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Collusion and biased tournaments

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ABSTRACT

Tournaments are vulnerable to collusion. This paper finds that biased tournaments can be more effective at preventing collusion than unbiased ones. When agents can collude to exert low effort, introducing some bias into tournaments generates opposite effects on favored and disfavored agents' respective incentives to exert high effort and provides strong incentives for the favored agent to deviate from collusion. Introducing an adequate degree of bias reduces the principal's incentive cost for preventing collusion; however, granting excessive bias instead increases the incentive cost. We show that the optimal level of bias can be endogenously determined.

1. Introduction

Objective assessments of employee performance are rarely available. Firms instead rely on subjective performance evaluation. However, subjectivity opens a door to the problem of employer opportunism, in that employers may renege on the contracted rewards for employee performance. For instance, suppose an employer promises to pay an employee a certain salary if a subjectively measured performance criterion is met. Ex post, the employer has a strong incentive to claim that the criterion has not been met in order to reduce the wage payouts.

In recognition of unfairness to employees, organizations often try to counter this problem. One organizational response to opportunism is for employers to commit to a fixed total wage scheme in which the division of wages among employees depends on some measure of relative performance.[1] Such incentive schemes, also referred to as tournaments, aim to provide optimal incentives for employees while eliminating the employers' incentive to renege on rewards.[2]

Yet, tournaments are vulnerable to another problem, collusion, because they create strong incentives for employees to exert low effort jointly. Because relative performance of employees is determined by their relative rather than absolute efforts, reducing their efforts collectively saves effort cost without affecting the rank order of performance and thus benefits the employees.[3] This theoretical prediction is well supported by the widespread evidence about collusive phenomena in a variety of organizations which rely on relative performance evaluation.[4] Sociologists (Crozier, 1964; Dalton, 1959) and organization theorists (Cyert and March, 1963) have emphasized the importance of analyzing collusive behavior and its

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[1] See, for instance, Carmichael (1983) for detailed discussion. Prendergast (1999) gives an excellent survey of the provision of incentives in such organizations.

[2] See, for instance, the studies of Green and Stokey (1983), Lazear and Rosen (1981), and Nalebuff and Stiglitz (1983).

[3] See for instance Mookherjee (1984) for a discussion of the possibility of collusion in relative performance evaluation.

[4] See Tirole (1986, 1992) for detailed discussion. In particular, as collusive behaviors always occur in secret, what we have observed is likely to be only the tip of the iceberg. This suggests that collusive phenomena in the real world could be much more serious than observed.

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implications for organizational design. Meanwhile, economists (Laffont and Tirole, 1991; Tirole, 1992) have also argued that it would be naive to construct incentives for individual members of an organization without considering their effect on collective behavior, and thus the design of incentive schemes must account for the possibility that employees will collude to manipulate the schemes' functioning.

This paper studies the optimal design of tournament mechanisms as a response to collusion in the presence of subjective performance evaluation, taking into account – and in fact taking advantage of – the possibility that the employer will use biased incentive schemes. The paper finds that the optimal collusion-proof tournament mechanism, which aims to minimize the incentive cost, involves some degree of bias in performance evaluation.

Let us summarize the model of a tournament which we will elaborate on in Section 2 of this paper. At this stage, a simple and stylized model captures the key dynamics. The model involves one principal (the employer) and two identical agents (her employees). Agents can choose to exert one of two levels of effort – high or low – and their performances are imperfectly related to their efforts. The principal offers a sufficiently large prize for winning the contest so as to give both agents an incentive to put in the higher level of effort.

In the absence of bias, when both agents put in high effort they would win the prize with the same probability. However, we take the case where the principal in fact harbors a bias in favor of one agent, agent *i*. Formally, we say that a biased principal adjusts the rule which determines the ranking of agents as follows. Instead of declaring agent *i* the winner if and only if *i*'s performance surpasses his rival's, the principal declares *i* the winner so long as *i*'s performance does not fall short of his rival's by more than some amount, *b*. Thus *b* denotes the level of bias in agent *i*'s favor.[5] The favored agent enjoys a higher probability of winning than the disfavored one given other things equal, which in turn yields a higher expected payoff for the favored agent than the disfavored one. As a result, compared to the threshold when there is no bias, a smaller threshold size of prize suffices to elicit high effort from the favored agent. Importantly though, an effect which works in the opposite direction occurs at the same time: namely, it takes a larger prize to elicit high effort from the disfavored agent compared to the no-bias threshold. However, as the principal cannot offer unequal, or "discriminatory", incentive prizes for the respective agents (the agents will reject such a contract since they know the principal has an incentive to renege on the higher incentive prize), the incentive prize must meet the higher threshold for the disfavored agent. This leaves the principal overall worse off. Hence, *when there is no collusion*, introducing bias into performance evaluation for a tournament does not increase the principal's payoff; in fact under certain conditions it makes her worse off.

Yet, in the body of the paper we will show that, *when there is collusion*, bias in performance evaluation can reduce the cost of preventing it. Agents can sustain collusion on low effort only if no agent has an incentive to deviate to the higher effort level unilaterally. However, for a favored agent, deviating to high effort unilaterally increases the probability of winning. The increment of the winning probability due to deviation rises with the level of bias up to a certain point, then falls with the level of bias beyond that point. This implies that, up to a point, increasing the degree of bias would strengthen the incentive for the favored agent to deviate, which in turn reduces the threshold level of incentive prize that it takes to break collusion. However, any additional bias beyond that point would instead reduce the favored agent's incentives for deviation and increase the threshold for breaking collusion. Therefore, the optimal level of bias, defined as the level which minimizes the incentive cost for preventing collusion, can be endogenously determined.

Thus, we derive three main results from this simple model. First, bias in performance evaluation does not benefit the principal and may actually leave her worse off in the absence of collusion. Second, introducing a certain degree of bias reduces the incentive cost of preventing collusion, but, from the principal's point of view, bias beyond that degree is not desirable. Third, the optimal level of bias in terms of collusion-proofing can be endogenously determined.

The idea of using bias to prevent collusion is indeed not novel to politicians. Political leaders often face serious threats of cliques, and as a response they tend to favor some subordinate so that these favored ones are discouraged to collude with others. Recently, the Chinese political leader Xi Jinping promoted 10 army generals. It was observed that two of them did not meet the conventional criteria for promotion to the rank of full general, and according to observers, these two generals held positions in the 31st Army, which is favored by President Xi.[6] These promotions were also interpreted as a response to the serious challenge of cliques in the army.[7]

Economists, however, have by and large ignored the role of biased incentive schemes in fighting collusion.[8] Bias in performance evaluation is also referred to as favoritism. Evidence of explicit and implicit bias is widely documented in a variety of organizations.[9] It is commonly recognized that bias is one of the most important sources of conflicts in

[5] We follow the same approach to modeling bias in tournaments as Meyer (1991).

[6] See the article, "The Diplomat", at http://thediplomat.com/2015/08/xi-jinpings-new-generals/.

[7] Collusion and corruption in the People's Liberation Army (PLA) have been a serious challenge to President Xi's leadership. According to the report by *The Economist*, in a campaign against cliques in the PLA, two vice-chairmen of the Central Military Commission, which runs China's armed forces, Mr. Guo Boxiong and Xu Caihou, were arrested and more than 15 senior ranking figures were also accused of corruption in the past year. The article is at http://www.economist.com/news/china/21660257-china-nets-its-most-senior-army-general-yet-xi-jinpings-fight-against-corruption-military.

[8] Economists do note that biased mechanisms can improve the efficiency of organizations for different reasoning. See the detailed discussion in the concluding remarks.

[9] For example, Kraiger and Ford's (1985) survey of the effects of race on ratings reported that the race of both the rater and the ratee affected evaluations. Overall, supervisors give higher ratings to subordinates of their own race.