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Market-based tournaments: An experimental investigation☆

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ABSTRACT

This paper examines "market-based tournaments", in which firms use the tournament outcome to update their expectations about worker ability. A theoretical model offers several implications, which are unique to the market-based tournament and which we test in a laboratory experiment. The experiment supports most of the implications: We find that an increase in the variance of worker ability leads to a higher wage spread and that there is a non-monotonic relationship between this variance and effort. An increase in the marginal product of ability increases effort.

1. Introduction

Workers typically care about their future career opportunities and therefore have an incentive to perform well. If these career incentives are sufficiently strong, firms do not need to complement them with other types of incentive devices, such as bonuses or piece rates. On the contrary, if career incentives alone are insufficient to implement desired effort levels, alternative incentive devices should be used. For firms it is thus important to understand the determinants of workers' career incentives to identify circumstances in which firms should and should not try to augment these incentives using incentive contracts.

A pathbreaking paper on career incentives is the one by Holmström (1982). In a multi-period model, Holmström assumes that multiple firms compete for a worker's service. The worker's performance is observable by all firms and it depends on his or her ability which is unknown to all parties, the chosen effort level, and some random term. The worker has an incentive to exert effort since higher effort leads to better performance, thereby increasing firms' expectation regarding the worker's ability (although, in equilibrium, firms correctly anticipate the worker's effort and, hence, infer the worker's expected ability correctly). Among other things, Holmström shows that career incentives are highest in early rounds. Since firms gather more and more information about the worker's ability over time, it becomes much harder for the worker to affect the firms' assessment of his or her ability in later than in earlier rounds, reducing the incentive to exert effort. In addition, Holmström finds a higher incentive to exert effort when the worker's ability is highly uncertain (as measured by the variance of the ability distribution). The intuition is simple: The more uncertain the worker's ability, the more firms learn about ability from the performance observation and the higher the worker's incentive to affect the performance signal.

While Holmström's model yields many important insights into the functioning of career incentives, the assumption that all firms are able to observe the worker's absolute performance seems to be somewhat restrictive. Even though this assumption is potentially valid in some industries, these industries represent exceptions rather than the rule. A more likely scenario is one in which firms are able to observe workers' performance relative to other workers rather than their absolute performance. To give an example, suppose that the workers are employed by two different architecture firms participating in the same tender. Let the workers be responsible for their firms' proposals, respec-

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tively. Then the outcome of the tender signals workers' relative performances. Similarly, if the workers are researchers from different firms whose task is to develop a new drug, then their relative performance becomes observable when one of the workers succeeds at developing the drug before the other does. In another example all workers are hired by the same employer who observes workers' relative performance and then takes a decision to signal the obtained information to the other firms. As argued e.g. by Waldman (1984), promotion decisions are often publicly observable, for example because workers explicitly state their job titles in applications and, more recently, on social networking services such as LinkedIn. When the employer bases a promotion decision on workers' performance relative to other workers, the external firms could interpret this promotion as a signal about workers' relative performance and use this signal to update their expectation about workers' abilities.

In sum, while the assumption in Holmström's model that workers' absolute performance can be observed by all firms is relatively restrictive, the assumption that firms obtain signals about workers' relative performance is more appealing. This latter assumption gives rise to what is referred to as a "market-based tournament" in the literature (Waldman, 2013a). In a market-based tournament, post-tournament wages are determined by a bidding process that takes into account the relative performance signal. In what follows, we will assume that the signal is generated by a promotion decision even though, as just discussed, workers' relative performance maybe observable for other reasons. Given this interpretation, firms other than the current employer (the "labor market") perceive promotion as a positive signal of an employee's ability. Accordingly, promotion induces the labor market to upgrade the assessment of an employee's ability, which consequently leads to higher wage offers for that employee. Therefore, employees have an incentive to vie for promotion.[1]

The objective of the current paper is to investigate workers' career incentives when firms are able to observe workers' relative performance. As indicated before, the question when career incentives are insufficiently high is of great importance to firms, as they need to know under which circumstances alternative incentive mechanisms are necessary. To address the research question, we begin by presenting a theoretical market-based tournament model. We find that both the difference between the wages of the promoted worker and the non-promoted worker (the "wage spread") and equilibrium effort depend on the variance of worker ability and the marginal product of ability. Whereas changes in these latter variables affect the wage spread only directly, effort may be affected both directly and indirectly through the wage spread. The corresponding effects result in four behavioral hypotheses. First, we expect that the difference between the wages of the promoted worker and the non-promoted worker increases in the variance of worker ability because an increase in ability variance increases the learning potential with respect to worker ability, implying that firms' wage offers respond more strongly to the promotion decision, and the wage spread becomes greater. Second, we hypothesize that the relationship between effort and worker ability variance can be constant, strictly increase, or first increase and then decrease which differs from the findings in Holmström (1982). The reason is that effort has a smaller impact on the promotion decision if the worker ability variance is increased, which in turn reduces workers' incentive to exert effort. Because this effect interacts with the effect of the ability variance on the wage spread, all mentioned relationships are possible, depending on the size of the effort costs. Third and fourth, we suppose that an increase in the marginal product of ability positively affects the wage spread and the optimal effort even if the marginal product of effort stays the same. This is apparent from the fact that workers have an incentive to choose effort to signal a high ability to firms. When the marginal product of ability grows, a worker with a specific ability level becomes more valuable to the firms, and the wage offers and their differences increase. As a result, the workers increase their efforts.

In a second step, we conduct a laboratory experiment to test the four hypotheses. To our knowledge, our experiment is the first one studying the market-based tournament approach.[2] Falk and Fehr (2003) discuss the advantages of laboratory experiments for labor economics. Most importantly, all variables that affect behavior can be controlled and systematically studied. Another important advantage stems from the possibility of implementing ceteris paribus changes. Our study makes extensive use of this latter possibility and allows us to draw conclusions about causal connections between several of the model parameters. Using field data rather than data obtained from the lab is problematic in the given context. The reason is that many of the variables that are relevant for our study are difficult to observe in practice. For example, to test our model it is important to observe workers' efforts and, in particular, to distinguish effort from ability. In practice, however, workers' output or performance can be observed, if at all, and it is usually impossible to deduce workers' efforts from the output observation. We decided to run experiments to address these data issues.

The results of our laboratory experiments are strongly supportive of three of the four hypotheses. We do indeed find a positive relationship between the wage spread and the variance of worker ability and a non-monotonic relationship between effort and the variance of ability. Furthermore, we observe that an increase in the marginal product of ability leads to an increase in effort. In addition, we find some weak evidence that the marginal product of ability positively affects the wage spread.

To sum up, workers' incentives to exert effort seem to be highest when uncertainty regarding ability (as measured by its variance) is intermediate, implying that promotion decisions are important signals about worker abilities, but efforts still have noticeable impact on promotion decisions and when firms place high valuations on workers' abilities. When these conditions are met, complementing career incentives by other types of incentive devices to implement adequate effort levels does not seem to be necessary. On the contrary, if uncertainty regarding ability is low, career incentives are low and firms need to find other ways to motivate their workers. In practice, the variance of worker ability depends on a number of factors such as workers' experience in the labor market, the school/university that they attended, or their field of study. For example, if workers attended a university that is known for a diverse student body, the variance of ability is higher than if workers graduated from a university with relatively homogeneous students. Career incentives are also low if workers perform relatively standardized tasks, implying that the impact of ability on output is low and firms do not find it that important to hire workers of high ability.

The remainder of the paper is organized as follows: In the next section, we discuss related literature. Section 3 presents the model. Section 4 is the main part of the paper and contains the description of the experiments and the experimental results. Section 5 concludes.

[1] The main difference between the market-based tournament and the seminal tournament model by Lazear and Rosen (1981) (which is also referred to as the "classic tournament model") originates from different assumptions regarding the employer's commitment power. A key feature of the model by Lazear and Rosen is that the employer commits to pay wages (or prizes) to both promoted and non-promoted employees before the tournament starts. The employer chooses these wages to implement the desired level of effort. Such ex-ante commitment to wages is not possible in the market-based tournament.

[2] On the contrary, many laboratory experiments have been conducted to test the classic tournament model. Examples include Bull et al. (1987), Schotter and Weigelt (1992), Orrison et al. (2004), Müller and Schotter (2010), Sheremeta (2010) Harbring and Irlenbusch (2011), Altmann et al. (2012), Balafoutas and Sutter (2012), Gürtler et al. (2013), and Dutcher et al. (2015). An extensive survey of these studies is provided by Dechenaux et al. (2015).