Worker flows and job flows: A quantitative investigation ☆

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A B S T R A C T

This paper studies quantitative properties of a multiple-worker firm search/matching model and investigates how worker transition rates and job flow rates are interrelated. We show that allowing for job-to-job transitions in the model is essential to simultaneously account for the cyclical features of worker transition rates and job flow rates. Important to this result are the distinctions between the job creation rate and the hiring rate and between the job destruction rate and the layoff rate. In the model without job-to-job transitions, these distinctions essentially disappear, thus making it impossible to simultaneously replicate the cyclical features of both labor market flows.

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1. Introduction

The flow analysis is now a standard tool to analyze the labor market dynamics. Measures of job creation and destruction rates, proposed by Davis et al. (1996), are constructed from establishment-level employment observations and are supposed to capture rates at which new jobs are created and existing jobs are destroyed. Cyclical features of these variables have been extensively studied and are well known. For example, the job creation rate is procyclical, while the job destruction rate is countercyclical. Worker transition rates, measured from a survey of households, capture similar but distinct labor market information. Again, researchers have studied their cyclical features and find that the job finding rate for unemployed workers is procyclical and the separation rate into unemployment is countercyclical.

The macro-labor literature has used either job flow rates or worker transition rates as a yardstick to evaluate quantitative performance of labor search/matching models. For example, Mortensen and Pissarides (1994) and den Haan et al. (2000) focus on job flow rates in evaluating their models' quantitative performance. Since an influential paper by Shimer (2005), however, the literature has focused mostly on the model's performance in replicating the cyclical features of worker transition rates.

In this paper, we consider both job flow rates and worker transition rates simultaneously within one framework. As mentioned above, the overall empirical regularities of these data are well established and tell us intuitive stories about what is happening in the labor market. For example, a higher job destruction rate is likely to imply the deterioration of the labor market. A similar story can be told when the transition rate from employment to unemployment spikes up. As we will show in this paper, however, the relationships between these flow variables are more complex and richer than these casual observations suggest. Therefore, there is much to learn from considering both flow measures simultaneously, and the simultaneous analysis allows us to disentangle different underlying forces at work in driving each of these variables, thereby giving us a deeper understanding of the U.S. labor market dynamics.

For the purpose of this paper, we consider a search/matching model in which each firm operates a decreasing returns-to-scale production technology and is subject to aggregate as well as idiosyncratic productivity shocks. Each firm hires multiple workers, in contrast to the canonical matching model of Mortensen and Pissarides (1994), in which a worker-firm match is taken to be the unit of analysis. Cooper et al. (2007) and Elsby and Michaels (2013) also study the multiple-worker firm environment. Our paper is different from these existing papers because we explicitly incorporate job-to-job transitions into the model. Both the multiple-worker firm environment and job-to-job transitions are essential for analyzing both worker transition rates and job flow rates. To see this point, note that job flows are defined by establishment-level *net* employment changes over a quarterly period: Job creation aggregates net employment changes at the establishments that are expanding on net over the period, and, similarly, job destruction is the sum of net employment losses. To be consistent with the measurement, we need a model with a meaningful notion of the establishment that hires many workers. Furthermore, in the environment in which job-to-job transitions are assumed away, the difference between net employment changes and gross worker flows is largely futile except for the difference that arises to due to the different data collection frequency.[1] As a simple example, consider a firm that plans to expand its employment in the current period. In the absence of worker turnover due to quits, the number of hires is identical to net jobs created in this period. However, job-to-job transitions introduce *endogenous* worker turnover and thus work as a wedge between gross hires and net employment gains. The firm may lose some of its workers to other firms and thus net employment gains would differ from gross hires. Importantly, the pace of job-to-job transitions in the model is time varying and thus the wedge is also time varying. In the paper, we analyze various cases in which net employment changes and gross flows are different.

We calibrate the model by matching the steady-state levels of worker transition rates and cross-sectional moments such as the dispersion of the employment growth distribution reported by Davis et al. (2010). We show that the calibrated model captures essential features of the cross-sectional "hockey stick" relationships between gross worker flows and net employment growth studied by Davis et al. (2012). We show that the model successfully replicates overall cyclical features of worker transition rates and the job creation and destruction rates. As noted above, incorporating job-to-job transitions into the model plays a crucial role for this result. Suppose that the firm aims to reduce its workforce size. How many workers the firm aims to lay off depends on how many workers quit the firm. Those who are laid off flow into unemployment, while those who quit make job-to-job transitions, implying that the transition rate from employment to unemployment (EU transition rate) is different from the job destruction rate. It is also possible that this firm actually hires some workers when the number of quits exceeds the total number of desired reduction of employment. The relationship between the job creation rate (sum of net employment gains normalized by aggregate employment) and the overall hiring rate (all hires normalized by aggregate employment) is even more complex. As discussed previously, the presence of job-to-job transitions makes net employment change and gross hires different from each other. There is an important aggregate implication of this fact. Suppose (for the sake of an illustration) that one expanding firm hires all new workers from another expanding firm. In this case, the latter expanding firm must be hiring more workers than it lost to "create new jobs." If, on the other hand, those two firms hire all of their new workers from the unemployment pool or shrinking firms, net job gains are equal to total hires. These examples imply that the relationship between net job gains and total hires depends on the pace of job-to-job transitions and the share of job-to-job transitions that occur within expanding firms, both of which are endogenously changing over time along with the aggregate shock.

Moreover, the example in the previous paragraph shows how a chain of hiring occurs when workers make job-to-job transitions from one expanding firm to other expanding firms. That is, as the pace of job-to-job transitions increases, the number of new hires necessary to achieve the target employment size increases. We show that the chain of hiring is reflected in the behavior of vacancies in our model in which vacancies are more procyclical, volatile, and persistent compared with the behavior in the model without job-to-job transitions. The result in our model captures the notion of "vacancy chain" introduced by Akerlof et al. (1988).

Let us now discuss where our paper stands in relation to the literature. As mentioned above, this paper is closely related to the studies by Cooper et al. (2007) and Elsby and Michaels (2013), who also quantitatively analyze a multiple-worker firm matching model. The key difference from these papers is the presence of job-to-job transitions in our model. There are several other papers that study the directed search environment with decreasing returns to scale (e.g., Kaas and Kircher, 2013 and Schaal, 2012). Kaas and Kircher analyze the environment without job-to-job transitions, and Schaal adds on-the-job search to the model. However, Schaal focuses more on the recent Great Recession episode in the presence of the uncer-

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[1] Job flows are measured by net employment changes over a quarterly period, whereas worker transition rates are measured from the monthly survey. We address this issue by solving the model at monthly frequency and analyzing job flows constructed in the same way as in the actual data.