



On-the-job search and cyclical unemployment: Crowding out vs. vacancy effects



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ABSTRACT

Incorporating on-the-job search (OTJS) into a real business cycle model has been shown to increase the cyclical volatility of unemployment. Using a particularly simple model of OTJS, we show that the increased search of employed workers during expansions induces firms to open more vacancies, but also crowds out unemployed workers in the job search, resulting in an ambiguous overall effect on unemployment volatility. We show analytically and numerically that the difference between the employer's share of the match surplus with an employed versus an unemployed job seeker determines the degree to which OTJS increases unemployment volatility. We use this result to re-consider some related papers of OTJS and explain the amplification of volatility they obtain. Finally, we show that a plausible calibration of the OTJS model allows us to reproduce most significant features of the US labor data.

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1. Introduction

As is well known, when a standard search-matching unemployment model such as [Pissarides \(2000\)](#) is embedded into a standard dynamic stochastic general equilibrium model of the macro-economy, it generates too little volatility over the business cycle in the key labor market variables of unemployment and job vacancies ([Shimer, 2005](#)). A number of fixes have been proposed for this problem. One is to introduce some form of wage rigidity, by assumption ([Gertler and Trigari, 2009](#)), by calibration of the parameters relevant to the wage bargain ([Hagedorn and Manovskii, 2008](#)) or by altering the bargaining mechanism ([Hall and Milgrom, 2008](#)). A second solution is the introduction of countercyclical vacancy costs as in [Yashiv \(2006\)](#) or [Fujita and Ramey \(2007\)](#). A third potential fix that has recently generated interest is to incorporate on-the-job search (OTJS) by currently employed workers for better jobs. While OTJS has been explored extensively in the partial equilibrium literature, to our knowledge just five papers to date have examined how OTJS increases the unemployment volatility in a DSGE context: [Krause and Lubik \(2010\)](#) and [Van Zandweghe \(2010\)](#) consider two-tier labor markets in which workers with bad jobs search for good jobs, [Tasci \(2007\)](#) and [Nagypal \(2007\)](#) construct models with a distribution of match quality, in which all employed workers search, but they only accept matches with a higher quality than the one they are currently in, and [Menzio and Shi \(2011\)](#) investigate OTJS in a model with directed (as opposed to random) search.¹

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¹ See [Section 5.1](#) below for a review of this literature.

These models of OTJS are quite different from one another and rely on specific assumptions as well as on different mechanisms to amplify the volatility of labor market variables. In this paper, we present a very simple model of OTJS, staying as close as possible to the textbook model of [Pissarides \(2000\)](#). First, we show that OTJS may increase *but also may decrease* the volatility of unemployment, depending on the difference between (the employer's share of) the surplus of a match with a previously employed versus unemployed worker. Second, we adapt our model to reconsider some of the above-mentioned papers on OTJS and we explain the amplification of volatility they obtain in the light of this result. Third, we show that a plausible calibration of the OTJS model allows us to reproduce most significant features of the US labor data.

Incorporating OTJS is expected to increase the volatility of unemployment and vacancies over the business cycle through several mechanisms. First, even if employed workers search with less intensity than unemployed workers (hereafter experienced and inexperienced workers respectively), as is the case in this paper, OTJS smooths the number of potential hires businesses face over the course of the business cycle, leading firms to post more vacancies during expansions than they otherwise would. This results in more matches with inexperienced workers and thus to lower unemployment during expansions. This mechanism is common to all OTJS models. Second, if workers' gains from finding a better job are procyclical, experienced workers will expend greater search effort during expansions than during recessions, which serves to accentuate this first effect. This is the mechanism explored in [Krause and Lubik \(KL hereafter\)](#) and in [van Zandweghe](#), and is incorporated in this paper. Third, when firms prefer experienced to inexperienced workers, they will open more vacancies when more of their hires are expected to be experienced, i.e. during expansions. In [Nagypal and Tasci](#), firms prefer experienced workers because these matches are expected to last longer due to higher average match quality. In addition, in [Tasci](#), matches of higher quality generate more per-period output.

In this paper, we motivate firms' preference for experienced workers through a one-time productivity boost conferred in the first period of a match. While this is a somewhat ad hoc mechanism for generating a preference for experienced workers, we motivate it with the argument that workers typically switch to jobs where they are more productive, and additionally inexperienced workers might be expected to be less productive due to skill loss during unemployment.² Allowing workers to realize their productivity gains at the new job through a single lump-sum bonus eliminates the need to track the distribution of match quality, greatly simplifying the model. In addition, because wages are renegotiated each period as in the standard model, the non-convexity problem of [Shimer \(2006\)](#) does not apply. These issues are discussed further in [Section 5.1](#). Moreover, this simple mechanism allows us to easily adjust firms' degree of preference for experienced workers, and to calibrate this to match observed wage gains by job switching workers.³

As would be expected, and as in KL, OTJS activity is procyclical in our model, inducing firms to open more vacancies during expansions when more of their hires will be experienced. We term this the vacancy effect. At the same time, because both experienced and inexperienced workers search in the same labor market, unlike in [Krause and Lubik \(2010\)](#), [Van Zandweghe \(2010\)](#), [Menzio and Shi \(2011\)](#), a larger fraction of the job matches formed during expansions will be with experienced workers. We term this the crowding out effect (i.e. experienced workers crowd out inexperienced workers), and it leads to a countervailing decrease in the cyclical volatility of unemployment. The overall effect of OTJS on unemployed workers' job finding prospects and thus on the unemployment rate is therefore ambiguous. This is similar to the ambiguous overall effect of high-skilled workers' job search on low-skilled workers' job-finding prospects in [Gautier \(2002\)](#), and of the effect of commuters' job search on residents' job-finding in [Pierrard \(2008\)](#).⁴

This observation of competing vacancy and crowding out effects of OTJS on cyclical volatility appears to be new to the literature. In addition, we incorporate one other novel feature in our model: experienced workers negotiate the wages at their new job (specifically, their hiring bonus) using their previous job as a fallback. How wages are negotiated when switching jobs is a topic that has generated a great deal of interest (see, e.g., [Cahuc et al. \(2006\)](#)), with the default assumption (e.g. in each of the five above OTJS papers) being that job switchers first renounce their previous position then negotiate new wages using unemployment as a fallback. Our wage assumptions of a hiring bonus upon job switching makes changing workers' fallback position straightforward, and we find negotiating wages based on the previous job appealing both on theoretical and empirical grounds. (Regarding the latter, see e.g. [Fujita, 2011](#); [Barlevy, 2001](#).) However, in [Section 5](#) we relax this assumption, forcing experienced workers to negotiate wages with unemployment as a fallback. Since this increases the surplus of an experienced match relative to an inexperienced one, we find that this increases the volatility of unemployment relative to our benchmark.

For our calibration, we follow [Krause and Lubik \(2010\)](#) as closely as possible, using their estimates for OTJS activity. We show that when the match surplus with an experienced worker is similar to or not much larger than that with an inexperienced worker because the productivity gain of job switchers is small, the crowding out effect dominates the vacancy effect, and the net effect of endogenous (procyclical) search by employed workers is to decrease unemployment volatility

² A counterargument to this would be that some workers switch jobs out of fear of losing their previous position, and indeed some job switchers accept wage losses—see [Fujita \(2011\)](#). While this point complicates our calibration, we note that the prevalence of this latter type of job switching is likely to be countercyclical.

³ Specifically, we calculate the wage gains workers would experience if their one-time hiring bonus were amortized over their expected duration of employment and compare this to empirical results for job switchers.

⁴ One potential objection to the notion of job switchers *crowding out* unemployed job seekers is that each job switch generates a new vacancy: the job the switcher left. Because of the free entry condition (Eq. (4)), however, firms open vacancies until their net value is zero (which is a standard in search models) and thus abandoned jobs have no impact on the overall number of vacancies in the economy.

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