

Competition and Productivity in Employee Promotion Contests

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Abstract

Why do firms use incentives that encourage anti-social behavior among employees? Rank-based promotion schemes are among the most widespread forms of competition and incentives, despite encouraging influence-peddling, sabotage and anti-social behavior. I study a natural experiment using rich administrative data from a large, white collar firm. At the firm, competitors for promotions depend partly on dates-of-hire. I utilize the date-of-hire assignment as a source of exogenous variation in the intensity of intra-worker competition. I use the firm's multidimensional timestamped productivity logs as "time diaries" to study the amount, character and allocation of output across tasks. I find that competition has significant incentives for effort and efficiency – as well as lobbying- and sabotage- like behaviors – without affecting the quality and innovativeness of output. I also find that employees facing high competition are more likely to quit and join other companies, particularly higher-performing employees. Lastly, I show that competition induces workers to differentiate and specialize by concentrating effort into a smaller set of tasks. These results show that while workers respond to incentives from competition, they also seek to avoid it through sorting and differentiation strategies. The productivity gains from differentiation and specialization may partly explain the common use of these incentives by firms.

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1 Introduction

Competition between employees within a firm is among the most widespread forms of formal incentives. In America, intra-worker competition at the same firm is a feature of wage growth for 77% of the workforce.¹ Worker-vs-worker competition has been publicly championed as a management technique by high-profile business leaders including Jack Welch, Marissa Mayer and Steve Ballmer, and is a leading application for a growing formal literature on contest theory (Siegel, 2009).

Despite its prevalence, workplace competition has been widely criticized for encouraging sabotage (Dye, 1984) and influence-peddling (Milgrom and Roberts, 1988) in both academic and popular (Eichenwald, 2005; Swisher, 2013; Carlson, 2014) management circles. Are the potential productivity gains worth the risk of encouraging lobbying and anti-social behavior?

This paper studies the extent to which intra-worker competition affects workplace performance and behavior using a natural experiment. At the firm I study, competitors for promotions depend partly on dates-of-hire. I utilize this as a source of exogenous variation in the intensity of intra-worker competition in an instrumental variables setup.²

The outcomes I study come from the firm’s administrative data. The firm logs a wide variety of timestamped, labeled worker productivity data to facilitate collaboration and debugging. I use these activity logs as “time diaries” (Hamermesh et al., 2005) to analyze how competition affects the level and composition of worker effort. The data includes not only estimates of time spent, but also the quantity of output per-dimension using the firm’s internal task descriptions.³

I use this productivity and time use data to measure the effect of competition on worker effort – including not only the amount of effort, but also its efficiency, quality and allocation across multiple dimensions of productivity. For example, I study effects on innovation, productive on-the-job cooperation with colleagues, providing public goods for one’s peers and other economic characteristics of output (besides its amount). The multidimensional nature of output also permits analysis of specialization and the division of labor.

This paper has four main findings. First, I find that competition creates strong incentives for effort, output and efficiency, without decreases (or increases) in the quality or innovativeness of

¹This figure comes from a survey conducted for this paper of over 15,000 employed Americans, reweighted to match the census tracts. The survey and its results are described in Section ?? and reported in Table ??.

²The first stage has an F -statistic of ~ 31 .

³By contrast, traditional time use datasets usually measure only inputs (time) and not outputs. An additional advantage of this data is that it involves no self-reporting. Lastly, my data contains labels of activities designed by the firm, rather than by an external researcher. As such, the division of tasks I study in this paper aligns with the firm’s production function (or at least its self-perception thereof). They also assist with interpreting my results in light of the economic theory on incentives, contests and internal labor markets. Despite these advantages, these logs share some disadvantages with traditional time use data, described in Section ??.

output.⁴

Second, the competition does encourage several negative behaviors by employees. Workers report lower job satisfaction in competitive settings, and are less likely to be engaged in productive cooperation and organizational citizenship on several dimensions.

Third, I find that employees respond to the competition through sorting and retention decisions. Employees facing high competition sort into different competitive pools via quitting. Workers in high competitive situations are more likely to quit and join other companies. This is especially true for high-performing workers.

Fourth, I find that higher competition induces a different division of labor across workers. Competition affects not only the amount of output, but also its composition and division between workers. I find that competition induces differentiation and specialization by workers. As competition increases, workers increase the concentration of their effort into a subset of tasks.

This result has two interpretations. As early as [Smith \(1776\)](#), economists have viewed specialization and the division of labor within firms as a source of efficiency gains and a rationale for the existence of firms. In intra-worker competition, workers are likely to specialize in tasks where they hold comparative advantages against other contest opponents. The resulting productivity gains from specialization create additional efficiency benefits for the firm.

Specialization also makes comparisons between employees harder. A second interpretation of these results is that differentiation thus resembles a contest-theoretic version of differentiation ([Hotelling, 1929](#); [Tirole, 1988](#)) or “obfuscation” ([Ellison and Ellison, 2009](#)). By differentiating, workers can affect the noisiness of evaluation – a parameter set by the principal in most contest-theoretic models. Increases in evaluation noise decrease players’ equilibrium effort and increase player welfare.

Specialization thus benefits the worker and the firm, and dampens incentives for sabotage and influence-peddling. It thus represents a heretofore unrecognized benefit of rank-based competition, improving productivity and mitigating antisocial incentives. The effects of competition on the division of labor offer an additional and novel explanation for the widespread use of contests inside firms in multi-tasking environments, despite their negative side-effects on sabotage and politics.

This paper builds on several literatures. I use a methodological approach from the research on the economics of time use ([Aguilar et al., 2012](#)) to study a widespread phenomena at the intersection of labor economics and contract theory. Although I describe my data as “time diaries,” they differ in important ways from classical time use datasets and I discuss these differences in Section ??.

⁴Although this result is consistent with most theory, some models of heterogeneity in workplace competition (i.e., [Gürtler and Gürtler, 2013](#)) predict the opposite results.

This paper is also the first to attempt to measure the prevalence of a tournament-like form of wage growth and incentives. Through a large survey, I collect new data to measure the pervasiveness of workplace tournaments: The results in Table ?? suggests they are a part of compensation for 77% of American workers. If anything, these figures may understate the prevalence of tournament-like rewards.⁵

The contract theory literature has embraced tournaments as a descriptive model of incentives within firms. Workplace contests are among the most common motivating applications of the theoretical tournament literature. An analysis of a natural experiment in stock option pricing by Cowgill and Zitzewitz (2009) suggests that promotion contests are a cheaper, more powerful form of incentives than stock options, even using the most generous estimates of the effects of options.

However, despite the central component of tournaments, the existing theoretical literature is mostly concerned with effort, sabotage and (to a lesser extent) “influence activities.” This paper shows the central role that sorting, differentiation, specialization and obfuscation may have in the context of workplace tournaments. One recent paper (Morgan et al., 2012) models self-selection into tournaments, but its theoretical predictions are ambiguous. There are few contest-theoretic papers with multidimensional effort at all.⁶

In addition, the empirical literature on contracting has narrowly focused on situations whereby we observe clear unidimensional measures of output (e.g., sports⁷ and manual labor⁸). In contrast, this paper focuses on the allocation of effort across a multidimensional set of tasks, some of which involve more uncertainty (e.g. innovative activities). These are arguably more common workplace environments. These jobs require workers to not only follow manager instructions, but also to form judgments, strategize, take risks, innovate and specialize. The multidimensional nature of output introduces contracting issues around multitasking (Holmstrom and Milgrom, 1991; Baker, 1992), specialization, innovation and complementarities that aren’t captured in farming or athletic settings.

White-collar work also exhibits contracting and measurement features that naturally lend themselves to tournaments. One of the heralded benefits of contests is “it is not necessary to determine how much better one worker is than another; all that is needed is rank order information” (Prendergast, 1999). Managers in sports and fruit-picking can easily measure differences in employee output. It is thus unclear why industries such as sports and farms need tournament incentives at

⁵Behavioral economists and psychologists have argued that even without formal contest incentives, workers care about rank-order performance as they directly affect self-image (Benabou and Tirole, 2003; Köszegi, 2006; Maslow, 1943; McClelland et al., 1953) and convey status (Besley and Ghatak, 2008; Moldovanu et al., 2007; Frank, 1985).

⁶Two rare exceptions include Garicano and Palacios-Huerta (2005) and a very a brief discussion in Acemoglu and Jensen (2010). A related literature on auctions has studied multidimensional bidding, for example, Che (1993), Yoganarasimhan (2013) and Krasnokutskaya et al. (2013).

⁷For example, Brown (2011); Garicano and Palacios-Huerta (2005); Balafoutas et al. (2012); Becker and Huselid (1992).

⁸For example, Bandiera et al. (2013), Drago and Garvey (1998), Knoeber and Thurman (1994), Knoeber (1989).

all, rather than alternative contracts.

By contrast, managers in white collar work cannot easily measure differences in the market value of software output, patentable ideas or consulting advice – but can make reasonable rank comparisons. As such, these settings embody the information and contracting details that give rise to tournament incentives.

This paper also incorporates ideas from the larger literature on how firms mitigate competition, price wars and other forms of costly competition. In different contexts, economists and strategy researchers have addressed maneuvers to avoid or “soften” competition through differentiation ([Hotelling, 1929](#); [Tirole, 1988](#)), tacit or explicit collusion ([Stigler, 1964](#)), capacity restrictions, erecting barriers to entry ([Caves and Porter, 1977](#)) and/or “obfuscation” ([Ellison and Ellison, 2009](#); [Ellison and Wolitzky, 2012](#)).

This paper shows the applicability of these ideas from industrial organization in a labor and organizational economics setting. Like other competitive settings, contests are characterized by zero-expected profits through rent-dissipation. In most laboratory studies, rents are actually over-dissipated in contests ([Sheremeta, 2014](#)).

Lastly, this paper contributes to the literature on peer effects (e.g. [Sacerdote, 2011](#)). Much of the peer effects literature measures the homogenizing influence of peers on each other. However, the contest literature predicts a different type of peer effects in competitive settings. This paper demonstrates competition creating specialization and differentiation between peers, rather than homogenization. I also show evidence of endogenous self-sorting ([Carrell et al., 2013](#)) motivated by these competition-related peer effects. Tournament-like incentives exist in many of the settings wherein economists care about peer-effects; not only in firms, but also in classrooms where grades are often awarded on relative performances “curves” that create contest-like incentives.

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