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Promotion Policies of Workers who Observe their Ability

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Abstract

We analyze promotion policy when workers are privately informed regarding their abilities at the outset of their careers. We show that the resulting equilibrium outcomes coincide with the outcomes derived in the standard promotion framework where workers and firms do not possess private information at the start of their relationship (Waldman 1984).

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Introduction

The promotion-signaling framework starting with Waldman (1984) assumes that both workers and firms have no private information at the start of their relationship. That is, workers do not observe their ability at the outset of their career. Information asymmetry arises at the end of the first period, a worker's current employer obtains private information about that worker's ability, whereas competing firms only observe the worker's job assignment and interpret a promotion, which is positively correlated with ability, as a signal of ability.[1] A natural question is whether the results obtained in this framework extend to a different setting where workers observe their ability at the outset of their career as in the signaling literature starting with Spence (1973).

We proceed to analyze promotion policy in an economy in which workers observe their ability at the outset of their career. We show that in spite of the introduction of workers, privately informed, regarding their abilities at the beginning of their careers, equilibrium outcomes are unaffected and coincide with those obtained when workers do not observe their abilities. In related work, with privately informed workers, Waldman (2016) added the possibility of investing in observable schooling by the workers.

2. A Benchmark Model

To start, consider a benchmark model that invokes the standard assumption that workers do not observe their own abilities at the outset of the employment relationship. Consider a two-period setup with free entry of firms, in which all agents are risk neutral and do not discount the future. Firms produce a single, homogeneous product that can be sold at a per-unit price normalized to 1. A firm can assign a worker to either of two jobs, denoted job 1 and job 2.

Individuals live for two periods; in each period, each individual's labor supply is perfectly inelastic and fixed at one unit. The ability of worker i, θ_i, is drawn from an

[1] Along with the related analysis of Bernhardt (1995), Ghosh and Waldman (2010), DeVaro and Waldman (2012), Zábojník (2012), Zax (2012 and 2017), Waldman and Zax (2016 and 2018), Cassidy, DeVaro and Kauhanen (2016), Jin and Waldman (2016), DeVaro, Ghosh and Zoghi (2018), Mukherejee and Vasconcelos (2018), Dato, Gruewald, Kräkel and Müller (2016) and Ekinci, Kauhanen and Waldman (forthcoming).

atomless distribution function, $F(\theta)$, with support $[\theta_L,\theta_H]$. At the outset of the game, ability is unobserved by all parties.

Each firm employs at most one worker. Each worker and his own employer privately observe the worker's ability at the end of period 1. Job assignments and wage rates offered to an individual are public information.

Worker i's output if assigned to job 1 is $d_1 + c_1\theta_i$ in both periods, and when assigned to job 2 in the first period he is employed by his employer is $d_2 + c_2\theta_i$. The worker's output is $d_2 + c_2\theta_i + \Delta$ if assigned to job 2 in period 2 by the first period employer, where Δ is positive and represents firm-specific human capital.[2] We assume that $0 < d_2 < d_1, 0 < c_1 < c_2$. Furthermore, we assume that $d_1 + c_1E(\theta) > d_2 + c_2E(\theta)$, where $E(\theta)$ denotes the expected value of θ. Hence, if the firm has no information regarding the worker's ability, the worker is optimally assigned to job 1.

The timing of the game is as follows. At the start of period 1, workers apply to firms simultaneously, each firm makes a wage offer to every worker who applied, and each worker chooses a firm.[3] Each firm with a worker, assigns the worker to a job, production occurs, workers are paid, and at the end of period 1 each worker's ability level is observed by himself and by his employer. At the start of period 2, each firm that employed a worker in period 1 offers the worker a job assignment. Assigning a worker to job 2 who was previously in job 1 is called a promotion. The other firms in the market observe these job assignments and make wage offers accordingly. The period-1 employers then observe these market wage offers and make wage counteroffers to their own workers. Each worker then chooses to work at the firm that offers the highest wage. If the highest wage is offered by multiple firms, the worker chooses randomly among these firms unless one was the period 1 employer, in which case the worker stays with his period 1 employer. Finally, after each worker chooses a firm in period 2, firms assign workers to jobs, production occurs, and

[2] The assumption that firm-specific human capital only increases the output of a promoted worker is for simplicity. All qualitative results continue to hold as long as the output increase of a promoted worker is higher than the output increase of a non-promoted worker.

[3] If two or more workers choose the same firm, then one of those workers is randomly selected to work at the firm, and the others join other firms.

wages are paid.

In the following Proposition 1, we characterize an equilibrium, similar to the ones widely discuss in previous papers (see Footnote 1). In Proposition 2 we show that basically the same equilibrium arises in an economy where workers do observe their ability at the beginning of the first period.

Letting w_Y denote the wage paid to young workers in period 1, and θ^+ the threshold ability for promotion, we obtain the following:

Proposition 1 *When each worker's ability is observed by himself and by his period-1 employer at the end of period 1, there is a unique equilibrium in which:*

(i) each worker is assigned to job 1 in period 1 and is paid $w_Y > d_1 + c_1 E(\theta)$.

(ii) there is a unique ability threshold, θ^+, $\theta^+ = \frac{\Delta}{c_1} - \theta_L$.

(iii) a worker of ability θ_i, *with* $\theta_i > (<) \theta^+$, *is assigned to job 2 (job 1) in period 2.*

(iv) the wage of a worker assigned to job 1 in period 2 is $d_1 + c_1\theta_L$.

(v) the wage of a worker assigned to job 2 in period 2 is $d_2 + c_2\theta^+$.

Due to the winner's curse phenomenon, prospective employers will not bid above the lowest possible productivity of workers with the same observable characteristics (i.e., job assignment).[4] More precisely, the wage of a promoted worker equals the output (at a competing firm) of a worker with θ_H ability θ^+, which equals $\max[d_2 + c_2\theta^+, d_1 + c_1\theta^+]$.

We assume that $d_1 + c_1\theta_H < d_2 + c_2\theta_H$ which implies the existence of a unique threshold satisfies $d_1 + c_1\theta^+ < d_2 + c_2\theta^+$. Hence, a worker with ability θ_i is promoted if

$$d_1 + c_1\theta_i - (d_1 + c_1\theta_L) \leq d_2 + c_2\theta_i + \Delta - (d_2 + c_2\theta^+) \qquad (1)$$

where the left-hand (right-hand) side equals the profit generated by a worker of ability θ_i who is assigned to job 1 (2). θ^+ is the θ_i value for which condition 1 holds in

[4] The winner's curse arises for the following reason. If a prospective employer offers a worker assigned to job 1 a wage of $\boldsymbol{d_1 + c_1\theta_j}$ and hires the worker into job 1 (where $\boldsymbol{\theta_j > \theta_L}$), it must be the case that the ability of the worker is lower than θ_j. Otherwise, the worker's initial employer would have made a counteroffer sufficient to retain the worker in job 1.

equality and is given by $\frac{\Delta}{c_1} + \theta_L$.[5]

The period-1 wage, w_Y, is determined using the free-entry assumption that implies zero-expected-profit for each firm. It exceeds the worker's expected period-1 output because the firm's expected period-2 profit is positive.

3. Workers Privately Observe Their Own Abilities

The benchmark model is now extended to allow workers to privately observe their own abilities at the start of period 1. As in the benchmark model, we assume each firm employs one worker. The following proposition characterizes the equilibrium.

Proposition 2 *If each worker's ability is privately observed at the start of period 1 by the worker and at the end of period 1 by the worker's period-1 employer, then there is a unique equilibrium which coincides with the equilibrium obtained in Proposition 1.*

Note that under the assumption that a worker's ability is observable only by himself and by his period-1 employer, firms cannot credibly commit to any promotion policy that does not maximize their period-2 profits. In particular, firms cannot commit to paying wages that differ from those offered by prospective employers competing over their workers.

Due to the inability to commit, the ability threshold for promotion, θ^+, satisfies the same equation as before. This implies that all firms must, in equilibrium, use the same promotion policy. As a result, the promotion and wage policies coincide with those obtained in section 2. Ricard i Costa (1988) analyzes a similar economy with a separating equilibrium, i.e., an economy in which workers signal ability by accepting a lower paying job. However, in his model, ability is not perfectly observed by the employer, and different jobs have different probabilities of providing a high-ability signal.

[5] Note that if $\Delta=0$ no one is promoted, see Waldman and Zax (2016).

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