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Costly interviews☆

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ABSTRACT

In this paper, we show how the interaction between costly screening and competition in decentralized markets may prevent efficient matching. We examine this phenomenon in a simple dynamic model of a professional labor market, where firms can pay a cost to interview applicants who have private information about their own ability. Inefficiencies arise when a firm decides not to interview potentially able candidates since it infers that sufficiently good candidates will be hired by more productive firms. This effect is robust to changes in the information structure of the market, but it can be mitigated by subsidizing screening costs.

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1. Introduction

In this paper, we construct a simple model of an entry-level professional labor market (such as those for lawyers, MBAs, academics, and others) where applicants have private information about their abilities and firms of different productivities can interview applicants at a cost to uncover that information. There is an exogenous interview schedule in which applicants are matched with firms in each period. Hiring takes place subsequent to the interview schedule. If a firm hires an applicant, production takes place and the surplus is split proportionally.

In this game, able applicants may not be hired. This phenomenon arises when a firm decides not to interview (and therefore does not hire) a potentially able applicant since it foresees sufficiently good candidates will be hired by more productive firms. In other words, competition from other firms for the candidate makes the firm anticipate that it will suffer from a winner's curse at the hiring stage.

This is a kind of unemployment that could, and in some cases, should be avoided, since the rejected applicant may actually be a good match for the firm. At the core of this inefficiency is an externality; firms do not consider workers' surplus from a match when they decide whether to interview a candidate. From a policy perspective, we demonstrate that lowering firms' screening costs through subsidies can improve welfare by increasing firms' surplus from a match, thereby mitigating the externality.

The effect illustrated here is different from stigma as described in the literature. There, it usually refers to a realized selection effect; somebody or something is inferred to have failed a screening test given their observable current state. For example, unemployment or unemployment duration may create an inference that a worker is of lower ability.[1] Our model differs in two ways. First, the observable current state does not provide any information — a firm knows that its current candidate may have been previously interviewed, but it has no information to use to update since job offers take place later in the game and interviews are unobservable. Second, it is the fact that firms compete for workers that creates the negative inference. A low productivity

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[1] See Greenwald (1986) and Lockwood (1991) for this effect in the context of the labor market. Taylor (1999) examines a similar "time-on-the-market" effect for the housing market. In the finance literature, the stigma effect can be found in Dell'Ariccia et al. (1999) for the credit market, Landier (2006) for entrepreneurial finance, and Ennis and Weinberg (2013) in the context of the Fed discount window.

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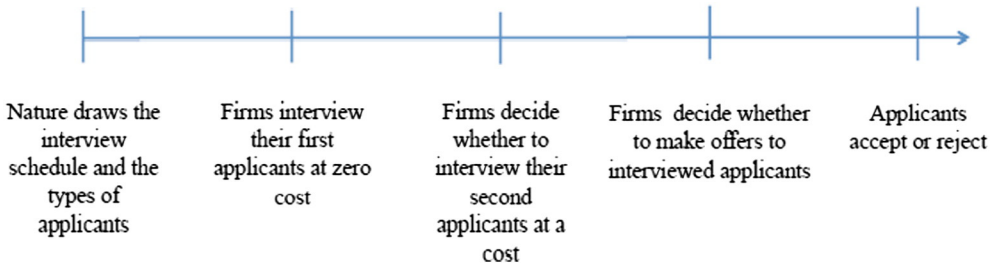

Fig. 1. Timeline.

firm that knows it will lose out on an able worker to a more productive firm will decide not to interview the worker.

A related paper is Ely and Siegel (2013), who also analyze a model of a labor market with screening costs. The two models share a strict ranking of firms and an exogenous wage structure. In both models, lower ranked firms may prefer not to incur the screening cost, anticipating a winner's curse. However, unlike Ely and Siegel (2013), our model has multiple workers and multiple rounds of interviews. Our model is also different in that the surplus from hiring is firm specific and the focus is on unemployment.

This paper is organized as follows. In Section 2, we set up the simple model with two firms and two applicants. In Section 3, we derive the market equilibrium and demonstrate the main result. In Section 4, we consider how subsidizing interviews can increase welfare. In Section 5, we extend the model to allow for uncertainty about firm types. In Section 6, we conclude. Proofs and a general model with F firms and X applicants can be found in the Appendix.

2. The model

In this section, we examine the case of two firms and two applicants. The main result is shown in the Appendix to hold for the general case of multiple firms and applicants. Specifically, there are two firms $i=1,2$ of publicly observable productivity f_1 and f_2, where $f_2>f_1>0$, and two applicants, $j=1,2$, who have privately observable productivity $x_j\in\{L,M,H\}$, where $H>M>L>0$. The realization of the types of the two applicants is independent and determined by the probabilities p_L, p_M, and p_H, which are all positive and sum to one. A firm with productivity f_i who hires an applicant of ability x_j creates an output $\pi_{ij}=f_i x_j$. The players split the output from the match according to an exogenous sharing rule: firms get $\alpha\pi_{ij}$ and applicants get $(1-\alpha)\pi_{ij}$, where $\alpha\in(0,1)$. We explicitly model the surplus as multiplicative for ease of presentation, although any supermodular function should give the same results.

We assume that firms have an outside option equal to $\alpha f_i t$, which they receive if they do not hire anyone. The value of the threshold t is common across firms and $M>t>L$, implying that neither firm would willingly hire a type L applicant.[2] Applicants have a reservation payoff of zero if they are not hired.

The game has two periods. At the start of the game, nature draws a publicly observable interview schedule and the types of the two applicants. For simplicity, we will assume that interviews are costless in period 1, but costly in period 2. This assumption reduces the number of cases to analyze.[3]

In period 1, each firm is matched with an applicant. The firms observe the type of the applicant they are matched with, but not the type of the other applicant.

In period 2, the firms are matched with the applicants they did not match with in period 1. Each firm decides whether to interview the applicant it is matched with in the second period at a cost of $C>0$. An interview fully reveals the applicant's type to the interviewing firm, but the other firm cannot observe this type or whether the applicant was interviewed.

Firms then choose whether to make any of the applicants an offer.[4] Firms make offers simultaneously and they can only make offers to applicants if they have interviewed them.[5] Finally, the applicants decide whether to accept any offer.

The timeline of the game is summarized in Fig. 1.

We assume that the structure of the game is common knowledge to all participants and that the following conditions hold for $i=1,2$:

$$\alpha p_M f_i(M-t)<C, \tag{C1}$$

$$\alpha p_H f_i(H-M)>C. \tag{C2}$$

Condition C1 says that the firm would prefer to go unmatched rather than interview an applicant when it doesn't have the possibility of hiring a high type. This condition is key to our result. Note that the interview cost parameter C must be positive for this to hold.

Condition C2 implies that a firm with an applicant of type M in period 1 would prefer to interview a new applicant in the second period and make an offer to the best of the two. It converts the potential mismatch under C1 into a problem of unemployment for productive applicants.

The left hand sides of C1 and C2 represent the option values of interviewing and the right hand sides the cost.

In addition to the above conditions, we will for expositional purposes assume that if a firm is matched with an applicant of the same type in periods one and two, and it can hire either of them with probability one, then it will always prefer the latter. These conditions pin down parameters for which unemployment of able applicants will occur.

3. The market equilibrium

We start by analyzing the market solution, where firms maximize their profits by strategically making decisions about interviews and offers. To simplify notation, we use the convention that firm 1 is matched with applicant 1 and firm 2 with applicant 2 in period one. We summarize equilibrium properties in the following proposition:

Proposition 1. *In any Perfect Bayesian Equilibrium of the hiring game with two firms and two applicants:*

i) *If $x_2=H$, firm 2 will hire applicant 2. If $x_2=M$ or L, firm 2 will interview applicant 1 and hire her if she is of type M or H.*
ii) *Firm 1 never interviews applicant 2.*

[2] Applicants of type L are never hired in equilibrium in our model, but are necessary to justify the use of interviews over hiring without interviews. However, a modified model where interviews give incorrect signals about the applicants' type with a small probability would have similar results and have L applicants hired in equilibrium.

[3] We show in a previous version of the paper (Josephson and Shapiro (2012)) that in a game with positive and identical interview costs in both periods, there is an equilibrium such that all firms interview in the first period. In other equilibria of this game, some firms may opt out of interviewing in round one. This makes unemployment even more likely than in our model.

[4] Allowing firms to make (open) offers in the first period as well does not alter the main results.

[5] Assuming that $\alpha p_L f_2(t-L)>C$ is necessary and sufficient to ensure that neither firm 1 nor firm 2 would hire without interviewing.

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