



Hiring costs and labor market tightness[☆]

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ABSTRACT

We provide new empirical evidence on the magnitude and determinants of a firm's hiring costs when filling a vacancy for skilled workers. In Switzerland, the average hiring costs amount to about 16 weeks of wage payments. The main components of hiring costs are post-match hiring costs, resulting from the initial low productivity and formal training needed for a new hire (53%), and disruption costs, resulting from the informal instruction of a new hire (26%). Pre-match hiring costs (i.e., search costs) account for just 21% of a firm's hiring costs. Moreover, we find that search costs are positively associated with labor market tightness (i.e., the v/u ratio), both in the cross-section and over time. Our results will help to calibrate the hiring cost parameter in search models.

1. Introduction

Hiring the right employees is important to the success of a firm. To fill a vacancy, a firm incurs direct costs in searching for and interviewing suitable candidates, and in conducting subsequent training activities. Moreover, new hires incur indirect costs related to their initially lower productivity and their disruption of a firm's production process. The costs incurred in filling a vacancy vary according to the skill requirements of the tasks, but these costs may also depend on labor market tightness. When skilled labor is scarce, a firm may have to increase its search effort to find a suitable job candidate, or accept a lower match quality for a given level of search effort. However, hiring lower quality workers may prolong the adaptation period, that is, the time required for a new hire to become fully productive. It may also result in additional formal training being required, or in an increase in disruption costs, owing to the greater need for informal instruction by co-workers.

Empirical evidence on how firms recruit employees is still scarce, largely as a result of data limitations. Moreover, there is a paucity of empirical evidence on the association between hiring costs and labor

market tightness (Davis et al., 2012, Rogerson and Shimer, 2011, Pissarides, 2009). Therefore, using unusually rich establishment-level data describing a firm's hiring behavior, we examine the hiring costs associated with skilled workers, and determine the relationship between these costs and labor market tightness.¹ Filling a vacancy requiring a skilled worker is expensive. In Switzerland, we find that the average cost is 16 weeks of wage payments. The largest costs associated with filling a vacancy are the adaptation costs resulting from formal training and the initial low productivity of a new hire (53%). These are followed by disruption costs, that is, the time required by other workers to instruct a new hire (26%), and the search costs incurred in filling the position (21%).

¹ Following Blatter et al. (2012), we define skilled workers as individuals with a vocational qualification at the upper secondary level.

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With regard to the labor market environment, we find that the vacancy-unemployment (v/u) ratio is positively related to the search costs, in the cross-section and over time. A two standard deviation increase in the v/u ratio is associated with an 18% increase in average search costs in the cross-section. When using aggregated panel data at the industry level for three periods that account for industry fixed effects, the corresponding result increases to 25%. For a subsample of firms, a firm-level fixed-effects estimation shows that a two standard deviation increase in labor market tightness is associated with a 62% increase in search costs. Thus, our results suggest that accounting for unobserved heterogeneity at the firm level is necessary to avoid an omitted variable bias. Examples of potentially relevant omitted variables in the cross-section are a firm's production technology and the attractiveness of a firm to job applicants in terms of non-wage working conditions (e.g., career and development opportunities).

Our results imply that theoretical search models should decompose hiring costs into a pre-match and a post-match component, as in [Yashiv \(2006\)](#) or [Pissarides \(2009\)](#).² Moreover, we offer empirical evidence on how to model the association between hiring costs and labor market tightness. [Pissarides \(2009\)](#), among others, argues that this relation is important to the performance of search models in terms of matching employment fluctuations over the business cycle.

The remainder of this paper is organized as follows. [Section 2](#) provides an overview of the relevant literature. [Section 3](#) describes the data used for our analysis and provides extensive descriptive statistics for the components of hiring costs. Then, [Section 4](#) discusses the estimation strategy, and [Section 5](#) contains the empirical analysis of the effect of labor market tightness on hiring costs. Lastly, [Section 6](#) concludes the paper.

2. Relevant literature

The size and shape of labor adjustment costs, and hiring costs in particular, play important roles in theoretical search models of the labor market (surveyed by [Eckstein and van den Berg, 2007](#); [Rogerson and Shimer, 2011](#); [Rogerson et al., 2005](#); [Yashiv, 2007](#)).

In the absence of hiring costs, firms can instantly fill a vacancy at zero cost. However, frictions in the labor market may result in costly hiring, as well as a loss of profit if a vacancy remains unfilled for some time. In the standard search model, the free-entry condition implies that a firm will create a job if the expected discounted profit of doing so outweighs the expected hiring costs ([Pissarides, 2000](#)). Thus, the magnitude and determinants of hiring costs play a crucial role in the standard search model. In this model, firms can hire a worker at a fixed cost, and the total hiring cost is set proportional to output, because hiring workers who are more productive is costlier ([Pissarides, 2000](#)).

However, there is still a lack of empirical evidence justifying the assumptions of these models. Moreover, an as yet unresolved issue is that calibrated search models typically fail to match the volatility in employment caused by productivity shocks ([Shimer, 2005](#)). [Pissarides \(2009\)](#) highlighted the importance of knowledge about the association between labor market tightness and average search costs, with regard to the cyclical volatility of tightness, and acknowledges that this subject is not well researched. Furthermore, [Davis et al. \(2012\)](#) emphasized the lack of direct empirical data on the recruitment intensity of firms, and suggested that standard search models need to be extended to account for this factor. [Rogerson and Shimer \(2011\)](#) made a similar point, arguing that the assumptions underlying the functional form of the association between hiring costs and recruiting intensity are rather arbitrary. Indeed, many theoretical models rely on outdated cross-sectional evidence when specifying hiring costs.³

² Throughout this paper, we use the terms hiring costs and vacancy costs (as defined in [Pissarides, 2000](#)) synonymously.

³ [Rogerson and Shimer \(2011\)](#) calibrated their search model using data reported in [Hagedorn and Manovskii \(2008\)](#) and [Silva and Toledo \(2009\)](#). How-

In addition to search costs, hiring costs include costs related to initial formal (and informal) training and indirect costs resulting from lost productivity until a new hire reaches full productivity (e.g., see [Yashiv, 2000](#); [Yashiv, 2006](#)).⁴ In the following, we refer to search costs as the costs incurred until a successful match is accomplished, and we refer to hiring costs as the total costs incurred to fill a vacancy, including the costs that arise after the employment contract has been signed. Thus, our definition of hiring costs is similar to that of [Silva and Toledo \(2009\)](#), although they also considered separation costs in their definition of post-match labor turnover costs. However, we exclude this cost factor owing to a lack of empirical data.

[Pissarides \(2009\)](#) showed that his model performed best in terms of matching employment fluctuations when pre-match hiring costs were low compared to post-match hiring costs, and when pre-match hiring costs (search costs) depended on labor market tightness, but post-match hiring costs did not. However, [Pissarides \(2009\)](#) could not provide empirical evidence on which components of hiring costs depend on tightness.⁵ To the best of our knowledge, this is the first study to provide direct empirical evidence on the association between labor market tightness and search costs, and on post-match hiring costs (i.e., adaptation and disruption costs).

The association between labor market tightness and hiring costs is also relevant when estimating the matching elasticity (i.e., how labor market tightness affects the job finding rate). As pointed out by [Borowczyk-Martins et al. \(2013\)](#), the matching elasticity is subject to an omitted variable bias, to the extent that unobserved factors in the error term correlate with the v/u ratio. Whereas hiring costs determine whether it is profitable for a firm to post a vacancy (because firms only post a vacancy if the present value of future profits associated with doing so exceed the expected hiring costs), the search cost component of hiring costs affects the efficiency of the matching process. Thus, to the extent that (unobserved) search costs are positively correlated with labor market tightness, the estimated matching elasticity will be subject to a downward bias.

In summary, our study makes two main contributions to the literature. First, we provide detailed empirical information on the various costs of filling a vacancy, including search, selection, and formal and informal training costs, from which we are able to estimate the relative

ever, [Hagedorn and Manovskii \(2008\)](#) relied on cross-sectional evidence from [Barron et al. \(1997\)](#), who analyzed US firms for the period 1980 to 1993. The evidence in [Barron et al. \(1997\)](#) points to small search costs (about 11% of the weekly pay). However, more recent studies, which take into account job advertising costs, provide evidence of much higher search costs (e.g., [Blatter et al. 2012](#) found that the average search costs were 369% of the weekly pay for skilled workers in Switzerland, and [Muehlemann and Pfeifer 2016](#) reported a corresponding proportion of 277% in Germany). [Hagedorn and Manovskii \(2008\)](#) allowed the wage costs of recruitment personnel to fluctuate over the business cycle, but did not allow for changes in a firm's recruitment intensity (as in [Davis et al. 2012](#)).

⁴ [Silva and Toledo \(2009\)](#) used existing survey information on post-match labor costs for the United States ([Barron et al., 1997](#), [Bishop, 1996](#), [Dolfin, 2006](#)), which accounted for workers not initially being fully productive. They found that accounting for such costs substantially improved the performance of their calibrated model. However, [Silva and Toledo \(2009\)](#) did not postulate a relationship between hiring costs and labor market tightness.

⁵ [Stadin \(2012\)](#) found that local labor market conditions in Sweden significantly affect the probability of a firm filling a vacancy. Therefore, these conditions affect the hiring costs if a longer vacancy duration is associated with increased expenditure on job advertisements and unsuccessful (and costly) interviews with job applicants. Moreover, [Moscarini and Postel-Vinay \(2012\)](#) and [Moscarini and Postel-Vinay \(2013\)](#) showed that the effects of the business cycle differ by firm size, because large firms create significantly more jobs during an economic expansion than small firms do. Thus, they argue that small firms may find it more difficult to hire workers during an economic upturn, because large firms are more attractive to active job seekers, owing to the higher pay and more stable working conditions. Moreover, large firms may also actively poach employees from small firms.

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