Review of Economic Dynamics 21 (2016) 16–28

Contents lists available at ScienceDirect

Review of Economic Dynamics

www.elsevier.com/locate/red

The aggregate matching function and job search from employment and out of the labor force

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ARTICLE INFO

Article history:
Received 27 September 2014
Received in revised form 1 March 2016
Available online 22 March 2016

JEL classification:
E24
E32
J64

Keywords:
Matching function
Mismatch
Estimation

ABSTRACT

The majority of new jobs in the U.S. is filled by workers coming from employment or from out of the labor force (inactivity). Yet, because the number of job seekers in these groups is unobserved, they are often ignored in empirical labor market studies. This paper, instead, uses latent-variable techniques to estimate the aggregate matching function – a relation between hires, vacant jobs and job seekers – while considering searchers from unemployment, employment and inactivity. Importantly, the estimation allows for the (match) efficiency with which these three groups of searchers find jobs to vary on average and over time. This paper finds that almost half of the rise in U.S. unemployment during the Great Recession is explained by a drop in match efficiency of the unemployed. This contrasts sharply with previous studies which found match efficiency to be quantitatively unimportant.

1. Introduction

About three quarters of all new jobs in the U.S. are filled by workers coming from employment or by those who were formally counted as out of the labor force. These “non-unemployed” searchers compete with the unemployed for available jobs. Taking their behavior into account is, therefore, crucial for understanding unemployment fluctuations.

A popular way of parsing unemployment fluctuations is through the lens of the aggregate matching function. This function relates new hires (matches) to the number of job seekers and vacant jobs. Any systematic changes in hires which cannot be accounted for by fluctuations in the number of job seekers or vacancies are then attributed to changes in “matching efficiency” (or “mismatch”). Existing studies find that the contribution of changes in mismatch to unemployment fluctuations is at most 30 percent.[1] This paper, instead, finds that the contribution of mismatch can be as high as 49 percent.

The reason for such a stark difference in results is an omitted variable bias. Because job seekers from outside unemployment are unobserved, they are ignored in the vast majority of existing studies. This paper first shows analytically that such an omission is innocuous only if the numbers of unemployed and non-unemployed job seekers are perfectly correlated. If not, then estimates of the aggregate matching function and estimates of mismatch will be biased.

In order to quantify the bias, this paper proposes a state-space model of a generalized aggregate matching function which explicitly considers not only the unemployed, but also employed and inactive job seekers. Moreover, the (unobserved) degree of mismatch faced by job seekers from each of these labor market states is allowed to differ both on average and over time. The model is estimated with latent-variable techniques using U.S. monthly data from the end of 2000. The results suggest

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[1] See e.g. Barlevy (2011), Barnichon and Figura (2015b), Sahin et al. (forthcoming).

http://dx.doi.org/10.1016/j.red.2016.03.001
1094-2025/

that *on average* around 40 percent of unemployment fluctuations over the business cycle can be attributed to fluctuations in matching efficiency. During the Great Recession, the contribution increased to as much as 49 percent. On the contrary, and in line with previous studies, estimating the model while ignoring non-unemployed job seekers results in a considerably lower contribution of mismatch. In such a case at most 23 percent of the increase in unemployment during the Great Recession can be accounted for by mismatch and much less during normal times.

The reason why ignoring the non-unemployed leads to dampened estimates of mismatch is that job seekers from outside unemployment are estimated to move pro-cyclically. For instance, this paper finds that the number of non-unemployed job seekers fell during the Great Recession. All else being equal, this lead to less crowding out in the labor market and made it relatively *easier* for the unemployed to find jobs. Ignoring this favorable effect biases the estimated increase in mismatch downwards, making it seem less severe than it actually was.

The identification of the unobserved degrees of mismatch faced by the three labor market groups is based on the assumption of random search.[2] In particular, it can be shown that under random search the relative chances of finding a job from two different labor market states reflect the relative efficiencies with which individuals in these labor market groups find jobs. Therefore, using information on relative employment inflows from different labor market states in combination with data on total hires pins down the latent variables in the aggregate matching function.

At this point it is worth highlighting that mismatch in this paper is estimated as an unobserved, exogenous, component. However, there exists a range of reasons why mismatch may vary endogenously over time.[3] The goal of this paper is not to extend the list of culprits. Rather, the goal is to use a rather standard methodology to estimate mismatch and show that extending it to account for job seekers from outside unemployment renders fluctuations in mismatch centrally important.

This paper relates to studies which estimate the role of mismatch in determining unemployment fluctuations. In an influential paper Sahin et al. (forthcoming) find that a rise in sectoral mismatch accounted for at most 30 percent of the unemployment rate increase during the Great Recession. Similar results can be found in e.g. Barlevy (2011), Barnichon and Figura (2015b), Dickens (2011), Lubik (2011), Sedláček (2014). The current paper also relates to studies estimating the aggregate matching function, a survey of which can be found in Petrongolo and Pissarides (2001). Recent papers include Borowczyk-Martins et al. (2013), Hall (2005), Hornstein and Kudlyak (2015), Nagypál (2009), Rogerson and Shimer (2010). In contrast to all of the above, the current paper explicitly accounts for job seekers from outside unemployment.[4]

Non-unemployed job seekers have been included in matching function estimates in Boersma and van Ours (1999) and Jolivet (2009), neither of which, however, focuses on mismatch fluctuations.[5] Veracierto (2011) measures mismatch in a standard matching model extended for job seekers from inactivity, but not from employment. Finally, in parallel to this paper, Hall and Schulhofer-Wohl (2013) estimate mismatch while considering employed and inactive job seekers. Reassuringly, despite their different methodology, they find that higher mismatch accounted for about 40 percent of the unemployment increase during the Great Recession. Their results are based on an overall mismatch index constructed from separate mismatch estimates for nine groups of job seekers categorized by their labor market state.

The rest of the paper is structured as follows. Section 2 discusses the basic concepts and analytically shows how estimates of the matching function are affected by disregarding non-unemployed job seekers. Section 3 lays out the proposed time-series model of a generalized matching function and describes the data. Section 4 presents the estimation results of the matching function and quantifies the impact match efficiency of the unemployed has on the unemployment rate. Finally, Section 5 provides some concluding remarks.

2. Motivation and basic concepts

Workers have many distinct features making them particularly suitable for certain tasks. Jobs too differ in their requirements and employers are not indifferent about which type of worker they hire. Therefore, searching for jobs on the one hand and looking for a suitable worker for a given vacancy on the other are time-consuming and costly processes.

The so-called matching function is meant to concisely capture the underlying heterogeneities, information imperfections, slow mobility, congestion effects and other factors which influence the creation of jobs. It links the number of newly created jobs (H_t) to the number of job seekers (S_t) and vacancies (V_t):

$$H_t = h(S_t, V_t), \tag{1}$$

[2] While the unemployed search by definition, this is not true for the stock of employed and inactive individuals. Therefore, their efficiency of matching is a combination of mismatch and the (unobserved and potentially time-varying) fraction of job seekers within these groups of individuals. Without independent evidence on job search, it is not possible to separate the latter two effects. Section 4.4 discusses the available evidence on search intensity and what it means for the estimated efficiency of matching.

[3] See e.g. Barnichon and Figura (2015b), Kuang and Valletta (2010), Sahin et al. (forthcoming), Sterk (2015), Sedláček (2014).

[4] In robustness exercises, Sahin et al. (forthcoming) attempt to control for job seekers from outside unemployment using imputed measures of (previous occupations of) discouraged workers and employed job seekers. However, discouraged workers account for only about 1 percent of all people outside the labor force. Furthermore, the imputed measure of employed job seekers is based on the American Time Use Survey which has a much smaller sample size and shorter timer period than the CPS (the authors therefore pool all years together and cannot investigate business cycle variation). Hornstein and Kudlyak (2015) investigate how ignoring unobserved search effort can lead to biased estimates of the matching function and mismatch.

[5] While Boersma and van Ours (1999) approximate the stock of non-unemployed job seekers with several simple statistics, similar to the current paper Jolivet (2009) uses relative employment inflows from non-unemployment to determine the share of non-unemployed job seekers.