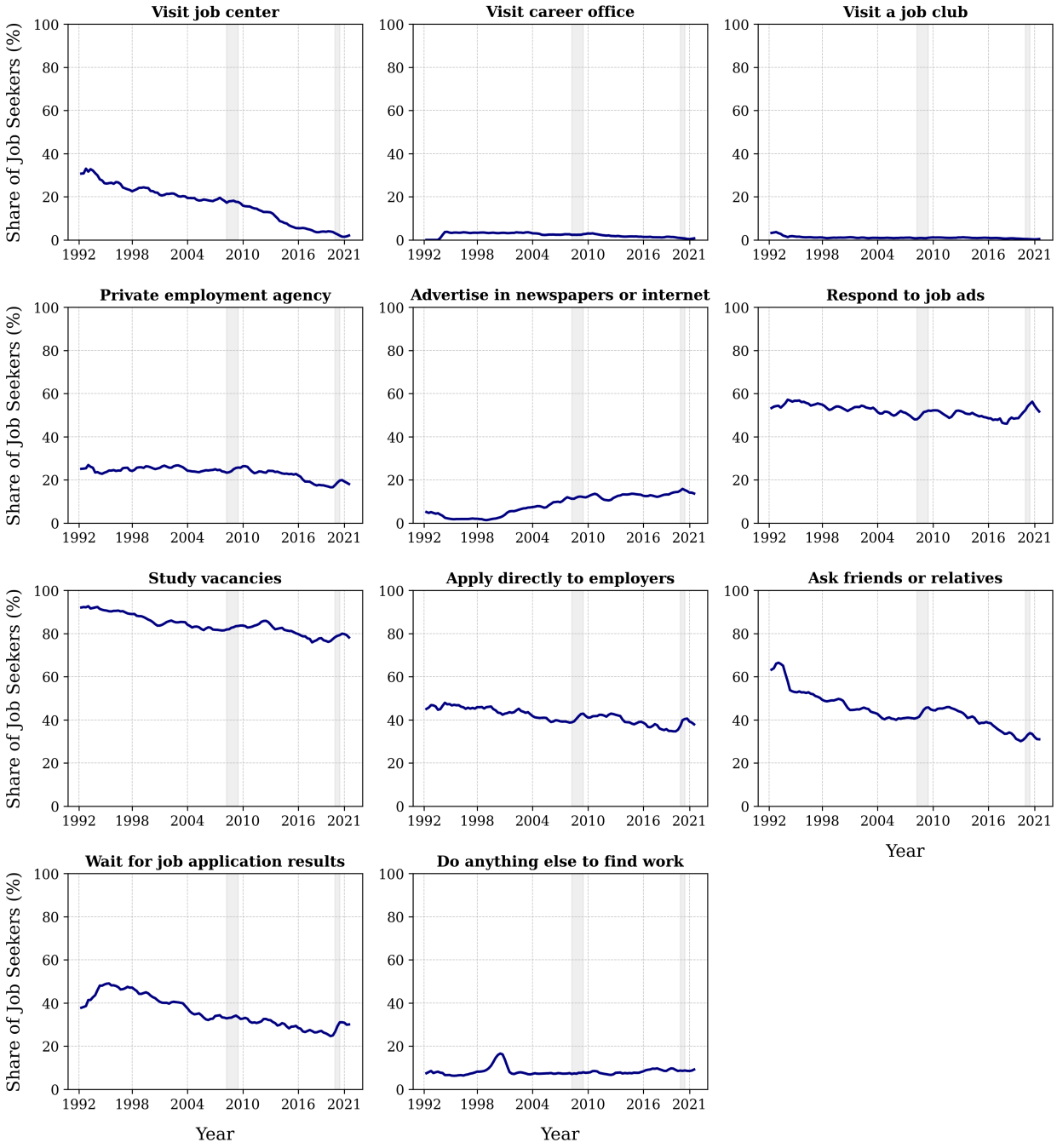
Notes: Graphs start in 1992: Q2 and end in 2021: Q4. All tick marks reflect the first quarter of the year represented, except the first tick mark. Sample weights used. The three quarter moving averages are plotted to smooth seasonality. Scheme 1 plots OJS by reason using the first OJS reason listed by respondents. Scheme 2 plots OJS by reason using any OJS reason indicated by respondents (i.e. second and third reasons listed).

Figure A2: Top Three Reasons for OJS Under Different Apportionment Schemes



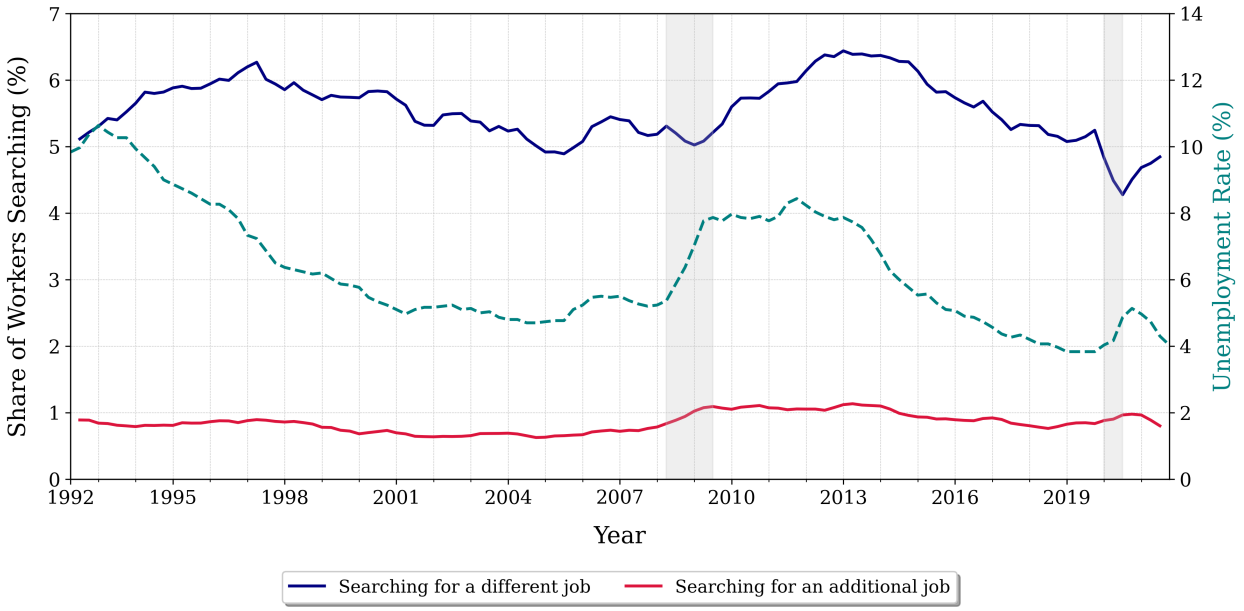
Notes: Graphs start in 1992: Q2 and end in 2021: Q4. All tick marks reflect the first quarter of the year represented, except the first tick mark. Sample weights used. The three quarter moving averages are plotted to smooth seasonality. Scheme 1 apportions individuals who list change occupation, change sector, transitional jobs, and other reasons as their first OJS reason by using the OJS reason breakdown of these individuals the next quarter. Scheme 2 apportions individuals who list change occupation, change sector, transitional jobs, and other reasons as their first OJS reason by using the second OJS reason listed by these individuals who list multiple OJS reasons.

Figure A3: Prevalence of OJS Methods Over the Business Cycle



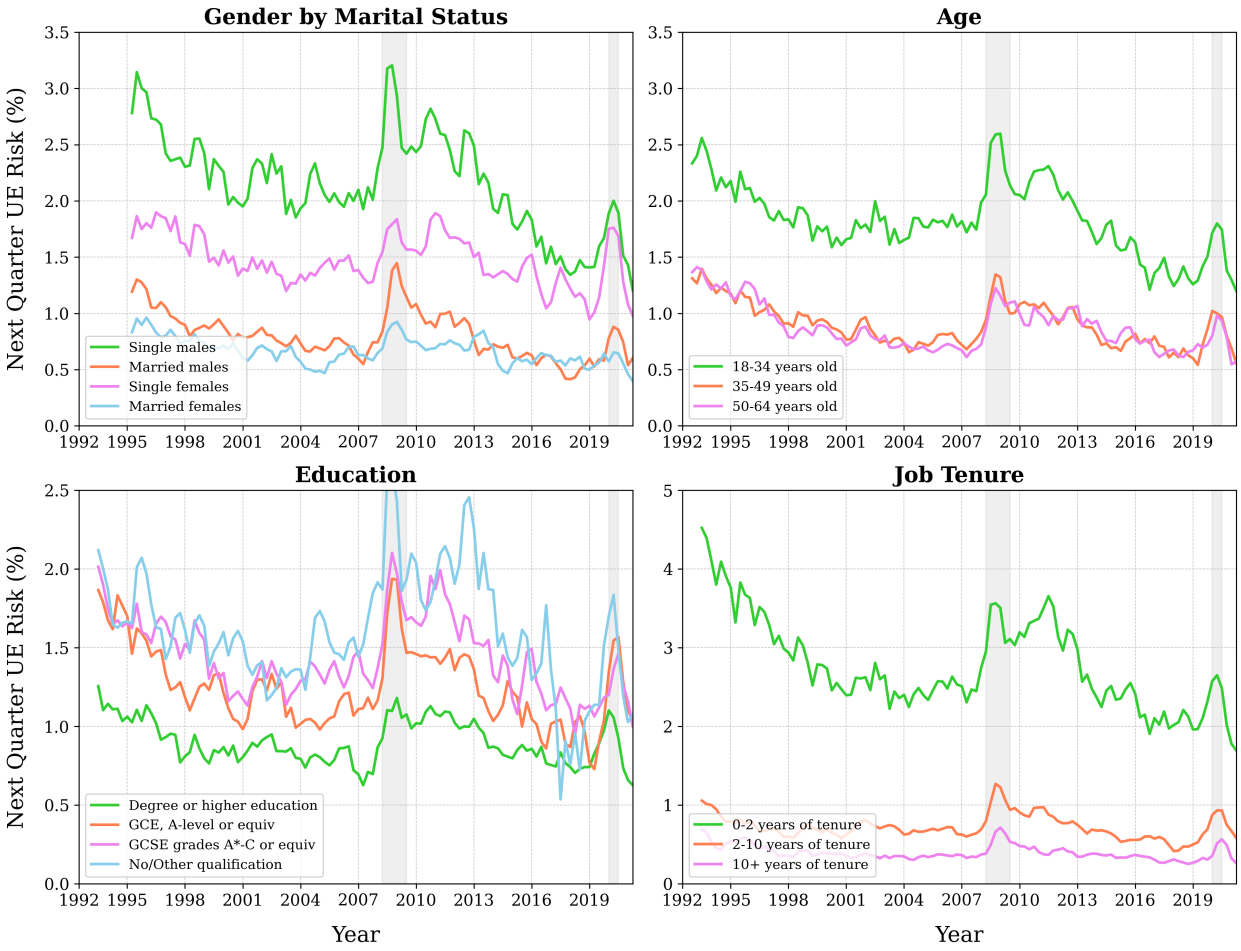
Notes: Graphs start in 1992: Q2 and end in 2021: Q4. All tick marks reflect the first quarter of the year represented, except the first tick mark. Sample weights used. The three quarter moving averages are plotted to smooth seasonality.

Figure A4: OJS for a Different or Additional Job Over the Business Cycle



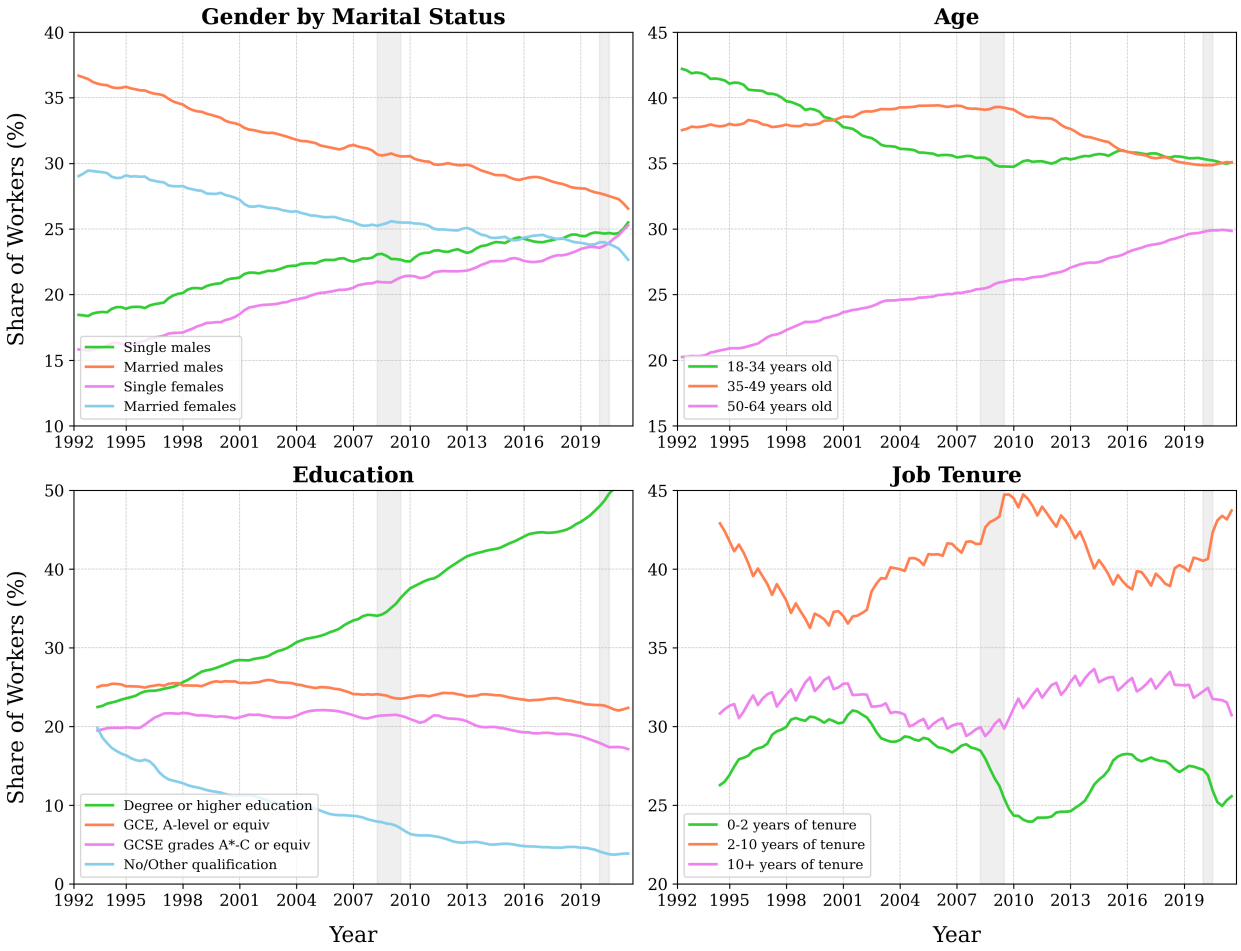
Notes: Graph starts in 1992: Q2 and ends in 2021: Q4. All tick marks reflect the first quarter of the year represented, except the first tick mark. Sample weights used. The three quarter moving averages of OJS rates are plotted to smooth seasonality.

Figure A5: Next Quarter Unemployment Risk by Worker Characteristics



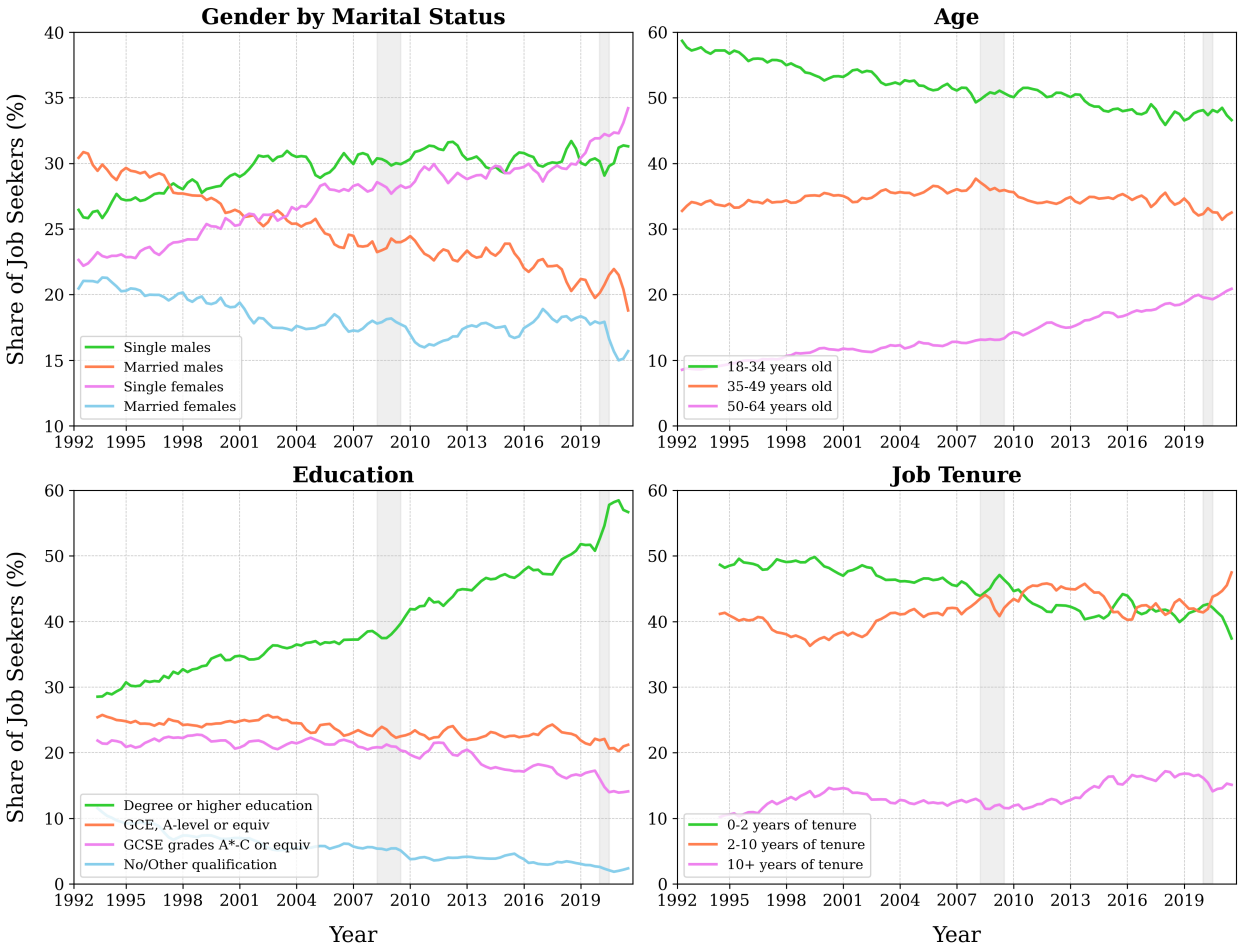
Notes: Graphs start in 1992: Q2 and end in 2021: Q4. All tick marks reflect the first quarter of the year represented, except the first tick mark. Quarter Sample weights used. The three quarter moving averages are plotted to smooth seasonality. Data for the time series comes from the Two Quarter Longitudinal Labour Force Survey. Marital status is available from 1995:Q1 onward. Consistent education groupings are available from 1993:Q2 onward. Job tenure is available from 1993:Q2 onward.

Figure A6: Worker Characteristics Over the Business Cycle



Notes: Graphs start in 1992: Q2 and end in 2021: Q4. All tick marks reflect the first quarter of the year represented, except the first tick mark. Sample weights used. The three quarter moving averages are plotted to smooth seasonality. Consistent education groupings are available from 1993:Q2 onward. Job tenure is available from 1994:Q2 onward.

Figure A7: Job Seeker Characteristics Over the Business Cycle



Notes: Graphs start in 1992: Q2 and end in 2021: Q4. All tick marks reflect the first quarter of the year represented, except the first tick mark. Sample weights used. The three quarter moving averages are plotted to smooth seasonality. Consistent education groupings are available from 1993:Q2 onward. Job tenure is available from 1994:Q2 onward.

Appendix B: Tables

Table B1: Extensive Margin: Basic OLS Regression Results

		OJS by Reason				
Dependent variable: *OJS Decision*	All OJS	Fear of Job Loss	Better Pay	Better Amenities	Add'l Job	Other Reasons
UE Rate	0.00240***	0.00096***	0.00013	-0.00004	0.00080***	0.00048***
	(0.00033)	(0.00005)	(0.00010)	(0.00012)	(0.00005)	(0.00011)
Time	0.00005***	0.00001***	-0.00005***	-0.00003***	0.00005***	0.00007***
	(0.00002)	(0.00000)	(0.00001)	(0.00001)	(0.00000)	(0.00001)
Constant	0.04756***	0.00181***	0.01430***	0.02020***	0.00094**	0.01041***
	(0.00258)	(0.00042)	(0.00086)	(0.00099)	(0.00045)	(0.00092)
R-squared	0.00020	0.00029	0.00025	0.00005	0.00022	0.00020
Observations	4,559,914	4,559,914	4,559,914	4,559,914	4,559,914	4,559,914

Standard errors are clustered by quarter. Quarter fixed effects and linear time trend (year x quarter) included. Sample weights used. ***, **, and * show significance at the 1%, 5%, and 10% levels.

Table B2: Extensive Margin: OLS with Controls Regression Results

		OJS by Reason				
Dependent variable: *OJS Decision*	All OJS	Fear of Job Loss	Better Pay	Better Amenities	Add'l Job	Other Reasons
UE Rate	0.00357***	0.00114***	0.00037***	0.00029**	0.00095***	0.00076***
	(0.00032)	(0.00005)	(0.00012)	(0.00014)	(0.00006)	(0.0001)
Male	0.01924***	0.00102***	0.00502***	0.00210***	0.00468***	0.00601***
	(0.00052)	(0.00014)	(0.00020)	(0.00021)	(0.00018)	(0.00021)
Nonwhite	0.02024***	0.00084***	0.00402***	0.00071**	0.00908***	0.00519***
	(0.00078)	(0.00023)	(0.00033)	(0.00034)	(0.00033)	(0.00045)
Age	0.00061***	0.00046***	0.00030***	0.00086***	0.00042***	-0.00147***
	(0.00014)	(0.00003)	(0.00006)	(0.00006)	(0.00005)	(0.00006)
Age Squared	-0.00002***	-0.00001***	-0.00001***	-0.00001***	-0.00001***	0.00001***
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
Married	-0.02174***	-0.00222***	-0.00426***	-0.00451***	-0.00451***	-0.00591***
	(0.00048)	(0.00013)	(0.00019)	(0.00020)	(0.00017)	(0.00017)
Full time	-0.03668***	0.00048***	0.00076***	-0.00805***	-0.01870***	-0.00991***
	(0.00117)	(0.00015)	(0.00024)	(0.00040)	(0.00043)	(0.00032)
0-2 years of tenure	0.03592***	0.00845***	0.00661***	0.00696***	0.00520***	0.00809***
	(0.00246)	(0.00040)	(0.00073)	(0.00075)	(0.00044)	(0.00099)
2-10 years of tenure	0.00926***	-0.00130***	0.00478***	0.00468***	0.00004	0.00086
	(0.00238)	(0.00032)	(0.00069)	(0.00077)	(0.00040)	(0.00096)
10+ years of tenure	-0.01538***	-0.00373***	-0.00269***	-0.00402***	-0.00199***	-0.00293***
	(0.00233)	(0.00033)	(0.00068)	(0.00075)	(0.00040)	(0.00094)
Degree or higher ed.	0.01821***	0.00210***	0.00126	0.00213	0.00223*	0.00985***
	(0.00608)	(0.00075)	(0.00152)	(0.00150)	(0.00114)	(0.00156)
GCE, A-level or equiv.	0.00274	-0.00056	0.00119	-0.00014	0.00160	0.00010
	(0.00603)	(0.00073)	(0.00151)	(0.00151)	(0.00111)	(0.00152)
GCSE, A*-C or equiv.	0.00197	-0.00048	0.00163	0.00074	0.00101	-0.00149
	(0.00604)	(0.00075)	(0.00151)	(0.00149)	(0.00112)	(0.00153)
No/Other qualification	-0.00422	-0.00151**	0.00064	-0.00176	0.00090	-0.00301**
	(0.00604)	(0.00074)	(0.00152)	(0.00150)	(0.00113)	(0.00151)
Time	-0.00001	0.00000	-0.00005***	-0.00004***	0.00003***	0.00004***
	(0.00002)	(0.00000)	(0.00001)	(0.00001)	(0.00000)	(0.00001)
Constant	0.06226***	-0.00919***	0.00430*	0.01141***	0.00508***	0.05113***
	(0.00742)	(0.00123)	(0.00230)	(0.00227)	(0.00144)	(0.00239)
R-squared	0.02403	0.00444	0.00452	0.00434	0.01065	0.01100
Observations	4,559,914	4,559,914	4,559,914	4,559,914	4,559,914	4,559,914

Standard errors are clustered by quarter. Quarter fixed effects and linear time trend (year x quarter) included. Industry dummies excluded from table. Sample weights used. ***, **, and * show significance at the 1%, 5%, and 10% levels.

Table B3: Extensive Margin: Fixed Effect Regression Results

		OJS by Reason				
Dependent variable: *OJS Decision*	All OJS	Fear of Job Loss	Better Pay	Better Amenities	Add'l Job	Other Reasons
UE Rate	0.00117*	0.00159***	-0.00017	-0.00029	0.00084***	0.00026
	(0.00062)	(0.00024)	(0.00027)	(0.00034)	(0.00026)	(0.00036)
Age	-0.00850***	-0.00123***	-0.00282***	-0.00169***	0.00003	-0.00259***
	(0.00110)	(0.00035)	(0.00051)	(0.00059)	(0.00043)	(0.00062)
Age Squared	0.00009***	0.00001***	0.00003***	0.00002**	0.00000	0.00003***
	(0.00001)	(0.00000)	(0.00001)	(0.00001)	(0.00000)	(0.00001)
Married	-0.00350	0.00055	-0.00045	-0.00342***	-0.00100	0.00060
	(0.00216)	(0.00074)	(0.00114)	(0.00116)	(0.00076)	(0.00111)
Full time	-0.07338***	-0.00131**	-0.00515***	-0.01796***	-0.02268***	-0.02454***
	(0.00159)	(0.00061)	(0.00061)	(0.00086)	(0.00078)	(0.00104)
0-2 years of tenure	-0.03881***	-0.00900***	-0.00579***	-0.01328***	-0.00053	-0.01006***
	(0.00130)	(0.00055)	(0.00060)	(0.00072)	(0.00053)	(0.00074)
2-10 years of tenure	0.01929***	0.00002	0.00584***	0.00804***	0.00006	0.00511***
	(0.00107)	(0.00044)	(0.00050)	(0.00060)	(0.00045)	(0.00059)
10+ years of tenure	0.02279***	0.00616***	0.00419***	0.00795***	-0.00059	0.00498***
	(0.00114)	(0.00050)	(0.00050)	(0.00064)	(0.00047)	(0.00063)
Time	-0.00307***	-0.00030***	-0.00057***	-0.00122***	-0.00012**	-0.00078***
	(0.00014)	(0.00005)	(0.00006)	(0.00008)	(0.00005)	(0.00008)
Constant	0.47683***	0.04466***	0.11177***	0.13776***	0.03109***	0.13218***
	(0.02495)	(0.00832)	(0.01167)	(0.01349)	(0.00946)	(0.01442)
Observations	4,559,914	4,559,914	4,559,914	4,559,914	4,559,914	4,559,914
R-squared	0.52525	0.45289	0.47791	0.45973	0.45197	0.47077

Standard errors are clustered by individual. Quarter fixed effects and linear time trend (year x quarter) included. Sample weights used. ***, **, and * show significance at the 1%, 5%, and 10% levels.

Table B4: Intensive Margin: Basic OLS Regression Results

		OJS by Reason				
Dependent variable: *No. of search methods*	All OJS	Fear of Job Loss	Better Pay	Better Amenities	Add'l Job	Other Reasons
UE Rate	0.061***	0.064***	0.046***	0.045***	0.084***	0.058***
	(0.007)	(0.017)	(0.010)	(0.010)	(0.019)	(0.012)
Time	-0.005***	-0.007***	-0.005***	-0.006***	-0.002*	-0.007***
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Constant	3.301***	3.709***	3.288***	3.219***	2.947***	3.459***
	(0.054)	(0.128)	(0.078)	(0.079)	(0.135)	(0.093)
R-squared	0.012	0.016	0.013	0.014	0.008	0.016
Unique Persons	53,783	4,867	8,933	13,477	4,162	10,169
Observations	134,804	11,392	21,809	32,364	9,776	23,868

Standard errors are clustered by quarter. Quarter fixed effects and linear time trend (year x quarter) included. Sample weights used. ***, **, and * show significance at the 1%, 5%, and 10% levels.

Table B5: Intensive Margin: OLS with Controls Regression Results

		OJS by Reason				
Dependent variable: *No. of search methods*	All OJS	Fear of Job Loss	Better Pay	Better Amenities	Add'l Job	Other Reasons
UE Rate	0.055***	0.070***	0.036***	0.044***	0.078***	0.049***
	(0.007)	(0.017)	(0.011)	(0.011)	(0.019)	(0.013)
Male	0.181***	0.205***	0.139***	0.142***	0.223***	0.210***
	(0.012)	(0.043)	(0.033)	(0.026)	(0.045)	(0.030)
Nonwhite	0.059***	-0.188**	0.091**	-0.073	0.150**	0.065
	(0.020)	(0.081)	(0.046)	(0.045)	(0.061)	(0.041)
Age	-0.019***	0.029*	-0.008	-0.012	-0.018	-0.054***
	(0.004)	(0.015)	(0.008)	(0.008)	(0.014)	(0.008)
Age Squared	0.000***	-0.000**	0.000	0.000	0.000	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Married	-0.100***	0.009	-0.058*	-0.122***	-0.210***	-0.093***
	(0.015)	(0.055)	(0.032)	(0.020)	(0.044)	(0.032)
Full time	-0.270***	-0.048	-0.207***	-0.206***	-0.444***	-0.372***
	(0.014)	(0.054)	(0.037)	(0.032)	(0.061)	(0.031)
0-2 years of tenure	0.055	0.757***	-0.110	0.332	-0.637*	-0.028
	(0.147)	(0.271)	(0.303)	(0.281)	(0.331)	(0.311)
2-10 years of tenure	-0.301**	0.333	-0.358	0.054	-0.802**	-0.357
	(0.149)	(0.273)	(0.303)	(0.283)	(0.339)	(0.307)
10+ years of tenure	-0.558***	0.154	-0.641**	-0.206	-0.896**	-0.687**
	(0.149)	(0.268)	(0.308)	(0.287)	(0.348)	(0.306)
Degree or higher ed.	0.225	-0.101	0.466***	0.086	-0.088	0.609***
	(0.136)	(0.115)	(0.124)	(0.154)	(0.229)	(0.150)
GCE, A-level or equiv.	0.081	-0.162	0.303**	-0.036	-0.170	0.350**
	(0.133)	(0.111)	(0.125)	(0.151)	(0.225)	(0.148)
GCSE, A*-C or equiv.	-0.003	-0.252**	0.215*	-0.084	-0.283	0.219
	(0.134)	(0.107)	(0.124)	(0.155)	(0.227)	(0.151)
No/Other qualification	-0.247*	-0.501***	-0.063	-0.356**	-0.444**	0.097
	(0.134)	(0.135)	(0.125)	(0.152)	(0.223)	(0.154)
Time	-0.006***	-0.006***	-0.006***	-0.007***	-0.004***	-0.007***
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Constant	4.041***	2.928***	3.961***	3.574***	4.578***	4.015***
	(0.193)	(0.446)	(0.414)	(0.346)	(0.424)	(0.431)
R-squared	0.052	0.055	0.042	0.052	0.050	0.075
Unique Persons	53,783	4,867	8,933	13,477	4,162	10,169
Observations	134,804	11,392	21,809	32,364	9,776	23,868

Standard errors are clustered by quarter. Quarter fixed effects and linear time trend (year x quarter) included. Industry dummies excluded from table. Sample weights used. ***, **, and * show significance at the 1%, 5%, and 10% levels.

Table B6: Intensive Margin: Fixed Effect Regression Results

		OJS by Reason				
Dependent variable: *No. of search methods*	All OJS	Fear of Job Loss	Better Pay	Better Amenities	Add'l Job	Other Reasons
UE Rate	0.134***	0.242***	0.099	0.136**	0.269***	0.075
	(0.027)	(0.092)	(0.069)	(0.054)	(0.097)	(0.067)
Age	0.137***	0.241	0.206*	0.244***	-0.053	0.113
	(0.043)	(0.158)	(0.110)	(0.093)	(0.166)	(0.095)
Age Squared	-0.002***	-0.003	-0.003*	-0.004***	-0.001	-0.001
	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)
Married	-0.065	0.091	-0.109	-0.064	0.053	0.096
	(0.069)	(0.255)	(0.157)	(0.145)	(0.299)	(0.161)
Full time	-0.398***	-0.578***	-0.215	-0.353***	-0.307*	-0.173**
	(0.037)	(0.132)	(0.134)	(0.090)	(0.169)	(0.087)
0-2 years of tenure	-0.084	0.070	-0.371	0.507**	-0.721*	0.256
	(0.124)	(0.401)	(0.345)	(0.257)	(0.404)	(0.311)
2-10 years of tenure	-0.018	-0.009	-0.413	0.463*	-0.482	0.404
	(0.125)	(0.401)	(0.345)	(0.257)	(0.411)	(0.316)
10+ years of tenure	-0.039	0.097	-0.579	0.499*	-0.490	0.625*
	(0.133)	(0.417)	(0.365)	(0.266)	(0.498)	(0.361)
Time	0.225***	0.275***	0.203***	0.230***	0.241***	0.210***
	(0.006)	(0.021)	(0.016)	(0.012)	(0.024)	(0.015)
Constant	-13.658***	-19.043***	-13.843***	-16.769***	-10.051***	-13.819***
	(0.908)	(3.116)	(2.382)	(1.868)	(3.634)	(1.996)
Unique Persons	53,783	4,867	8,933	13,477	4,162	10,169
Observations	134,804	11,392	21,809	32,364	9,776	23,868
R-squared	0.693	0.739	0.728	0.726	0.734	0.750

Standard errors are clustered by individual. Quarter fixed effects and linear time trend (year x quarter) included. Sample weights used. ***, **, and * show significance at the 1%, 5%, and 10% levels.

Table B7: Heterogeneity Analysis: Extensive Margin Regression Results

Dependent variable: OJS Decision	(1)	(2)	(3)	(4)	(5)	(6)
UE Rate	0.00159***	0.00127***	0.00158***	0.00108**	0.00118***	0.00051
	(0.00023)	(0.00033)	(0.00037)	(0.00048)	(0.00028)	(0.00065)
UE Rate Interactions						
Male		0.00064				0.00073*
		(0.00042)				(0.00043)
Married		-0.00000				-0.00001
		(0.00001)				(0.00001)
Degree or higher ed.			0.00080*			0.00079*
			(0.00047)			(0.00047)
GCE, A level			0.00032			0.00031
			(0.00043)			(0.00043)
GCSE grades A-C*			0.00044			0.00044
			(0.00044)			(0.00044)
No/Other qualification			0.00022			0.00022
			(0.00043)			(0.00043)
18-34 yrs old				0.00075*		0.00040
				(0.00040)		(0.00041)
35-49 yrs old				0.00039		0.00026
				(0.00030)		(0.00030)
0-2 yrs of tenure					0.00057*	0.00056
					(0.00035)	(0.00037)
2-10 yrs of tenure					0.00017	0.00016
					(0.00032)	(0.00032)
10+ yrs of tenure					-0.00085***	-0.00084***
					(0.00032)	(0.00032)
R-squared	0.45242	0.45242	0.45280	0.45242	0.45242	0.45281
Unique Persons	1,208,080	1,208,080	1,208,080	1,208,080	1,208,080	1,208,080
Observations	4,559,914	4,559,914	4,559,914	4,559,914	4,559,914	4,559,914

Standard errors are clustered by individual. Quarter fixed effects and linear time trend included. Sample weights used. The excluded categories for education and tenure include observations with missing education and tenure information. The excluded category for age includes 50-64 year old respondents. *, **, and *** show significance at the 1%, 5%, and 10% levels.