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Behavioral spillovers from freeriding in multilevel interactions

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ABSTRACT

We study multilevel interactions using experimental methods. Does the efficiency of a production team suffer from the freeriding behavior of some team members at the firm level? Can we identify behavioral spillovers affecting teams? We isolate common tasks that teams must complete – coordination and cooperation – and model each of them using a simple experimental game that is designed to avoid identification problems. By observing a team's efficiency before and after the firm-level event, we identify the behavioral spillovers of freeriding to team-level cooperation and coordination. We demonstrate that team composition with respect to freeriding behavior of individual members during the firm-level conflict conditions behavioral spillovers. In particular, the efficiency of heterogeneous teams decreases after a firm-level conflict, whereas homogeneous teams can improve their performance.

1. Introduction

This study reports on multilevel interactions in organizations. Firms have hierarchical structures, and although most workplace interactions take place among co-workers at the same level, such as within the same team, department or subsidiary, numerous important interactions run *across* organization levels. Examples include firm-level processes, such as establishing a new management structure, implementing innovations, or wage negotiations. Workers' interactions with team members are potentially affected by interactions and conflicts with the same individuals within processes that concern matters at the firm-wide level. Although such multi-level interactions are quite common, our understanding of how interactions at one level impact behavior at another level remains underdeveloped.

Many interactions between employees and management at the firm level – such as conflicts over organizational and strategic changes or over employment conditions – potentially affect team-level interactions. Recently, there has been a call to include the interplay of different levels of interaction in economic and social research to identify the behavioral spillovers running across them (e.g., Hitt et al., 2007; Korsgaard et al., 2008). There is some evidence that positive experiences spill over from one level to another, and cooperation at one level of interaction increases the efficiency of a team operating at another level (Cason, Savikhin, and Sheremeta, 2012). However, positive spillovers only represent one-half of the phenomenon. In this paper, we address the companion question: How do cooperation problems, specifically freeriding at the firm level, spill over from the firm level to team-level interaction? Importantly, firm-level conflict that negatively affects the coordination and cooperation in production teams might ultimately endanger firms' profitability.

The specific question we address is: what are the behavioral spillovers from a firm-level event on a team's (i) coordination and (ii) cooperation in achieving an efficient outcome? In our study, the firm-level event is a social dilemma, in which individual incentives conflict with the interests of the group of workers at the firm level.

Examples of such firm-level events are conflicts over organizational or strategic changes or labor conflicts between management and workers. In all of these cases, the workforce frequently does not act in concert; instead, different opinions might divide the workforce and teams with potential consequences for teamwork and the overall productivity of the firm. Getman and Marshall (1993) observe an escalation of inter-personal conflicts at the team level after a firm-level labor strike, in which certain team members participated and others continued working. A striker is quoted as follows: "I absolutely refuse to give any intelligence. There's all kinds of tricks of the trade that you learn, and when I'm working with a scab [a non-striker], I will not use anything I ever learned. [. . .] I pull my ass eight hours knowing full

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well in five minutes I could get it done another way." (Quote from a striker in Getman and Marshall, 1993: 1841).

Such negative consequences of a strike, as a firm-level conflict, are frequently reported to spill over to work teams. Teams' efficiency decreases due to the fault lines arising after a strike, separating work team members by their behavior during the firm-level event (MacDowell, 1993). Numerous studies report physical, verbal, and social harassment in teams divided by such fault lines (Brunsden and Hill, 2009; Francis, 1985; Barling and Milligan, 1987; Waddington, Dicks, and Critcher, 1994), leading to decreased productivity (Francis, 1985; Getman, 1999; Waddington, Dicks, and Critcher, 1994; Krueger and Mas, 2004; Mas, 2008; Addison and Teixeira, 2009).

Although these behavioral spillovers in multi-level interactions appear to be repeatedly observed in case studies, the mechanism underlying them and their generalizability across work environments remains vague due to missing, incomplete, or limited data. We therefore implement an incentivized experiment, with the goal of identifying behavioral spillovers and isolate their impact on the two main aspects of teamwork: cooperation and coordination. The experimental method allows us to address causality by comparing pre- and post-firm-level conflict situations in teams, as well as the spillover's impact across teams, when production resembles a coordination (weakest link) task and when it resembles a cooperation (public good) task.

Table 1
Payoffs in the weak-link game.

The payoff table (payoff in points)							
Your final effort	The lowest final effort in the team						
	7	6	5	4	3	2	1
7	130	110	90	70	50	30	10
6	–	120	100	80	60	40	20
5	–	–	110	90	70	50	30
4	–	–	–	100	80	60	40
3	–	–	–	–	90	70	50
2	–	–	–	–	–	80	60
1	–	–	–	–	–	–	70

Table 2
Payoffs in the public goods game.

The payoff table (payoff in points)													
Your final effort	Sum of efforts of your team members												
	14	13	12	11	10	9	8	7	6	5	4	3	2
7	130	123	117	110	103	97	90	83	77	70	63	57	50
6	133	127	120	113	107	100	93	87	80	73	67	60	53
5	137	130	123	117	110	103	97	90	83	77	70	63	57
4	140	133	127	120	113	107	100	93	87	80	73	67	60
3	143	137	130	123	117	110	103	97	90	83	77	70	63
2	147	140	133	127	120	113	107	100	93	87	80	73	67
1	150	143	137	130	123	117	110	103	97	90	83	77	70

2. Theory and experiment design

Team production takes place when a team's output depends on individual efforts, as well as on the externalities they exert (Batt, 2004). In teams, the individual team member's efforts become aggregated into a team outcome, for which the team members receive remuneration. Depending on the nature of the technology generating the output, teams face either of two main challenges, namely *coordination* and *cooperation* (Alchian and Demsetz, 1973; Orr, 2001; Siemsen, Balasubramanian, and Roth, 2007).

Coordination is defined as a situation in which every team member gains by choosing the same action as the other team members, and *cooperation* is a situation in which each team member's individual efforts generate an additional positive externality at the team level (Cassar, 2007: 211). Cooperation differs from coordination in that it entails a tension between the team's interest and self-interest. When in need of coordination, team members agree on what effort will generate the best outcome for the team and for themselves, but when required to cooperate, freeriding is imminent: each team member faces incentives to deviate from the effort that would maximize team production. Let us describe the games that we employed in our experiments to model coordination and cooperation.

First, we model team *coordination* in our experiments using the *weak-link game* (Van Huyck, Battalio, and Beil, 1990; Battalio, Samuelson, and van Huyck, 2001; Knez and Camerer 2000, 2006; Knez and Simester 2001; Dugar, 2010). Accordingly, the experimental treatment implementing this game is referred to as the WL treatment. The weakest link game is a pure coordination game with seven strict Nash equilibria, which can be Pareto ranked. In the experiment, a session always consisted of 12 subjects, who were matched into teams of three and interacted repeatedly on the same team. In the weak-link game, the subjects' payoff was determined by the payoff function:

$$60 + 20^{*} \text{ the "minimum effort in the team"} - 10^{*} \text{ "own effort".}$$

Individual effort was an integer between 1 and 7. Table 1 contains the payoff table for this game.

In this weak-link game, any symmetric strategy profile represents a Nash equilibrium, but efficiency is only obtained if all subjects on a team choose the highest effort of 7. Past research demonstrated that the task of coordinating on the most efficient Nash equilibrium in the weak-link game can be a daunting task (for a review, see Camerer, 2003). Strategic uncertainty prevailing among players explains the lack of immediate coordination on the most efficient equilibrium.

Second, we model team *cooperation* using the *linear public goods game* (Ledyard, 1995; Zelmer, 2003). Accordingly, the experimental treatment implementing this game is referred to as the PG treatment. The incentive structure of the game is such that the efficient outcome is not a Nash equilibrium. Although the efficient outcome is better for all players, from the team perspective, it is instable due to the individual incentives to free ride. This game embodies a tension between the individual- and team-level incentives. In the experiment, subjects were also matched into teams of three members and interacted repeatedly on the same team. They had to choose a level of effort, being an integer between 1 and 7, with 1 corresponding to the individually rational action and 7 corresponding to the efficient action. The payoffs are calculated by the payoff function:

$$60 + (20/3)^{*} \text{ "sum of all efforts in the team"} - 10^{*} \text{ "own effort".}$$

Table 2 presents the resulting payoffs.

We parameterized the payoff functions of the two games such that they are easily comparable. The highest and the lowest payoff that the team members can obtain in a symmetric strategy profile are equal in both games. However, the stability of these symmetric strategy profiles varies between games. In the weak-link game, the efficient outcome, with all subjects choosing 7, is a strict Nash equilibrium, but this choice is not an equilibrium due to freeriding incentives in the public goods game. Moreover, the symmetric profile yielding the lowest payoff, with all subjects choosing 1, is a strict Nash equilibrium in both games. Consequently, the willingness of team members to cooperate and their beliefs concerning their teammates being cooperative will affect the possibility of obtaining the efficient outcome for the team in the public goods game. In contrast, coordination in the weak-link game is in the self-interest of each team member, and the team's success solely depends on each member's assessment of the expected behavior of other team members but not on their willingness to cooperate.

In each of the games, the actual choice of the efforts that determined the payoffs was organized as follows: subjects received 2 min