Revving Up or Backing Down? Cross-Level Effects of Firm-Level Tournaments on Employees' Competitive Actions

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Forthcoming, ***Academy of Management Journal***

December 1, 2023

Patrick Hallila and Hans Frankort share first authorship. We wish to thank Associate Editor Reddi Kotha and three anonymous reviewers for providing detailed and constructive comments and suggestions. We also thank Argyro Avgoustaki, Simone Ferriani, Hemant Kakkar, Tobias Kretschmer, Henning Piezunka, Jan-Michael Ross, Janina Steinmetz, members of the Strategy Group at Bayes Business School, and audience members at the 2021 Academy of Management Virtual Conference and a virtual workshop on rivalry in sports organized by Thorsten Grohsjean and Jan-Michael Ross for helpful comments and discussions. Davide Barana, Paolo Ciabatti, and Davide Tardozi of the Ducati MotoGP team offered advice regarding rider conduct on the racetrack. Patrick Hallila is an affiliate and Paolo Aversa the Jonas Persson Visiting Professor at the Center for Sports & Business at Stockholm School of Economics. During part of the research for this study, Paolo Aversa was a visiting scholar at Esade Business School and the UCL School of Management.

REVVING UP OR BACKING DOWN? CROSS-LEVEL EFFECTS OF FIRM-LEVEL TOURNAMENTS ON EMPLOYEES' COMPETITIVE ACTIONS

ABSTRACT

The tournament literature has typically traced employees' competitive actions to characteristics of individual-level career tournaments. Yet such individual-level tournaments usually transcend firms that themselves compete in a firm-level tournament. We study the cross-level implications of a firm-level tournament for the competitive actions that constituent employees undertake against other individuals internal and external to their firm. We propose a theory of individual reputational incentives, which predicts that a firm's competitive threats decrease its employees' internal competitive actions yet increase their external competitive actions, while a firm's competitive opportunities increase employees' internal and external competitive actions. The theory also predicts that these effects are the largest when a firm faces potential unexpected losses or gains in its standing, such as when the firm experiences competitive threats from resource-disadvantaged firms, or competitive opportunities against resource-advantaged firms. In panel data on the population of motorcycle riders competing in MotoGP from 2004 to 2020, we examine these hypotheses using overtakes to measure riders' internal and external competitive actions. Our findings reveal how riders adjust their internal and external overtakes based on their team's competitive threats and opportunities, and on the relative resource endowments of the teams supplying such threats or opportunities.

INTRODUCTION

Concerned with achieving desirable career-related rewards, employees tend to engage in competitive actions against other individuals both internal and external to their firm. For example, they may encroach on others' spheres of influence (Baum, Bowers, & Mohanram, 2016) or poach their clients (Chan, Li, & Pierce, 2014). Such career tournaments, in which individuals seek to enhance their relative position (Lazear & Rosen, 1981; Rosen, 1986), almost everywhere transcend firms that themselves compete in a firm-level tournament. Indeed, firms widely pursue things such as market share (Ferrier, Smith, & Grimm, 1999), critical contracts (Mihm, Sting, & Wang, 2015), or favorable spots in relevant rankings (Rindova, Martins, Srinivas, & Chandler, 2018).

Yet while the nesting of individual-level career tournaments in firm-level tournaments is a near-ubiquitous organizational reality, the prior tournament literature has mostly traced employees' competitive actions to characteristics of the individual-level tournament, such as the spread of rewards across tournament levels (Connelly, Tihanyi, Crook, & Gangloff, 2014; Dechenaux, Kovenock, & Sheremeta, 2015). To date, it has not examined the possible cross-level consequences of a firm-level tournament for the competitive actions of constituent employees, who themselves strive for career-related rewards. A firm's standing may have important implications for employees' careers, however (e.g., Bidwell, Won, Barbulescu, & Mollick, 2015; Rider & Tan, 2015). Thus, closer attention to the cross-level effects of firm-level tournament dynamics seems critical for a more complete understanding of employees' internal and external competitive actions.

Of course, a large and multidisciplinary body of research has examined how individuals' behaviors may depend on whether their group (e.g., a firm) competes with other groups (Böhm, Rusch, & Baron, 2020). This research has long emphasized the 'common-enemy effect,' which holds that common enemies unite the members of a group (De Jaegher, 2021). At first blush, its natural prediction here would be that employees engage less in internal and more in external competitive actions when their firm faces more intense competition in a firm-level tournament (e.g., Halevy, Bornstein, & Sagiv, 2008). However, this prediction may not follow so neatly because the nesting of career tournaments in firm-level tournaments is different in two potentially consequential ways. First, the vertical nature of tournaments implies a sharp distinction between competitive threats from lower-ranked firms and competitive opportunities against higher-ranked firms (e.g., Bothner, Kang, & Stuart, 2007). In the common-enemy literature, the implications of these distinct kinds of group-level competition for individual behaviors remain underdeveloped.[1] Second, employees' career concerns could occasionally lead them to engage fiercely in both internal and external competitive actions (e.g., Lazear, 1989). Yet career concerns play little conceptual role in the common-enemy literature and, perhaps therefore, its empirical designs tend

[1] In Online Appendix A, we review 35 studies of the relation between intergroup competition and individual attitudes and behaviors, spanning the period from 1961 to 2019. We coded how they conceptualized group-level competition. About half the studies did not specify whether a group faced competition due to the threat of loss or the opportunity for gain. The other half alluded to the outcome of interest as either a potential loss or a potential gain. Nevertheless, in most such studies the competing groups acted from a position of parity. Thus, even in that research threats or opportunities derived from the framing of the outcome rather than groups' relative standings in a dynamic tournament.

not to allow individuals to act simultaneously against members of both their own and other groups.[2]

Accordingly, our objective is to theorize and examine how a firm's competitive threats and opportunities in a firm-level tournament affect the internal and external competitive actions of its employees, who are concerned with their future careers. Drawing from the career-concerns literature (e.g., Borland, 1992; Fama, 1980; Holmström, 1999; Miklós-Thal & Ullrich, 2016), we propose a theory of individual reputational incentives, according to which employees will compete more fiercely if they expect that specific competitive actions help them sustain or improve their reputation. Yet they may hold back in situations in which they anticipate that such actions could hurt their reputation. Our theory predicts that a firm's *competitive threats* decrease its employees' internal competitive actions but increase their external competitive actions, while a firm's *competitive opportunities* increase employees' internal and external competitive actions. The theory also predicts that these effects should be larger when a firm faces potential unexpected losses or gains in its tournament standing, such as when the firm experiences competitive threats from resource-disadvantaged firms, or competitive opportunities against resource-advantaged firms.

We test our hypotheses in original panel data on the population of riders competing in MotoGP during a 17-year period, from 2004 to 2020. MotoGP is the leading championship in professional motorcycle racing, in which riders have individual career concerns yet all are also employed by teams that compete in a firm-level tournament. The transparent nature of competition in MotoGP means we can use overtakes as a consistent measure of riders' internal and external competitive actions. By 'overtake,' we mean a rider's act of passing another rider on the racetrack. MotoGP teams are clearly differentiated by their resource endowments, which also allows us to perform persuasive tests of the moderating role of teams' resource (dis)advantages.

[2] The common-enemy literature has achieved much of its empirical traction through team games, such as the intergroup prisoner's dilemma-maximizing difference game (see Online Appendix A). Individuals must typically decide whether to contribute all or part of a fixed endowment to benefit their own group and/or harm another group.

This article advances the tournament literature by challenging prior accounts tracing employees' competitive actions exclusively to characteristics of an individual-level career tournament. It argues and shows that employees' internal and external competitive actions may also respond to characteristics of a firm-level tournament in which the career tournament is nested. We also add to the literature on common-enemy effects, by offering a theory and empirical evidence of employees' competitive behaviors that account both for vertical differentiation among competing firms and for individual career concerns.

FIRM-LEVEL TOURNAMENTS AND EMPLOYEES' COMPETITIVE ACTIONS

Individuals employed by a firm are commonly part of some implicit or explicit tournament, through which they strive to improve performance relative to other individuals, with the objective of increasing their own career-related rewards (Lazear, 1989; Lazear & Rosen, 1981; Rosen, 1986). Rewards may be internal or external, and can include additional pay, resources, recognition, bonuses, promotions, or a role with a more desirable employer (e.g., Miklós-Thal & Ullrich, 2016; O'Neill & O'Reilly, 2010; Rosenbaum, 1984). These individual tournaments typically transcend firms, in that they comprise all the individuals in a market competing for particular career-related rewards, whether inside or outside of their current firm.

An employee's competitive actions represent one important way to attempt to progress in an individual tournament. By 'competitive action' we mean any targeted, specific, and observable move that individuals make, with the goal of enhancing their relative position. Thus, competitive actions threaten and may ultimately come at the expense of others. Examples of competitive actions could be poaching others' clients (Chan et al., 2014), encroaching on others' spheres of influence (Baum et al., 2016), or deceiving (Edelman & Larkin, 2015), sabotaging (Charness, Masclet, & Villeval, 2014), or refusing to help others (Drago & Garvey, 1998), with the specific objective of gaining a relative advantage. An individual may perform both *internal* competitive actions against colleagues and *external* competitive actions against the employees of other firms. For example, salespeople may poach the existing or potential clients of colleagues (an internal competitive action), yet also ones of salespeople employed elsewhere (an external competitive action). Employees' amount of effort can fluctuate over time (e.g., Frankort & Avgoustaki, 2022), so we assume that internal and external competitive actions can vary independently.

A substantial empirical literature on individual tournaments has examined the effects of tournament characteristics on the behavior of tournament participants. Some studies suggest that a larger spread of rewards across tournament levels elicits more individual effort (e.g., Audas, Barmby, & Treble, 2004; DeVaro, 2006). When the reward spread is larger, individuals may also take more risks (Becker & Huselid, 1992), be less inclined to help their colleagues (Drago & Garvey, 1998), and they may engage in sabotage behaviors (Harbring & Irlenbusch, 2011). Other studies show that interim rankings in a tournament's performance distribution affect individuals' risk-taking behaviors. For example, occupants of low or intermediate ranks may be more prone to undertaking risky actions (e.g., Brown, Harlow, & Starks, 1996; Genakos & Pagliero, 2012). Risky competitive behaviors have also been linked to whether other competitors are near an individual's interim rank position, so that the individual may imminently lose or advance his or her standing (Bothner et al., 2007). Taken together, the available tournament literature would overwhelmingly imply that employees' behaviors, including their competitive actions, can be traced to antecedents internal to the individual tournament (Connelly et al., 2014; Dechenaux et al., 2015).

However, individual tournaments usually transcend firms that are themselves part of a collective, firm-level tournament. Just as employees care about their position relative to other individuals, so do firms care about their position relative to other firms. For example, firms may strive to become or remain a market leader (Ross & Sharapov, 2015) and to increase their market share (Ferrier et al., 1999), or they may contend for critical supply contracts (Mihm et al., 2015).

Also, a broad variety of entities, including investment banks (Bidwell et al., 2015), law firms (Rider & Tan, 2015), and private universities (Askin & Bothner, 2016), engage in competition for favorable spots in relevant rankings and league tables (Espeland & Sauder, 2007; Rindova et al., 2018). Finally, most sports leagues are by design rank-order contests among teams (Szymanski, 2003). Thus, tournaments among individuals are usually nested in tournaments among firms.

Employees tend to be particularly aware of firm-level tournaments if good performance in such tournaments is relevant to current and prospective employers. Employees' awareness of the dynamics of a relevant firm-level tournament can derive from various factors. For example, their job might require employees to be proactive in staying informed because of the value attached to tournament standings by an industry's key constituents, such as investors, customers, or suppliers (Pollock & D'Adderio, 2012; Rindova et al., 2018). Also, employees may have arrived with a keen eye on the firm-level tournament because of their desire to work for a firm of good standing (Bidwell et al., 2015), or because they were hired for their potential to help sustain and enhance the firm's standing (Espeland & Sauder, 2007).

Despite the almost ubiquitous organizational reality of firm-level tournaments and employees' awareness of such tournaments, little attention has been paid to the cross-level implications of a firm-level tournament for the competitive actions of constituent employees, who themselves strive for career-related rewards as participants in an individual tournament. From their extensive review of the tournament literature, Connelly et al. (2014: 38) even concluded that they "*did not find tournament theory research employing multiple levels [of] analysis*" at all. We will argue that a concern for the potential dynamics of a firm's tournament standing may enter an employee's decision calculus, so that competitive intensity in a firm-level tournament can influence employees' competitive actions.

Individual Reputational Incentives and Firm-Level Tournaments

Our argument centers on the notion of individual reputational incentives. Success in an individual tournament—for example, through higher pay, a promotion, or more desirable employment—depends critically on assessments of an individual's functioning by current and/or prospective employers. Beyond objective individual measures, such assessments necessarily and often purposely rely on broader, possibly subjective judgments of behavior and performance (Gibbons, 1998). By implication, employees will be concerned with (prospective) employers' beliefs about their behavior and performance, which here we refer to as an employee's 'reputation,' ultimately from a concern for their future career (Fama, 1980; Holmström, 1999; Miklós-Thal & Ullrich, 2016). Such a concern for reputation generates implicit 'reputational incentives,' meaning incentives to pursue positive and avoid negative perceptions by others. Through this lens, one should see individuals *deploy* competitive actions in situations in which they expect that doing so helps them sustain or improve their reputation. Instead, one should observe that individuals *refrain* from competitive actions where they expect that such actions would hurt their reputation.

This simple yet powerful idea of career-related reputational concerns is one of the cornerstones of the literature on individual-level career tournaments (Borland, 1992). We argue that it naturally implies that a *firm-level* tournament can influence employee behaviors to the extent only that such a higher-level tournament affects reputational incentives. How would that happen? Employees can reasonably expect that a relevant firm-level tournament will provoke judgments regarding the degree to which they consider the firm's interests and contribute to its standing (Arvey & Murphy, 1998). Also, employers likely factor the standing of an employee's current firm into their perceptions of that individual's ability (Bidwell et al., 2015; Rider & Tan, 2015). Thus, employees' reputations depend on their firm's standing, and on their being seen to elevate and not endanger its standing. So construed, it is reasonable to imagine that the firm-level tournament may at times lead individuals to compete more fiercely if they expect that specific competitive actions help sustain or improve their reputation. Yet it may also lead individuals to hold back if they anticipate that certain competitive actions on balance can be perceived as harmful or undue.

Competitive Threats and Opportunities in Firm-Level Tournaments

We focus on two key dimensions of competitive intensity in a firm-level tournament—namely, a firm's competitive threats and opportunities—and how these affect the internal and external competitive actions of constituent employees. Convergent with work in organizational ecology, we view firm-level competitive intensity as 'localized,' meaning that a firm's competitive threats and opportunities derive from other firms occupying its neighborhood in the firm-level tournament (e.g., Baum, 1999; Baum & Mezias, 1992; Bothner et al., 2007). Specifically, we will say that a 'competitive threat' exists when, at a specific moment in time, another firm can surpass a focal firm's position in a contextually relevant tournament. Instead, a 'competitive opportunity' exists when, at a specific moment in time, the focal firm can surpass another firm's position in that tournament. Thus, a competitive threat implies a firm's potential loss in standing while a competitive opportunity implies its potential gain. Also, because competition in the tournament is zero-sum, one firm's competitive threat (and so potential loss) is another's competitive opportunity (and so potential gain). Finally, a firm's competitive threats and opportunities increase with the respective numbers of other firms that can surpass the focal firm, or that the focal firm can surpass.

Competitive threats. When faced with threats, individuals tend to focus on avoiding and dissociating from possible losses (Bolino, Long, & Turnley, 2016; Higgins, 1997). Thus, an increase in a firm's competitive threats should progressively lead employees to modify their behaviors to *avoid reputational losses*. Employees limit reputational losses to the extent their firm retains its standing, yet also by being seen to contribute to protecting the firm's standing. On this logic, we will argue that a firm's competitive threats will motivate its employees to increase external competitive actions yet decrease internal competitive actions.

Increased competitive threats imply an increased probability that a firm loses its standing. A firm's loss in standing may directly lower employees' reputations in the eyes of their employer. Yet it can also influence employees' labor-market reputations because prospective employers likely adjust downwards their beliefs about the abilities of the firm's employees (Fama, 1980; Rider & Negro, 2015; Sutton & Callahan, 1987).[3] Due to the zero-sum nature of tournaments, such belief updating also implies that the market adjusts upwards its beliefs about the abilities of the employees of other firms surpassing the focal firm. Thus, the individual reputational risks associated with a firm's competitive threats generate incentives for employees to engage in external competitive actions that help fend off competing firms. Such incentives strengthen the higher the level of competitive threat a firm faces.

By deploying external competitive actions, employees can be seen to contribute to protecting their firm's standing. They can also be seen to contribute by refraining from actions that may be perceived as damaging the firm's ability to fend off threats. Employees conceivably anticipate that internal competitive actions, which can involve a refusal to help others (Drago & Garvey, 1998) or sabotage (Charness et al., 2014), may be perceived as damaging when their firm is under threat. Thus, if a potential loss materializes, then employees who were seen to engage extensively in internal competitive actions may struggle to justify their efforts away from external threats, even if they also engaged in external competitive actions. Such employees run a greater reputational risk because they will find it more difficult to dissociate themselves from the loss, meaning they are more likely seen as blameworthy (e.g., Crant & Bateman, 1993).[4]

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[3] An employee's reputations in the eyes of their current and prospective employers may be mutually reinforcing. For example, if an employee's external reputation suffers, then so could their internal reputation because a decrease in outside options might reduce the employee's ability to signal their value (e.g., Lukesch & Zwick, 2023).

[4] Consistent with this reputational argument, for example, Pfann (2006) showed that in distressed firms, employees with a less favorable reputation may have inferior career prospects. Rider and Negro (2015) found that the same may be the case for individuals who are seen to be more closely associated with a firm's failure.

Moreover, when their firm's standing and so their own reputation is under threat, an individual's colleagues may not be keen to become entangled in internal conflicts. Such conflicts diminish their prospects of being perceived as defenders of the firm's standing and so the employer might then extend the attribution of a decline in the firm's standing to these implicated colleagues too. Thus, other employees may relay internal competitive actions initiated by a colleague to the employer, for example, through peer evaluations (Arvey & Murphy, 1998) or informal channels (Kurland & Pelled, 2000), which would further damage the colleague's reputation. These arguments suggest that an increase in competitive threats, and so a higher probability of a firm's positional loss, should reduce an employee's propensity to engage in internal competitive actions.

Hypothesis 1a. An increase in a firm's competitive threats decreases the rate at which an employee engages in internal competitive actions.

The arguments also suggest that an increase in competitive threats will increase an employee's propensity to engage in external competitive actions, though subject to two conditions. First, an employee's task domain must permit direct or indirect interaction with external actors. Second, an employee must believe that acting against such externals can credibly decrease the risk that a firm loses its standing. These conditions occur in diverse settings. Sales employees can have both an impact on performance and the ability to target (the existing or potential clients of) peers at competing firms (e.g., Chan et al., 2014). And in settings such as mutual funds (Kacperczyk, Beckman, & Moliterno, 2015), security analysis (Baum et al., 2016), venture capital (Sorenson & Stuart, 2001), or professional services (Empson, Muzio, Broschak, & Hinings, 2015), individual actions and indicators of firm standing can be closely coupled and, through direct and indirect connections, an employee's activities have the potential to intersect with those of externals. Finally, in team-based sports, interaction with competitors and a link of individual action to team-level tournament performance are essentially given (Fonti, Ross, & Aversa, 2023).

Hypothesis 1b. An increase in a firm's competitive threats increases the rate at which an employee engages in external competitive actions.

Competitive opportunities. While evidence suggests that individuals focus on avoiding and dissociating from possible losses when faced with threats, they focus on achieving and associating with possible gains when faced with opportunities (Bolino et al., 2016; Higgins, 1997). Thus, while attempting to avoid reputational losses when their firm is under threat, employees will progressively modify their behaviors to *achieve reputational gains* when their firm's competitive opportunities increase. Increased competitive opportunities imply a greater probability that a firm enhances its standing, which could lead both current and prospective employers to adjust upwards their beliefs about the abilities of the firm's employees (Bidwell et al., 2015; Fama, 1980; Rider & Tan, 2015). Thus, the prospect of an improved individual reputation generates incentives for employees to engage in external competitive actions to help surpass competing firms, and more so the higher the level of competitive opportunities.

Employees can gain in reputation if their firm improves its standing. Yet an employee's reputation should improve more if they have worked to associate themselves with, and thus can claim credit for, such an improvement (Graham & Cooper, 2013; Weiner, 1995). In the case of a firm's competitive threats, employees will be cautious to avoid bad impressions that would limit their ability to dissociate from a possible loss, especially if the threats are many and so the probability of losses is larger (Hypothesis 1a). However, in the face of their firm's competitive opportunities, employees should be eager to stand out. They can do this by deploying external competitive actions, yet may also attempt to gain an advantage over colleagues through internal competitive actions. Indeed, if a potential opportunity leads to a firm's better standing, then the reputations of employees who are seen to have led the charge to "bring home the win" may improve most (e.g., Ethiraj & Garg, 2012; Uhlmann & Barnes, 2014). This increased propensity to engage in internal competitive actions will be reinforced by an employee's concern that their colleagues might also deploy internal competitive actions to enable *them* to claim credit for the firm's improved standing (Lazear, 1989).

Together, these arguments suggest that an increase in competitive opportunities, and so an increased probability of a firm's positional gain, should increase an employee's propensity to engage in both internal and external competitive actions.

> *Hypothesis 2a. An increase in a firm's competitive opportunities increases the rate at which an employee engages in internal competitive actions.*

> *Hypothesis 2b. An increase in a firm's competitive opportunities increases the rate at which an employee engages in external competitive actions.*

Expected or Unexpected? The Moderating Role of Firms' Relative Resource Endowments

Thus far, we have argued that the competitive threats and opportunities a firm faces in a firm-level tournament influence its employees' reputational incentives, which in turn determine the locus and intensity of their competitive actions. But not all competitive threats and opportunities are created equal. If threats and opportunities have their cross-level effects through employees' reputational incentives, then the effects in Hypotheses 1a and 1b should be larger in situations in which competitive *threats* contain the potential for relatively larger *losses* in employees' reputations. And the effects in Hypotheses 2a and 2b should be larger in situations in which competitive *opportunities* contain the potential for relatively larger *gains* in employees' reputations. We will argue that such situations emerge when a firm faces potential *unexpected* downward or upward changes in its tournament standing.

Potential changes in standing in a firm-level tournament, which derive from a firm's competitive threats and opportunities, vary in the extent to which they conform to the prior expectations of the tournament participants. These expectations serve as reference points, relative to which firms evaluate the dynamics of their own and other firms' standing (Bartling, Brandes, &

Schunk, 2015; Dai, Dietvorst, Tuckfield, Milkman, & Schweitzer, 2018; Doyle, Pettit, Kim, To, & Lount Jr., 2022; Nurmohamed, 2020). A firm's downward or upward movements in the tournament may be 'expected' in the sense that they resonate with prior expectations. Yet these movements might also be 'unexpected' to the extent they violate prior expectations. If the probability increases that a firm faces relatively unexpected movements in its standing, then the attention to its employees' behaviors will be greater (e.g., Coates, Humphreys, & Zhou, 2014) and more deliberate (e.g., Feldman, 1981; Weiner, 1985). Also, if potential unexpected movements materialize, then (prospective) employers likely make more significant updates to their beliefs about the abilities of the firm's employees.[5] Thus, employees' reputations will be more sensitive to possible unexpected rather than expected movements in their firm's standing. It follows that the potential for their firm's unexpected movements should most strongly influence employees' reputational incentives, and hence their internal and external competitive actions.

What determines expectations in a firm-level tournament? We propose that firms' relative resource endowments are a critical determinant. By 'resource endowments,' we mean the levels of tangible and intangible assets tied semi-permanently to a firm (Dierickx & Cool, 1989; Wernerfelt, 1984). Tangible assets include things like financial capital and facilities, while intangible assets include such things as knowledge, capabilities, skilled personnel, a strong brand, and prestige in the industry. Tangible and intangible assets can be mutually reinforcing, so resource endowments often create clear categorical distinctions among the firms in an industry (e.g., Benjamin & Podolny, 1999; Castellucci & Ertug, 2010; Fombrun & Shanley, 1990). For example, the Big Four are viewed as resource advantaged in accounting, as are the MBB firms in management consulting,

[5] The more unexpected a firm's movement in standing, the greater the contrast of such movement with an observer's prior expectations. Thus, convergent with common models of reference dependence (e.g., Bartling et al., 2015) and learning (e.g., Bayesian updating; see Cyert & DeGroot, 1987), an observer's beliefs should update more following less rather than more expected movements.

the Magic Circle firms in UK corporate law, or the factory racing teams in MotoGP, our empirical context (see 'Empirical Setting'). Resource-advantaged firms are typically the "favorites" expected to perform or rank well, while resource-disadvantaged firms are often the "underdogs" expected to perform or rank poorly in comparison (Chen, Ham, & Lim, 2011; Doyle et al., 2022).

If firms' relative resource endowments create the expectations, then when are a firm's potential movements in its tournament standing most unexpected, and so when are its employees' reputational incentives strongest? The answer depends on whether movements would concern potential losses in standing due to competitive threats, or potential gains in standing due to competitive opportunities. First, potential losses in standing are relatively more expected if competitive threats derive from firms with resource endowments that are similar or superior to the endowments of the focal firm. Yet such potential losses would be least expected if they derive from firms that are resource disadvantaged relative to the focal firm. This occurs as soon as underdogs exert competitive threats on a favorite, meaning they somehow managed to come close enough to surpass the favorite's tournament position despite resource disadvantages. Thus, competitive threats imply the greatest potential for employees' reputational loss, and so they create the strongest reputational incentives, if the firms exerting the threats are resource disadvantaged.

Hypothesis 3a. A firm's competitive threats decrease the rate at which an employee engages in internal competitive actions more if the firms supplying such threats have relatively inferior (rather than similar or superior) resource endowments.

Hypothesis 3b. A firm's competitive threats increase the rate at which an employee engages in external competitive actions more if the firms supplying such threats have relatively inferior (rather than similar or superior) resource endowments.

Second, potential gains in a firm's standing are relatively more expected if competitive opportunities derive from firms with resource endowments that are similar or inferior to the endowments of the focal firm. Yet such potential gains would be least expected if they derive from firms that are resource advantaged relative to the focal firm. This occurs as soon as the focal firm is the underdog facing a competitive opportunity against a favorite, meaning that despite resource disadvantages, the firm managed to approach enough to surpass the favorite's position in the firm-level tournament. Thus, competitive opportunities imply the greatest potential for employees' reputational gain, and so they create the strongest reputational incentives, if the firms against which the focal firm faces competitive opportunities are resource advantaged.

> *Hypothesis 4a. A firm's competitive opportunities increase the rate at which an employee engages in internal competitive actions more if the firms supplying such opportunities have relatively superior (rather than similar or inferior) resource endowments.*

> *Hypothesis 4b. A firm's competitive opportunities increase the rate at which an employee engages in external competitive actions more if the firms supplying such opportunities have relatively superior (rather than similar or inferior) resource endowments.*

DATA AND METHOD

Empirical Setting

We use MotoGP as our setting because it offers considerable traction for testing hypotheses regarding employees' competitive actions. Founded in 1949 by the Fédération Internationale de Motocyclisme (FIM), MotoGP is the world's leading championship in professional motorcycle racing. MotoGP features different firms (i.e., racing teams) whose riders compete in yearly tournaments comprised of 16 to 19 circuit races across sometimes as many countries. The series accounts for a yearly turnover of well over $100m and is broadcast in about 200 countries to more than 400m viewers. Many teams are owned by major original equipment manufacturers (OEMs), such as Ducati, Honda, Kawasaki, Suzuki, and Yamaha. They deploy high-tech prototype motorbikes—the fastest racing bikes in the world that can reach speeds of 220 mph—making MotoGP the pinnacle of professional motorcycle racing, and a competitive ground for OEMs to develop and showcase their technological innovations. Riders receive points based on their arrival order in the final tally of a race, and these points count towards the season totals that determine a rider's final ranking. Teams typically have two or three riders, and riders' combined points total in turn determines the ranking of their team in the Team Championship.

Various characteristics of this setting make MotoGP particularly well suited for examining our research question. First, due to the nested nature of the tournament—individual riders and their teams both compete for a championship—riders consider both individual and team performance. On the one hand, riders compete for an individual championship. Riders also compete for recognition as top rider in the team, or ‘primus inter pares,’ as is widely recognized: “*Your teammate is your first rival (…) Everyone in the motorsport world knows, from the riders or drivers themselves to the millions of fans around the globe, beating your teammate is the number one priority*” (motogp.com, 2021). By outcompeting their team members, riders secure their jobs and may obtain more favorable contractual conditions. Outcompeting individual riders leads to a higher final position in the Riders’ Championship, which can be associated with trophies, global popularity, greater monetary awards, and sponsorship deals. On the other hand, racing teams compete for a Team Championship. Reaching a higher final position in the Team Championship is associated with more prize money, sponsorships, and business opportunities for the firms, often worth millions of dollars. The importance of the individual tournament supplies a conservative test of the cross-level effects of the firm-level tournament.

Second, riders interact with both internal and external competing riders and can engage in visible competitive actions against those riders, in service of both their individual and team’s performance. The public broadcasting of MotoGP races allows us to track such internal and external competitive actions with a level of precision and comprehensiveness that would be nearly impossible to achieve in any traditional organization. Specifically, overtaking—i.e., a rider’s act of catching up with and passing another rider on the racetrack—represents the quintessential competitive action in MotoGP, which can be observed in a consistent way for every rider across the entire season. An overtake can be achieved either by accelerating faster than the rider ahead on a straight, or by braking later than the rider ahead when approaching a turn.

Third, unlike some other motorsports, such as Formula 1 (Piezunka, Lee, Haynes, & Bothner, 2018) or NASCAR (Bothner et al., 2007), top-down race strategies play no role in MotoGP. Race strategist roles do not exist, riders do not have continuous radio communications with their team during the race and rarely make pit stops, and no race strategy is imposed by a team. All riders are free to pursue their best possible race performance. Thus, overtaking ultimately reflects riders' own decision-making. Specialist media confirm this aspect: "*MotoGP races are less about strategy, more about race craft…Unlike in Formula 1, strategy doesn't really play a big part [in] MotoGP. When the lights go out, it's usually up to the riders' styles*" (Longman, 2020).

Fourth, while overtakes can benefit riders, the competitive action of overtaking also carries major risks and potential costs. Racing in MotoGP occurs at high speeds of up to 220 mph and riders are protected only by a leather suit and a helmet. This makes overtakes risky as they could result in a race-ending accident for both the riders and their opponent, often accompanied by severe injuries that may force riders to sit out multiple races, damaging their championship run. Thus, while overtaking is a key competitive action in MotoGP, the risks involved mean that riders are expected to use their judgement to decide if, when, how, and who to overtake. Overtaking a teammate can also risk the team's overall performance. For example, Andrea Iannone attempted to overtake his teammate, Andrea Dovizioso, during the last lap of the Grand Prix in Argentina in 2016. Both riders fell and the team failed to secure a top position in the Team Championship.[6]

Fifth, teams in MotoGP are divided into two groups: Factory teams and satellite teams. The former hold far-superior resource endowments. The distinction is well known in MotoGP, widely

[6] This accident happened when the Ducati team experienced many competitive threats, mostly from teams with inferior resources. The arguments underlying Hypotheses 1a and 3a suggest that such a high level of competitive threat may render internal competitive actions reputationally costly, especially if the firm ultimately fails to achieve a desirable ranking. Consistent with this argument, the accident caused major frictions and it might have been among the reasons for why the Ducati team terminated Iannone's contract at the end of the season (Patterson, 2020).

discussed in the media (e.g., Allison, 2020; Patterson, 2022), and it explains why competing for a factory team is riders' ultimate career objective: "*The goal of every rider is to try to go in a factory team and then try to win with that bike.*" (Luca Marini, Ducati satellite team rider, quoted in McLaren, 2023).[7]

What are the resource differences? Factory teams are owned by major motorcycle OEMs and so they compete with large budgets of around $30m per year, offer higher salaries to riders, and deploy cutting-edge bikes that a dedicated R&D racing unit develops and upgrades through the season. Instead, satellite teams are private teams endowed with smaller budgets of around $15m per year and lacking the capabilities to design or manufacture motorcycles. Thus, they often lease off-the-shelf motorcycles from factory teams and rebrand them to fit with their own team's colors. Also, sometimes satellite teams purchase previous year's bike models, for which no further upgrades are even available. Due to manufacturing capabilities, factory teams also design, produce, and deploy component and technological upgrades during the season. In rare cases in which satellite teams have supply contracts that include the provision of some component upgrades, factory teams might deliver those only several races after they have implemented them in their own bikes. Intangible assets also distinguish factory from satellite teams. The former enjoy superior status, fan base, and visibility, which endows their riders with greater stardom and better sponsorships. Finally, factory teams can demand higher commitment and performance from their suppliers—a phenomenon also seen in Formula 1 (Castellucci & Ertug, 2010).

Sixth, related to the previous distinction, riders are not only aware in general which other riders race for a factory or satellite team; they are tuned to distinctions among their competitors during the heat of a race. This happens through direct observation of team colors on bikes and the

[7] Online Appendix B provides more quotes showing that differences between factory and satellite teams are known.

(nick)names of riders stitched onto the backs of their racing suits. Moreover, each lap riders can receive information through pit boards shown by their teams. These boards indicate laps remaining, who is the preceding rider, who is the following rider, and what are the time gaps with them. Such boards may also indicate if specific riders (e.g., close rivals) dropped out of the race due to a crash or technical problem (Box Repsol, 2022). Dropouts may even be noticed through information on the pit boards of other riders, or because pit boards for exiting riders disappear. Also, some incidents elicit warning flags and lights along the circuit that may require all riders to slow down and refrain from overtaking. This might give them a chance to see the scene of an accident or look at live monitors along the track. Thus, all throughout a race, riders are (keen to be) aware of the identities of others on the track, and their affiliations to factory or satellite teams.[8]

Sample

We constructed an original panel data set at the rider-lap level, using data on the population of MotoGP races from 2004 to 2020 collected from motogp.com, MotoGP's official database. Each circuit is divided into four sectors, and the database includes lap-by-lap, sector-level data for all races, and detailed data on rider and team characteristics. We began by omitting laps for which sector data were missing due to measurement problems during the race (e.g., a lack of signal). Such problems occur at random, meaning they are unrelated to competitive threat, opportunity, or riders' competitive actions. Thus, omitting these observations does not bias the estimates in or against our favor. Next, from a total of 134,011 rider-lap observations on 135 riders, we excluded 29,405 rider-laps in which a rider had no teammates in the race, as such a rider would not have the opportunity to undertake internal competitive actions. A rider might have had no teammates in the race, for example, if teammates interrupted the race due to a crash or a mechanical issue. The resulting final data set consists of 104,606 rider-lap observations involving 125 distinct riders.

[8] Online Appendix C provides more context underlining that riders know who is ahead and around on the track.

Dependent Variables: Internal and External Competitive Actions

We use overtakes to measure a rider's competitive actions. Overtakes are well suited to measure competitive action because they reflect a targeted, specific, and observable move that is aimed at enhancing the rider's position relative to one or more internal or external competitors. Thus, to test Hypotheses 1a, 2a, 3a, and 4a, we operationalize *Internal overtakes* as the number of times a rider overtakes teammates during a focal lap. To test Hypotheses 1b, 2b, 3b, and 4b, *External overtakes* is the number of times the rider overtakes other teams' riders during a focal lap.

Compared to other motorsport settings, such as Formula 1 (Piezunka et al., 2018), NASCAR (Bothner et al., 2007), or Le Mans (Aversa & Guillotin, 2018), overtakes may occur more frequently in motorcycle racing because motorcycles are narrower than cars and accelerate faster. Thus, to measure overtakes for our two dependent variables, we exploited the fact that MotoGP publishes granular sector-level data, rather than the coarser lap-level data common in most other motorsport settings (e.g., Formula 1). We considered an overtake to have occurred when a rider was behind another rider at the start of a sector, yet ahead of that other rider at the end of the sector. This way, we identified a rider's number of overtakes during a lap by first counting overtakes at the sector level—against teammates or external riders, respectively—and then summing the overtakes across a lap's four sectors.

Independent Variables

Competitive threat and opportunity. We measure competitive threat as the number of teams that can pass the focal team in the competition ranking during a race. Instead, we measure competitive opportunity as the number of teams that the focal team can pass in the competition ranking during a race. These measures follow the spirit of Bothner et al.'s (2007) measures for 'crowding from below' and 'crowding from above.' They are well suited here for their consistency with our conceptual definitions of competitive threat and opportunity. Moreover, Bothner et al.

(2007) implemented their measures in NASCAR, another motorsport setting, while others also implemented measures of crowding from below or above in sports settings, such as golf (Miller, Pastoriza, & Plante, 2019) and American football (To, Kilduff, Ordoñez, & Schweitzer, 2018).

We begin by obtaining the total number of points P of focal team *i* and each other team *j* at the start of a race—i.e., P_{ir-1} and P_{jr-1}, where *r* indexes the race number in the season. Next, for the start of each lap *t* in race *r*, we calculate two versions of the 'striking distance,' S_{jirt} and S_{ijrt}. The former captures the difference between the maximum number of race points that a team *j* can still collect in race *r* and the minimum number of points the focal team *i* will collect if its riders finish the race yet place last. Instead, the latter is the difference between the maximum number of race points that focal team *i* can still collect in race *r* and the minimum number of points another team *j* will collect if its riders finish the race yet place last. Typically, teams have two riders in the race, which means that the maximum number of available points is 45 (i.e., 25 + 20 for first and second place, respectively), but this drops to 25 if one of the riders exits the race. Also, 15 riders are guaranteed at least one point by finishing the race, so if the total number of riders drops below 16, all teams are guaranteed at least one point by finishing the race, provided a team still has at least one rider in the race at the finish.

From here, we calculate the variables to test Hypotheses 1a/b and 2a/b. *Competitive threat* to team *i* at the start of lap *t* in race *r* is calculated as follows:

$$CT_{irt} = \sum_{j=1}^{J} D_{ji}, \text{ where } D_{ji} = 1 \text{ if } 0 \leq P_{ir-1} - P_{jr-1} \leq S_{jirt}, \text{ and } D_{ji} = 0 \text{ otherwise.} \quad (1)$$

Thus, competitive threat enumerates the number of teams ranked *below* the focal team in the competition ranking, yet still within sufficient proximity to be able to surpass the focal team in that ranking during a race. Similarly, we calculate the variable *Competitive opportunity* of team *i* at the start of lap *t* in race *r* as follows:

$$CO_{irt} = \sum_{j=1}^{J} D_{ji}, \text{ where } D_{ji} = 1 \text{ if } 0 \leq P_{jr-1} - P_{ir-1} \leq S_{ijrt}, \text{ and } D_{ji} = 0 \text{ otherwise.} \quad (2)$$

Thus, competitive opportunity enumerates the number of teams ranked *above* the focal firm in the competition ranking, yet still within sufficient proximity for the focal team to be able to surpass them in that ranking during a race.

For clarity, our measurement of competitive threat and competitive opportunity departs from Bothner et al. (2007) in two ways. First, consistent with our theory, we calculate our measures at the firm rather than individual level. Thus, striking distance is not just a function of the number of riders in the race but also the distribution of riders across teams. Second, we update our measures from lap to lap rather than from race to race. Thus, we assume that riders are aware of changes in firm-level competitive intensity during a race. This assumption is realistic because riders learn about dropouts through a variety of channels, including pit boards shown to them each lap (see 'Empirical Setting' and Online Appendix C). Also, riders know which teams supply competitive threats and opportunities at the start of a race. Such competing teams are more salient to riders, meaning dropouts from these rather than other teams are even more likely to be noticed.[9]

Competitive threat and opportunity by relative resource endowments. To test Hypotheses 3a/b and 4a/b, we differentiate competitive threat and competitive opportunity by the relative resource endowments of the teams supplying such threats or opportunities. Specifically, we subdivide both *Competitive threat (CT)* and *Competitive opportunity (CO)* into three components, each which we allow its own slope based on other teams' resource endowments relative to the focal team. We establish relative resource levels by distinguishing between factory teams with relatively superior resources and satellite teams with relatively inferior resources (see 'Empirical Setting'). Typically, similar numbers of factory and satellite teams participate during a season.

Satellite teams can experience competitive threats from, and opportunities against, teams

[9] Online Appendix D instead uses measures of competitive threat and opportunity updating from race to race. Still, riders closely monitor the playing field *during* a race, so the correct approach is to update measures from lap to lap.

with similar or superior resources. Factory teams can experience competitive threats from, and opportunities against, teams with similar or inferior resources. Thus, we define *CT (inferior resources)* as the number of satellite teams that can pass a focal factory team in the competition ranking at the start of a given lap. *CT (similar resources)* is the number of satellite (factory) teams that can pass a focal satellite (factory) team in the competition ranking at the start of a given lap. *CT (superior resources)* is the number of factory teams that can pass a focal satellite team in the competition ranking at the start of a given lap.

Instead, *CO (inferior resources)* is the number of satellite teams that a focal factory team can pass in the competition ranking at the start of a given lap. *CO (similar resources)* is the number of satellite (factory) teams that a focal satellite (factory) team can pass in the competition ranking at the start of a given lap. *CO (superior resources)* is the number of factory teams that a focal satellite team can pass in the competition ranking at the start of a given lap.

Control Variables

Rider-level control variables. In all equations, we include several controls at the individual rider level. Frequent competitive actions in the past may predict competitive actions in the future. Thus, we control for previous internal or external overtakes by adding four variables. In all equations for internal overtakes, we add the variable *Previous internal overtakes (race)*, which is calculated as the number of overtakes the focal rider has conducted against a teammate during the race prior to the focal lap, and *Previous internal overtakes (season)*, which is the number of overtakes against their teammate/s during the season before the start of the focal race. Similarly, we include in equations for external overtakes the variables *Previous external overtakes (race)* and *Previous external overtakes (season)*. These are powerful controls because they absorb otherwise unobserved time-varying heterogeneity at the rider level (Heckman & Borjas, 1980).

We add four controls for individual-level competitive threat and opportunity. Specifically, *Rider internal threat*, *Rider external threat*, *Rider internal opportunity*, and *Rider external opportunity* capture whether a focal rider experiences competitive threats by, or opportunities against, internal or external riders in the Riders' Championship. Riders who are more prone to taking risks may also be more likely to attempt overtakes. Thus, we control for the rider's risk propensity through the variable *Risk taking*, which captures the average number of times per driven race that a rider crashed during the 12 months prior to the focal race. We add a variable *No previous races in past year* to distinguish between riders who had no crashes because they did not race in MotoGP in the past year and riders who did race yet without crashing. Finally, more experienced riders may have superior overtaking skills. Thus, we control for a rider's *Experience*, calculated as the number of MotoGP races in which the rider has participated before the start of the focal race.

Race-level control variables. We also include two race-level variables in our models. We control for weather conditions through the variable *Wet weather*, a dummy set to '1' if a race was driven partially or fully under wet weather conditions, and '0' otherwise. Under wet weather the slippery track can cause riders to make mistakes and riders may be more likely to make pit stops to change tires. Both increase the probability of overtakes. In addition, we control for the possibility that riders' propensity to overtake others might change during the season (Bothner et al., 2007). For example, the closer the riders are to the resolution of the season's competition, the more pressure they may experience to defend or improve their position. Thus, we control for *Season stage*, which is the race number in a season divided by the total number of races in that season.

Fixed effects. Apart from the above control variables, we include six sets of fixed effects in our equations. First, rider fixed effects account for stable differences in riders' abilities and other stable sources of rider-level heterogeneity. As detailed under 'Estimation' below, we capture rider fixed effects through a conditional fixed-effects approach. Second, studies have shown that interim rank position can affect competitive behaviors (e.g., Genakos & Pagliero, 2012). Thus, we control for rank effects by including fixed effects for individual and team rank in the season's tournament at the start of the focal race. Third, because each race begins from a standing start, riders are closer to each other during the early stages of the race and so overtakes are more common earlier rather than later in the race. Thus, we include lap fixed effects to control for differences in overtaking behaviors attributable to race stage. Fourth, fixed effects for racing teams control for any stable differences across teams—for example, in their proclivity for internal competitive actions.[10] Fifth, we account for idiosyncratic differences across circuits by including fixed effects for racetracks. Finally, year fixed effects control for temporal changes in such things as technology, regulation, or tournament size.

Estimation

Our dependent variables are count variables and so we estimated all models using a robust Poisson quasi-maximum likelihood (QML) estimator with conditional fixed effects pertaining to riders (Wooldridge, 1999). As is well known, the Poisson maximum likelihood estimator does not require assumptions about the variance of the dependent variable, provided only that the conditional mean is correctly specified (Cameron & Trivedi, 2010; Wooldridge, 1999). Thus, deviations from the Poisson process, in which the conditional mean is equal to the conditional variance, do not influence the consistency of the point estimates. Such deviations may of course affect standard errors, yet this is addressed easily by obtaining standard errors from robust estimates of the variance-covariance matrix.

The robust Poisson estimator is superior to alternatives because its estimates are consistent

[10] With one exception, team fixed effects also account for whether a rider's team is a factory or a satellite team. The exception is Gresini Racing, which changed from being Honda's satellite team to Aprilia's factory team in 2015. Once we add a separate indicator to our models for whether a rider's team is a factory or a satellite team, all our results fully replicate and the additional dummy fails to reach statistical significance.

under weak assumptions. It also accommodates auto-correlated error terms and conditional heteroscedasticity. Conditional fixed effects estimation requires that observations are discarded on riders who have no variation on the respective dependent variables. This requirement accounts for slight decreases in the number of observations relative to the full sample. To evade simultaneity and concerns of reverse causality, we predict overtakes during a focal lap as a function of competitive threat and opportunity at the beginning of that lap.

RESULTS

Table 1 presents summary statistics and bivariate correlations for all variables in the analysis (Online Appendix E shows basic OLS representations of the correlations involving the key variables). Correlations are modest in most cases, and unreported multivariate assessments suggest that collinearity is of limited concern. Average variance inflation factors (VIFs) are well below the common threshold of 10 (Kennedy, 2003: 213). Still, *Season stage* predictably has high VIFs, yet estimates of models without this control showed evidence of an omitted variable bias. This is consistent with the substantive importance of season progression in determining the probability of risky actions and the average decrease in competitive threat and opportunity as a season unfolds. Thus, we align with Bothner et al. (2007), Piezunka et al. (2018), and To et al. (2018) and retain season stage. In one of our robustness checks, we will use matching to break the connection of season stage to competitive threat and opportunity.

Insert Table 1 about here

Main Effects: Hypotheses 1a/2a and 1b/2b

Table 2 presents conditional fixed-effects Poisson QML estimates of *Internal overtakes* (Models 1-4) and *External overtakes* (Models 5-8) to test Hypotheses 1a/2a and 1b/2b. Model 1 shows estimates of the baseline model for *Internal overtakes* including only control variables. *Rider* *internal threat* and *internal opportunity* are statistically significant ($p < 0.01$), with comparable positive coefficients. Thus, both the internal competitive threats experienced and exerted by a rider predict internal overtakes. *Rider external opportunity* is also significant ($p < 0.05$), with the negative coefficient suggesting that internal overtakes are less likely when the rider experiences external opportunities in the individual tournament. Both variants of *Previous internal overtakes* fail to reach statistical significance, possibly suggesting that residual time-varying heterogeneity at the rider level might be limited (Heckman & Borjas, 1980). At the race level, *Wet weather* is significant ($p < 0.01$) with a positive coefficient, indicating that overtakes against teammates occur more frequently during races driven under wet weather conditions, as expected.

Insert Table 2 about here

Model 2 adds the independent variable *Competitive threat* to the baseline. Consistent with Hypothesis 1a, the coefficient for *Competitive threat* is negative (b = -0.0355) and statistically significant ($p < 0.05$). In terms of magnitude, the point estimate implies that a one-standard deviation increase in *Competitive threat* is associated with a 9% decrease in a rider's internal overtakes (i.e., a multiplicative factor of *exp*[-0.0355 * 2.65] = 0.91).[11] How does this compare to other variables in Model 2? Respective one-standard deviation reductions in *Rider internal threat*, *Rider internal opportunity*, and *Wet weather*, and a similar increase in *Rider external opportunity*, are associated with 12% (*exp*[0.2784 * -0.45] = 0.88), 13% (*exp*[0.3062 * -0.44] = 0.87), 12% (*exp*[0.4134 * -0.32] = 0.88), and 4% (*exp*[-0.1370 * 0.31] = 0.96) decreases in a rider's internal overtakes. Considering error margins, these standardized effect sizes all appear rather similar.

[11] To simulate effects true to the fixed-effects nature of our estimates, we standardize effect-size calculations to within-rider standard deviations (Mummolo & Peterson, 2018).

Model 3 alternatively adds the independent variable *Competitive opportunity* to the baseline. The coefficient is positive, yet it fails to reach statistical significance and so is consistent with both positive and negative true effects of *Competitive opportunity*. Thus, we find insufficient evidence to support Hypothesis 2a. Model 4 adds both threat and opportunity variables together, which reveals results convergent with the partial models.

Next, Models 4-8 have *External overtakes* as their dependent variable. Model 5 shows estimates of the baseline model including only control variables. At the rider level, *Previous external overtakes (race)* and *Rider external threat* are significant ($p < 0.01$), both with a positive coefficient. At the race level, *Wet weather* is again significant ($p < 0.01$) with a positive coefficient. Model 5 adds the independent variable *Competitive threat* to the baseline model. Consistent with Hypothesis 1b, the coefficient for *Competitive threat* is positive ($b = 0.0102$; $p < 0.1$). Model 7 instead adds *Competitive opportunity* to the baseline. Consistent with Hypothesis 2b, it has a positive coefficient and is significant ($b = 0.0253$; $p < 0.01$). Model 8 adds both independent variables together, which reveals results similar to the partial models.

In terms of magnitude, the point estimates of Model 8 imply that a one-standard deviation increase in *Competitive threat* is associated with a 4% increase in a rider's external overtakes (i.e., a multiplicative factor of $exp[0.0147 * 2.65] = 1.04$). For *Competitive opportunity*, that effect is 7% ($exp[0.0278 * 2.57] = 1.07$). For comparison, one-standard deviation increases in *Rider external threat*, *Wet weather*, and *Season stage* are associated with 3% ($exp[0.0787 * 0.32] = 1.03$), 17% ($exp[0.5017 * 0.32] = 1.17$), and 10% ($exp[0.3190 * 0.29] = 1.10$) increases in a rider's external overtakes. Especially the effect of wet weather is large in comparison, mostly because pit stops are over five times as likely during wet races. A pit stop requires a rider to leave the track, enter the pit lane, and come to a complete standstill. This may allow riders just behind yet still on the track to 'overtake' without the usual risks.

Moderating Effects: Hypotheses 3a/4a and 3b/4b

Table 3 presents conditional fixed-effects Poisson QML estimates of *Internal overtakes* (Models 1-3) and *External overtakes* (Models 4-6) to test Hypotheses 3a/4a and 3b/4b. Model 1 tests Hypothesis 3a, which posits that competitive threats from resource-disadvantaged firms will have the largest negative effect on internal competitive actions. *CT (inferior resources)* has a negative coefficient (b = -0.0582) and is statistically significant ($p < 0.01$). The coefficients for *CT (similar resources)* and *CT (superior resources)* are statistically indistinguishable from zero. Statistical tests of differences among the coefficients, reported towards the bottom of Table 3, show that the coefficient for *CT (inferior resources)* is statistically different only from that for *CT (superior resources)*, but not that for *CT (similar resources)*. Therefore, the estimates in Model 1 partially support Hypothesis 3a. The reduction in internal competitive actions is more pronounced when competitive threat derives from teams equipped with inferior rather than superior resources.

Insert Table 3 about here

Model 2 tests Hypothesis 4a, which posits that competitive opportunities against firms with superior resources will have the largest positive effect on internal competitive actions. The model shows that *CO (superior resources)* has a positive coefficient (b = 0.0861) and is statistically significant ($p < 0.01$). The coefficients for *CO (similar resources)* and *CO (Inferior resources)* are indistinguishable from zero. The relevant tests show that the coefficient for *CO (superior resources)* is statistically different from, and larger than, that for both *CO (similar resources)* and *CO (inferior resources)*. Therefore, the estimates in Model 2 fully support Hypothesis 4a: Competitive opportunity against teams with superior resources generates more internal competitive actions compared to opportunities against teams with similar or inferior resources. Model 3 includes both sets of variables for competitive threat and opportunity, revealing patterns of coefficients that are generally similar to the partial models.

Model 4 instead tests Hypothesis 3b, which posits that competitive threats from resource-disadvantaged firms will have the largest positive effect on external competitive actions. *CT (inferior resources)* has a positive coefficient ($b = 0.0159$) and is statistically significant ($p < 0.05$). The coefficients for *CT (similar resources)* and *CT (superior resources)* are not statistically significant. Also, the relevant tests show that the coefficient for *CT (inferior resources)* is not statistically different from that for either *CT (similar resources)* or *CT (superior resources)*. Thus, this partial model does not strictly support Hypothesis 3b, even though the estimated coefficients are consistent with that hypothesis.

Model 5 tests Hypothesis 4b, which posits that competitive opportunities against resource-advantaged firms will have the largest positive effect on external competitive actions. The model shows that *CO (superior resources)* has a positive coefficient ($b = 0.0279$) and is statistically significant ($p < 0.05$), yet so are the coefficients for *CO (similar resources)* and *CO (Inferior resources)*. The relevant statistical tests do not reveal noteworthy distinctions among the three coefficients. Thus, this partial model does not support Hypothesis 4b.

Model 6 includes both sets of variables for competitive threat and opportunity. Unlike the partial models, the statistical tests based on the full specification are now more consistent with both Hypotheses 3b and 4b. With respect to Hypothesis 3b, they suggest that the increase in external competitive actions is more pronounced when competitive threat derives from teams equipped with inferior rather than superior resources. With respect to Hypothesis 4b, they instead suggest that the increase in external competitive actions is more pronounced when competitive opportunities derive from teams equipped with superior rather than inferior resources.

ADDITIONAL ANALYSES

Basic Robustness

We examine the robustness of our findings through several additional tests. Results for these tests and more detail are available in the Online Supplement. First, earlier we alluded to correlations between season stage and competitive threat and opportunity, our key variables. Such correlations might produce inferences about, say, competitive threat based on observations with many competitive opportunities early in the season compared to 'extreme' counterfactual observations instead facing few competitive opportunities late in the season. Thus, to test Hypotheses 1a/b and 2a/b, we also generate estimates in samples matched through coarsened exact matching (Iacus, King, & Porro, 2012). The resulting coefficients supply even stronger evidence consistent with our predictions (see Online Appendix F).

Second, in our main analyses we discarded 29,405 rider-lap observations pertaining to riders without teammates in the race because a scope condition of our theory is that the opportunity for internal competitive actions must exist. The same assumption is not required if we were narrowly interested only in riders' *external* competitive actions. Thus, we also used the full sample of 134,011 observations to estimate models predicting external overtakes with and without controls for the number of teammates in the race. The coefficient estimates, shown in Online Appendix G, are again much like the ones in Tables 2 and 3.

Third, opportunities for overtaking, and thus the number of overtakes, may vary mechanically with the number of riders on the track. Our models absorb virtually all the variance in the number of external riders on the track (see Online Appendix H). The number of teammates is more idiosyncratic. Thus, we re-estimate models predicting *Internal overtakes,* while including a dummy variable for whether a rider had two (rather than one) teammates in the race. All our results fully replicate (see Online Appendix H, Table H1, Models 1 and 2). Next, the closer a rider is to the rider ahead, the greater their opportunity to overtake during a lap. We estimate equations holding constant the time difference to the nearest internal or external rider ahead at the beginning of the lap. All our results again fully replicate (see Online Appendix H, Table H1, Models 3-6).

Relatedly, internal and external overtakes may be linked. For example, if an external rider is the first rider ahead at the start of a lap, then an external overtake may be more likely than an internal overtake during that lap. In additional estimates, we include a variable for whether an external rather than an internal rider was first ahead at the start of a lap (see Online Appendix H, Table H2). This additional variable leaves our main inferences intact. We also estimated simultaneous-equation models that jointly predict a rider's internal and external overtakes (see Online Appendix I). Such an approach explicitly treats a rider's internal and external overtakes as interrelated. Estimates are again very similar to those in Tables 2 and 3.

Analyzing Individual Overtake Opportunities

In Online Appendix H, our attempts to separate the competitive action of overtaking from potentially correlated mechanical variation in overtake opportunities have been at the rider-lap level. Yet it is hard to know how much residual variation in opportunities remains within laps, and so how much remaining potential exists for confounding. Thus, we also implement a supplementary design, by studying individual overtake opportunities.[12] Specifically, we ask: Given *one specific rider* ahead, does a focal rider overtake *that specific rider*, as a function of competitive threat and opportunity of the focal rider's team, and whether the specific rider ahead is a teammate or an external? Such a design constrains the set of possible overtakes to '1' for all observations: Each observation simply represents one individual overtake opportunity (internal or external).

The rider immediately ahead on the track can change continuously, as can the conditions under which they are ahead. Ideally, then, we would sample at random from this practically infinite population of overtake opportunities. Unfortunately, MotoGP only releases information for four

[12] We are grateful to the Associate Editor for suggesting this empirical approach.

specific moments during each lap: The ends of the lap's respective first, second, third, and fourth sectors. Thus, the approach we take is to code who is immediately ahead of a focal rider at the start of a sector, and whether the focal rider has overtaken the rider initially ahead by the end of that sector. With four sectors per lap, the resulting sample contains 418,424 rider-sector observations of overtake opportunities (i.e., 104,606 rider-laps times 4 sectors). This sample might be called 'systematic,' in that it includes observations for all riders, all laps, all races, and all years on a sector-by-sector basis. Yet through available data we have no way of knowing whether the nature of opportunities exhibits patterns within sectors. Thus, we cannot establish how representative our systematic sample is of the population of overtake opportunities.[13]

With that caveat in mind, how do we analyze the sample? The dependent variable is a dummy variable for whether by the end of a sector, a focal rider has overtaken the rider who was immediately ahead at the start of that sector. For Hypotheses 1a/b and 2a/b, the independent variables are competitive threat or opportunity, interacted with *External rider ahead*, a dummy variable for whether the rider immediately ahead is an external rider. For Hypotheses 3a/b and 4a/b, we partition the coefficients of competitive threat/opportunity at levels of relative resources into ones pertaining to an internal rider ahead and ones pertaining to an external rider ahead (Yip & Tsang, 2007). All models include sector and unconditional rider fixed effects, over and above sets of rider- and race-level controls, and the vectors of other fixed effects as in Tables 2 and 3.

The large number of fixed effects would produce well-documented biases in estimates of logistic regression models (Beck, 2020; Lancaster, 2000). Thus, we use OLS with robust standard errors to generate estimates of the linear probability model (LPM). Timoneda (2021) shows that estimates of the LPM with fixed effects are more accurate than nonlinear specifications when the

[13] Even if we watched all races across all the years in our data (e.g., through https://www.youtube.com/@motogp), we would not be able to code a random sample of overtake opportunities. Only few riders are on-screen at any one time. Also, in-race rankings are not always shown on-screen. And when they are, they may not update in real time.

binary outcome variable has a mean between zero and 0.25. Our data satisfy this condition. In our sample, the probability that a rider ahead at the start of a sector is overtaken is 0.035, meaning an overtake opportunity is seized one in 28 or so cases, on average (i.e., 1 / 0.035 = 28.57).

Insert Table 4 about here

Table 4 shows the estimates. Consistent with Hypotheses 1a and 1b, Model 1 shows coefficients suggesting that competitive threat decreases the probability that a rider overtakes a teammate, while increasing the probability he overtakes an external. Model 2 shows that competitive opportunity predicts a greater overtake probability, apparently regardless of whether the rider ahead is a teammate or an external. This finding is consistent with both Hypotheses 2a and 2b. Model 3 shows coefficient signs and relative magnitudes that largely converge with the results for Hypotheses 3a/b and 4a (but not Hypothesis 4b) in Table 3. We return to these supplementary estimates, and their relation to our main estimates, in the Discussion section.

Do Contractual Conditions Matter?

To this point, we have implicitly assumed that all individuals respond in similar ways to the competitive threats and opportunities facing their firm. This assumption is reasonable if individuals are comparable on dimensions relevant to their competitive actions. Yet organizational reality might be more complex (Cappelli & Keller, 2013). Firms are typically home to a mix of permanent employees and others whose contract is up for possible renewal; interns or agency workers; and individuals voluntarily or involuntarily on their notice period. Scholars have long noted the potential incentive effects of such diverse contractual conditions (e.g., Engellandt & Riphahn, 2005; Klotz, Swider, Shao, & Prengler, 2021; Stiroh, 2007). Thus, reverting to the rider-lap level of analysis, we examine whether contractual differences affect riders' competitive actions in response to the competitive threats and opportunities facing the team they represent.[14]

Insert Table 5 about here

We hand-collected data on contractual conditions for each rider at every point in time from 2004 to 2020. Table 5 shows how we define contractual conditions in the context of MotoGP. Online Appendix J supplies detail about data sources and measurement, and shows estimates adjusting for the main effects of contractual conditions (Table J2). None deviate in spirit from the results in Tables 2 and 3. Table 6 shows estimates of models predicting internal and external overtakes, in which we interacted *Competitive threat* and *Competitive opportunity* with each of four alternatives to permanent employment. Thus, the coefficients on the interaction terms express differences in responses to competitive threat or opportunity between riders under the specified contractual condition relative to permanent riders.

Insert Table 6 about here

Three broad patterns stand out. First, none of the estimates suggest riders whose contract is up respond differently to competitive threats or opportunities,[15] perhaps because such riders have incentives to serve their team for as long as they receive no signal their contract would not be renewed. At that point, their contractual condition would change to 'involuntary notice.' Second, replacement riders overtake more internally and externally when their host team faces competitive threats, and more internally when the team faces competitive opportunities. Maybe replacement

[14] For transparency, we note that the analyses in this section are post-hoc. We decided to perform the additional coding and analyses following an exchange with one of the anonymous reviewers, for which we are grateful.

[15] However, consistent with Stiroh (2007), the main effects of *Contract up* are persistently positive and statistically significant in Models 5-8 predicting *External overtakes* (see also Online Appendix J, Table J2, Models 3 and 4).

riders are keen to signal their skills relative to incumbents, hoping to secure a permanent contract.[16] Third, employees on notice engage in more internal overtakes under firm-level competitive intensity, and ones involuntarily on notice also engage in fewer external overtakes. These patterns could reflect riders' lesser identification, and possible disgruntlement, with their teams.

DISCUSSION

This article sought to examine how competitive intensity in a firm-level tournament has cross-level effects on the locus and intensity of employees' competitive actions. We drew from the career-concerns literature (e.g., Borland, 1992; Fama, 1980; Holmström, 1999; Miklós-Thal & Ullrich, 2016) to propose a theory of individual reputational incentives. This theory supplied four sets of hypotheses for how employees adjust their internal and external competitive actions in response to the intensity and nature of their firm's competitive threats and opportunities. We examined the hypotheses in panel data on riders competing in MotoGP, using overtakes to measure individual competitive actions. Our findings suggest that riders systematically adjusted their internal and external overtakes based on their team's competitive threats and opportunities in the team-level tournament, as well as the relative resource endowments of the teams supplying such threats or opportunities.

Contributions

Though career tournaments are usually nested in firm-level tournaments, the tournament literature would mostly trace employees' competitive actions exclusively to characteristics of individual-level tournaments (Connelly et al., 2014; Dechenaux et al., 2015). Also, through antecedents such as reward spread and interim rank position, prior work mainly offers predictions regarding the *intensity* of competitive actions (e.g., Brown et al., 1996; Drago & Garvey, 1998). It

[16] This dynamic may be particularly acute in MotoGP because replacement riders can find themselves at a sharp status boundary: They often compete in lower-status competitions, such as Superbike or Moto2, and suddenly have a time-limited opportunity to show off their skills in MotoGP, the leading championship. Thus, replacement riders have a rare shot at accessing the suite of benefits associated with permanent membership in the highest-status tournament.

says little about the *locus* of such actions—e.g., how employees choose whether to engage in internal versus external competitive actions. We challenge and complement such prevailing accounts, on the back of evidence that a firm's standing may have important implications for its employees' careers (e.g., Bidwell et al., 2015; Rider & Tan, 2015). Specifically, we advance the tournament literature by arguing and showing that the locus and intensity of employees' competitive actions may respond to characteristics of the firm-level tournament in which the career tournament is nested.

In the spirit of prior work calling for more systematic attention to the multilevel nature, and cross-level effects, of organizational phenomena (e.g., Hitt, Beamish, Jackson, & Mathieu, 2007), we think our multilevel approach to tournaments represents an important step forward. Our theory explicitly allows employees to consider how the dynamics of a higher-level tournament shape their reputational incentives. This way, it directly offers sharp predictions regarding not just the intensity but also the locus of competitive actions. Thus, a multilevel perspective can change the way we understand and study employees' behaviors, including their decisions to deploy competitive actions, by helping to explain more of the observed heterogeneity among such behaviors.

To probe our reputational mechanism, we examined how the cross-level tournament effects differed by whether competitive threats and opportunities implied the potential for relatively unexpected losses or gains in a firm's standing. Expectations, we argued, depend on the relative resource endowments of the firms supplying the threats or opportunities. This argument builds on and resonates with a nascent body of work on the role of underdogs and favorites in creating expectations in individual-level tournaments (e.g., Bartling et al., 2015; Chen et al., 2011; Dai et al., 2018; Doyle et al., 2022; Nurmohamed, 2020). Complementing such studies, we elucidated how expectations may derive from a higher-level tournament, and thus can moderate the cross-level spillovers of firm-level threats and opportunities to employees' competitive actions.

Consistent with the mechanism of individual reputational incentives, our findings hint at a fundamental asymmetry in the determinants of employees' competitive actions. Concerned with their reputations and careers, employees would strive to stand out among colleagues if their firm managed to surpass one or more favorites. But they would rather act to evade blame if one or more underdogs managed to surpass their firm.

Apart from its contribution to the tournament literature, our study also adds to the multidisciplinary literature on common-enemy effects (Böhm et al., 2020; De Jaegher, 2021). Specifically, we exploited two sources of difference between our question and the typical problem studied in the common-enemy literature (see Online Appendix A). First, the common-enemy literature has tended to view groups as competing when their outcomes are negatively correlated (e.g., Bornstein, Gneezy, & Nagel, 2002). This view is generally consistent with firms competing for a higher rank in a firm-level tournament. Yet the vertical nature of tournaments draws attention to the direction of competition. Though the common-enemy literature recognizes that individuals might contribute to an intergroup competition to fend off threats or exploit opportunities (e.g., De Dreu et al., 2010; Niou & Tan, 2005), it has underemphasized the behavioral implications of such directionality. Differently, we make a key conceptual and empirical distinction between competitive threats from lower ranks and competitive opportunities against higher ranks. This critical distinction helps uncover how the direction of firm-level competition may have implications for employees' competitive actions, allowing us to offer a richer and more complete representation of behavioral dynamics in nested tournaments.

Second, the common-enemy literature has paid no particular conceptual attention to individual career concerns. Thus, in its empirical designs, internal competitive actions are not usually among the options available to group members. Organizational reality is different because many employees have career concerns, which might potentially create situations in which they engage fiercely in both internal and external competitive actions (e.g., Lazear, 1989). We contribute by making career-related reputational incentives the core of our theory of employee behavior in nested tournaments, and by allowing employees to make separate decisions about internal and external competitive actions. This way, our theory accounts for a richer variety of behaviors, in which employees may engage to either avoid reputational loss or achieve reputational gain.

Beyond contributing to the tournament and common-enemy literatures, we think that our post-hoc analysis of contractual conditions also generates valuable insights and opportunities. For example, our exploratory findings foreshadow how employee-level differences may elicit heterogeneous responses to the competitive threats and opportunities of a firm. Such possible effects require more attention.[17] Also, the opportunity for career advancement faced by interns or agency workers (replacement riders, in our setting) may derive from yet another tournament, in which the desire to switch from a lower-status to a higher-status tournament (e.g., from Superbike to MotoGP) supplies effort incentives (e.g., Moliterno, Beck, Beckman, & Meyer, 2014). Future research might pursue this line of argument. It could consider the position of a firm-level tournament in a hierarchy of tournaments, vertically differentiated by the relative status of the tournament in which the host firm participates.

Application beyond MotoGP

Our empirical analyses exploit rich field data from MotoGP, a novel and exciting setting that allowed us to measure consistently, and distinguish sharply between, employees' internal and external competitive actions. In more traditional organizations, such actions have been hard to observe directly, and measure with granularity and precision. One might reasonably ask how far

[17] Barring proprietary data, in more traditional organizations it seems nearly impossible to collect systematic and longitudinal data on, for example, who is on voluntary or involuntary notice. Sports settings, such as MotoGP, are appealing because they may allow observers to move beyond binary distinctions (e.g., permanent versus temporary employees) and track a broader range of contractual conditions (e.g., Table 5) over extended time periods.

our theory would extend to more conventional business environments (Fonti et al., 2023). Generally, we believe that the key scope conditions of our theory are prevalent in numerous settings beyond MotoGP. Nested tournaments are widespread. Employees often find themselves directly or indirectly intersecting with externals working for other firms. And the competitive actions of diverse kinds of employees can have meaningful effects on relevant metrics at the firm level.

Consider how some of our findings would translate to investment banking. Like riders in MotoGP, investment bankers compete as individuals for promotions and recognition, and are members of firms themselves vying for high ranks in a league table. Such bankers must decide whether to compete for deals against colleagues and/or external bankers working for competing firms. Our results suggest that when more other banks pose a credible threat to a focal bank's rank in the league table, a banker is less likely to compete for deals against colleagues and more likely against external bankers. Yet when the bank can dethrone a better-resourced competing bank, the banker may end up competing against both colleagues and externals. Also, the employer may be able to direct bankers' actions by strategically highlighting the threats from underdogs or the opportunities against favorites. Overall, our theory and findings can improve awareness of the possible cross-level implications of firm-level tournaments for employee behaviors.

Limitations and Future Research

Two differences stand out across our main and supplementary analyses (Tables 2 and 3 vs. Table 4). First, while no evidence exists that competitive opportunity affects internal overtakes in the main analysis, Hypothesis 2a finds some support in the supplementary analysis. Second, Hypothesis 4b is supported in the main analysis, yet in the supplementary analysis we find no evidence that competitive opportunities against favorites have stronger effects on external overtakes. For comparison purposes, we show both analyses because they make slightly different assumptions. In the main analysis, we count overtakes on a lap-by-lap basis. This design gives us a population of observations and allows for differences across riders in the number of overtake opportunities they create. This is beneficial if one assumes, as we have, that the endogenous creation of opportunities might be among the mechanisms through which overtakes emerge.[18] Instead, in the supplementary analysis we observe the competitive action of overtaking on an opportunity-by-opportunity basis. This design differs by holding constant the number of overtake opportunities, which is ideal if one wishes to isolate the actual overtake. Limited by available data, such a design unfortunately gave us a coarser (though larger) sample of observations. Our view is that both designs have their own merit in MotoGP. In other contexts, scholars must choose empirical designs matching the scope of their specific competitive actions of interest.

Next, the mere fact that our key theoretical scope conditions apply both in MotoGP and in more traditional organizations does not mean that MotoGP lacks idiosyncratic features that could limit the broader application of our empirical findings. Indeed, while the scope of MotoGP is excellent for examining our hypothesized effects, it also has limitations that must be acknowledged. In the remainder, we will discuss six such limitations and suggest directions for further research.

First, competitive threats and opportunities in MotoGP are observable and all participants share a common understanding of what constitutes competition. The concomitant measurement accuracy allowed us to test our hypothesized relations, yet in other settings competitive threats and opportunities may be more difficult to discern. This could be, for example, because firms or their employees may be idiosyncratic in their appraisal of competitive threats and opportunities (Porac, Thomas, & Baden-Fuller, 1989; McMullen, Shepherd, & Patzelt, 2009). Thus, ample scope exists for incorporating cognitive conceptions of competition into studies of the relation between competitive threats and opportunities and employees' competitive actions.

[18] Of course, valid inferences from such a design still require that confounding *exogenous* variation in overtake opportunities is held constant, an issue we probe in Online Appendix H.

Second, and related to the previous point, competitive actions in MotoGP are both internally and externally transparent. Every move on the racetrack is immediately observable by colleagues and a broad range of external actors, including the riders and other employees of other racing teams, industry executives, sponsors, sport federation officials, media, and fans. Such transparency and contiguity influences riders' behaviors and makes the formation of individual reputations in the minds of current and prospective employers a virtually instantaneous and synchronous process. In more traditional organizations, learning about employees' competitive actions can be more difficult. Thus, reputation formation may be a slower process and internal and external reputations may move out-of-sync. Also, employees may purposely try to hide their competitive actions (e.g., Zhong & Li, 2023). Thus, it seems necessary to examine the transparency of actions as a strategic lever that employees can use to manipulate the perceptions of different audiences in distinct ways.

Third, riders in MotoGP have equivalent roles within their firm. Such homogeneity is a strength for our purposes. For example, by design it allows us to rule out differences among employees in formal power or authority as a possible explanation for internal competitive actions (e.g., Van Bunderen, Greer, & van Knippenberg, 2018). Yet due to organizational structure and size, roles tend to vary widely within as well as between firms. Given such heterogeneity, and its potential to influence the propensity to engage in internal and external competitive actions, possible extensions of our analyses in other empirical settings must pay close attention to employee roles. Also, research might probe differences in the reputational implications of internal competitive actions depending on whether they are targeted laterally or vertically—up or down the hierarchy.

Fourth, we consistently captured employees' internal and external competitive actions using overtakes on the track. While again a strength for our purposes, more traditional settings are characterized by a broader range of more nuanced competitive actions and, possibly, greater variation in their intensity. Moreover, in such other settings competitive actions might differ in their nature depending on whether they are internal or external, or whether they serve to avoid reputational loss or achieve reputational gain. For example, employees who feel threatened might mislead others, while ones anticipating recognition might gain clients through creative approaches to their jobs (Steinhage, Cable, & Wardley, 2017; To, Kilduff, & Rosikiewicz, 2020). Such distinctions in the nature of competitive actions deserve attention in nested tournaments.

Fifth, collaboration and competition are clearly separated in MotoGP. The riders of a team collaborate off the track, for example, by sharing experiences between races with their bikes. Yet on the track they compete. When discussing the relation to his teammate, MotoGP rider Francesco Bagnaia emphasized this sharp contrast: "*It's now essential to collaborate and develop the bike at its best. Then, on the track, when it's time to race, everyone will fend for themselves*" (Piazza, 2022). Such contrast also exists elsewhere. For example, investment bankers compete with colleagues to close deals yet may collaborate in internal projects or hiring decisions. The separation of collaboration and competition is a distinctive strength in our setting because it allowed us to capture the variation in competitive actions not confounded by considerations regarding collaboration. Yet questions emerge as to whether and how our findings might carry over to settings in which collaboration and competition coexist—e.g., where critical tasks are strongly interdependent rather than independent, yet incentives are at least partly individualized. Thus, future research may examine our cross-level theory in settings in which internal competition cannot readily be separated from collaboration.

Finally, MotoGP is governed by relatively clear and detailed formal rules. These rules and the sanctions they imply are applied almost instantaneously if a rider engages in prohibited behaviors on the racetrack. Deviance may be easier to conceal and is more likely (though by no means guaranteed) to be met with impunity in more traditional organizations. Also, the formal rules of MotoGP update on a rhythm, typically once per year and usually between seasons. Thus, riders and teams can rely on a stable set of rules for the entirety of a yearly tournament and will pattern their behaviors accordingly. Elsewhere, regulations may change in less predictable ways and informal behavioral norms may play a more important governing role. Future studies should consider settings in which regulations change less predictably, or where they play a more limited role in shaping competitive interactions among firms and constituent employees.

CONCLUSION

Using granular field data, we have examined how a firm's competitive threats and opportunities have cross-level behavioral implications, by affecting the locus and intensity of its employees' competitive actions. The combined findings largely resonate with our theory of individual reputational incentives, in which employees consider the potential dynamics of their firm's tournament standing to decide on their individual competitive actions against colleagues or externals. We hope our work will 'fast-track' future research on the multilevel antecedents of employees' internal and external competitive actions. Much remains to be discovered.

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TABLE 1
Summary Statistics and Bivariate Correlations (N=104,606)

		Mean	*SD*	Min.	Max.	1	2	3	4	5	6	7	8	9
1	Internal overtakes	0.02	0.13	0	2									
2	External overtakes	0.21	0.66	0	17	0.19								
3	Competitive threat	2.22	2.70	0	13	0.00	0.03							
4	Competitive opportunity	2.06	2.70	0	13	0.01	0.04	0.64						
5	CT (inferior resources)	0.66	1.49	0	11	0.00	0.01	0.58	0.32					
6	CT (similar resources)	1.18	1.57	0	10	0.00	0.03	0.83	0.54	0.16				
7	CT (superior resources)	0.38	1.01	0	6	0.00	0.02	0.53	0.40	-0.17	0.42			
8	CO (inferior resources)	0.45	1.27	0	11	0.00	0.02	0.39	0.55	0.62	0.16	-0.13		
9	CO (similar resources)	1.08	1.53	0	10	0.01	0.04	0.52	0.87	0.21	0.48	0.35	0.26	
10	CO (superior resources)	0.53	1.14	0	6	0.00	0.02	0.39	0.59	-0.21	0.47	0.63	-0.16	0.43
11	Previous internal overtakes (race)	0.26	0.51	0	5	-0.01	-0.06	-0.04	-0.03	-0.03	-0.03	-0.02	-0.03	-0.02
12	Previous internal overtakes (season)	2.66	2.76	0	19	0.03	0.00	-0.41	-0.36	-0.25	-0.32	-0.22	-0.19	-0.30
13	Previous external overtakes (race)	3.37	3.10	0	29	-0.04	-0.09	0.02	0.05	0.00	0.02	0.02	0.02	0.05
14	Previous external overtakes (season)	35.04	26.87	0	142	0.01	0.02	-0.48	-0.44	-0.30	-0.40	-0.21	-0.22	-0.37
15	Rider internal threat	0.34	0.47	0	1	0.01	0.01	0.34	0.40	0.20	0.28	0.19	0.24	0.33
16	Rider external threat	0.85	0.35	0	1	0.00	0.04	0.27	0.21	0.16	0.22	0.13	0.11	0.17
17	Rider internal opportunity	0.34	0.47	0	1	0.01	0.00	0.34	0.40	0.20	0.28	0.19	0.24	0.33
18	Rider external opportunity	0.85	0.36	0	1	-0.01	0.03	0.23	0.27	0.12	0.19	0.13	0.14	0.23
19	Risk taking	0.08	0.11	0	1	-0.01	0.01	0.04	0.05	-0.02	-0.01	0.15	0.04	0.00
20	No previous races in past year	0.02	0.14	0	1	0.00	0.00	0.16	0.18	0.01	0.15	0.18	0.05	0.17
21	Experience	77.04	65.75	0	354	0.01	-0.01	-0.05	-0.12	0.11	-0.11	-0.13	0.05	-0.11
22	Wet weather	0.12	0.33	0	1	0.02	0.07	-0.04	-0.04	-0.03	-0.02	-0.02	-0.04	-0.02
23	Season stage	0.53	0.29	0.0526	1	0.00	-0.01	-0.65	-0.59	-0.40	-0.55	-0.30	-0.30	-0.51

		10	11	12	13	14	15	16	17	18	19	20	21	22
10	CO (superior resources)													
11	Previous internal overtakes (race)	-0.01												
12	Previous internal overtakes (season)	-0.23	0.13											
13	Previous external overtakes (race)	0.03	0.22	0.01										
14	Previous external overtakes (season)	-0.30	0.03	0.60	0.09									
15	Rider internal threat	0.22	0.02	-0.09	0.02	-0.20								
16	Rider external threat	0.14	-0.05	-0.19	0.07	-0.09	0.14							
17	Rider internal opportunity	0.22	0.04	-0.15	0.01	-0.28	-0.14	0.12						

18	Rider external opportunity	0.18	-0.06	-0.21	0.06	-0.09	0.12	0.31	0.15					
19	Risk taking	0.08	-0.04	-0.04	0.02	0.06	-0.02	0.11	-0.01	0.12				
20	No previous races in past year	0.15	0.00	-0.14	0.00	-0.19	0.05	-0.02	0.10	0.06	-0.10			
21	Experience	-0.20	0.04	0.15	0.00	0.08	0.02	-0.08	-0.09	-0.14	0.01	-0.14		
22	Wet weather	-0.03	0.09	-0.01	0.26	-0.01	-0.02	0.01	-0.02	0.01	0.00	-0.02	-0.01	
23	Season stage	-0.40	0.02	0.58	-0.01	0.76	-0.34	-0.26	-0.34	-0.18	0.05	-0.07	0.05	-0.04

TABLE 2
Conditional Fixed-Effects Poisson QML Estimates of Overtakes: Hypotheses 1a/b and 2a/b

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
DV:	**Internal overtakes**				**External overtakes**			
Hypotheses:	**Controls**	**H1a**	**H2a**	**H1a/H2a**	**Controls**	**H1b**	**H2b**	**H1b/H2b**
Competitive threat		-0.0355**		-0.0345**		0.0102*		0.0147**
		(0.0153)		(0.0153)		(0.0056)		(0.0059)
Competitive opportunity			0.0122	0.0071			0.0253***	0.0278***
			(0.0159)	(0.0158)			(0.0075)	(0.0075)
Previous internal overtakes (race)	0.0204	0.0197	0.0202	0.0196				
	(0.0834)	(0.0841)	(0.0835)	(0.0841)				
Previous internal overtakes (season)	0.0102	0.0096	0.0105	0.0098				
	(0.0187)	(0.0188)	(0.0187)	(0.0188)				
Previous external overtakes (race)					0.0585***	0.0584***	0.0583***	0.0582***
					(0.0042)	(0.0042)	(0.0042)	(0.0042)
Previous external overtakes (season)					-0.0006	-0.0006	-0.0005	-0.0006
					(0.0007)	(0.0007)	(0.0007)	(0.0007)
Rider internal threat	0.2664***	0.2784***	0.2616***	0.2754***	0.0254	0.0220	0.0133	0.0071
	(0.0711)	(0.0708)	(0.0711)	(0.0708)	(0.0268)	(0.0264)	(0.0275)	(0.0267)
Rider external threat	-0.0490	-0.0351	-0.0443	-0.0326	0.0783**	0.0737*	0.0848**	0.0787**
	(0.0739)	(0.0752)	(0.0742)	(0.0751)	(0.0373)	(0.0377)	(0.0372)	(0.0380)
Rider internal opportunity	0.2939***	0.3062***	0.2882***	0.3026***	-0.0045	-0.0088	-0.0184	-0.0262
	(0.0753)	(0.0747)	(0.0760)	(0.0753)	(0.0216)	(0.0215)	(0.0219)	(0.0215)
Rider external opportunity	-0.1643**	-0.1370*	-0.1674**	-0.1395*	-0.0344	-0.0433	-0.0481	-0.0624
	(0.0820)	(0.0780)	(0.0832)	(0.0794)	(0.0337)	(0.0347)	(0.0363)	(0.0381)
Risk taking	-0.2958	-0.2645	-0.3039	-0.2698	-0.1955	-0.1999	-0.2040	-0.2116
	(0.3957)	(0.3925)	(0.3950)	(0.3924)	(0.1350)	(0.1347)	(0.1348)	(0.1343)
No previous races in past year	-0.1182	-0.0990	-0.1264	-0.1045	-0.1022	-0.1084	-0.1149*	-0.1249*
	(0.1893)	(0.1894)	(0.1913)	(0.1913)	(0.0663)	(0.0662)	(0.0658)	(0.0657)
Experience	0.0039	0.0043	0.0041	0.0043	0.0008	0.0007	0.0010	0.0009
	(0.0039)	(0.0038)	(0.0039)	(0.0039)	(0.0009)	(0.0009)	(0.0009)	(0.0009)

Wet weather	0.4123***	0.4134***	0.4116***	0.4129***	0.5047***	0.5036***	0.5034***	0.5017***
	(0.0612)	(0.0614)	(0.0611)	(0.0612)	(0.0248)	(0.0249)	(0.0249)	(0.0251)
Season stage	0.2607	0.0606	0.3195	0.1017	0.0772	0.1455	0.2086*	0.3190**
	(0.2882)	(0.2966)	(0.3117)	(0.3237)	(0.0991)	(0.1093)	(0.1129)	(0.1297)
N (rider-laps)	104,146	104,146	104,146	104,146	104,566	104,566	104,566	104,566
N (riders)	103	103	103	103	121	121	121	121
Log pseudolikelihood	-7750	-7748	-7750	-7748	-48329	-48327	-48316	-48312

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Conditional fixed effects pertain to the rider level. All models include vectors of fixed effects for rider rank at the start of the race, team rank at the start of the race, and lap numbers, teams, racetracks, and calendar years.

TABLE 3

Conditional Fixed-Effects Poisson QML Estimates of Overtakes: Hypotheses 3a/b and 4a/b

	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
DV:	**Internal overtakes**			**External overtakes**		
Hypotheses:	**H3a**	**H4a**	**H3a/H4a**	**H3b**	**H4b**	**H3b/H4b**
CT (inferior resources)	-0.0582***		-0.0412*	0.0159**		0.0273***
	(0.0225)		(0.0234)	(0.0077)		(0.0093)
CT (similar resources)	-0.0331		-0.0354	0.0090		0.0128
	(0.0248)		(0.0248)	(0.0080)		(0.0082)
CT (superior resources)	0.0198		0.0076	0.0007		0.0006
	(0.0361)		(0.0380)	(0.0147)		(0.0158)
CO (inferior resources)		-0.0047	0.0051		0.0243**	0.0180*
		(0.0323)	(0.0350)		(0.0102)	(0.0100)
CO (similar resources)		-0.0065	-0.0127		0.0250**	0.0281***
		(0.0201)	(0.0194)		(0.0100)	(0.0099)
CO (superior resources)		0.0861***	0.0659*		0.0279**	0.0411***
		(0.0333)	(0.0357)		(0.0115)	(0.0135)
Control variables	Y	Y	Y	Y	Y	Y
CT (inferior) - CT (similar)	-0.0251		-0.0058	0.0069		0.0145
CT (inferior) - CT (superior)	-0.0780***		-0.0488	0.0152		0.0267*
CO (superior) - CO (similar)		0.0926**	0.0786**		0.0029	0.0130
CO (superior) - CO (inferior)		0.0908***	0.0607*		0.0036	0.0231**
N (rider-laps)	104,146	104,146	104,146	104,566	104,566	104,566
N (riders)	103	103	103	121	121	121
Log pseudolikelihood	-7746	-7746	-7744	-48325	-48316	-48309

Notes: Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Consistent with our hypotheses, tests of differences between coefficients are one-tailed. Conditional fixed effects pertain to the rider level. All models include time-varying controls, and vectors of fixed effects for rider rank at the start of the race, team rank at the start of the race, and lap numbers, teams, racetracks, and calendar years.

TABLE 4
Fixed-Effects Linear Probability Estimates of Whether a Rider Exploits a Specific Overtake Opportunity

	(1)	(2)	(3)
Hypotheses:	**H1a/H1b**	**H2a/H2b**	**H3ab/H4ab**
Competitive threat (CT)	-0.0006**	-0.0001	
	(0.0003)	(0.0002)	
Competitive opportunity (CO)	0.0004**	0.0005*	
	(0.0002)	(0.0003)	
Internal rider ahead (Internal)		*Omitted category*	
External rider ahead (External)	0.0057***	0.0073***	0.0068***
	(0.0010)	(0.0010)	(0.0011)
CT × External	0.0007***		
	(0.0002)		
CO × External		-0.0001	
		(0.0002)	
CT (inferior resources) × Internal			-0.0012*
			(0.0007)
CT (similar resources) × Internal			-0.0010
			(0.0007)
CT (superior resources) × Internal			-0.0004
			(0.0012)
CO (inferior resources) × Internal			0.0003
			(0.0009)
CO (similar resources) × Internal			0.0018**
			(0.0007)
CO (superior resources) × Internal			0.0021**
			(0.0011)
CT (inferior resources) × External			0.0007**
			(0.0004)
CT (similar resources) × External			0.0002
			(0.0003)
CT (superior resources) × External			-0.0005
			(0.0005)
CO (inferior resources) × External			0.0001
			(0.0004)
CO (similar resources) × External			0.0004
			(0.0003)
CO (superior resources) × External			0.0005
			(0.0005)
Control variables	Y	Y	Y
R-squared	0.0502	0.0502	0.0503

Notes: N=418,424 rider-sectors. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All models include time-varying controls, and vectors of fixed effects for riders, rider rank at the start of the race, team rank at the start of the race, and lap numbers, sector numbers, teams, racetracks, and calendar years.

TABLE 5
Contractual Conditions and MotoGP Equivalents

Generic contractual condition	MotoGP equivalent	Variable name
Permanent employee	Rider has a contract with his team for at least the current and next season	(Omitted category)
Temporary employee	Rider has a contract with his team only for the current season, and has not (yet) signed a contract with any team for the next season	Contract up
Intern/agency worker	Rider is a replacement rider, usually from outside of MotoGP	Replacement
Employee voluntarily on notice	Rider has announced his retirement, or he has signed a contract with a different team (inside or outside of MotoGP) for the next season before his current team announced a new roster	Voluntary notice
Employee involuntarily on notice	Rider's team has announced a new roster for the next season that does not include him, or the team has announced its exit from MotoGP	Involuntary notice

TABLE 6
Conditional Fixed-Effects Poisson QML Estimates of Overtakes: Effects by Contractual Conditions

	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
DV:	**Internal overtakes**				**External overtakes**			
Competitive threat (CT)	-0.0417*	-0.0364**	-0.0360**	-0.0319**	0.0152	0.0138**	0.0143**	0.0138**
	(0.0216)	(0.0153)	(0.0150)	(0.0150)	(0.0100)	(0.0060)	(0.0059)	(0.0059)
Competitive opportunity (CO)	-0.0082	0.0079	0.0131	0.0044	0.0375***	0.0284***	0.0279***	0.0306***
	(0.0227)	(0.0159)	(0.0159)	(0.0157)	(0.0091)	(0.0074)	(0.0075)	(0.0077)
CT × Contract up	0.0150				-0.0027			
	(0.0254)				(0.0107)			
CT × Replacement		0.1562**				0.0448*		
		(0.0705)				(0.0244)		
CT × Voluntary notice			0.1334*				0.0023	
			(0.0757)				(0.0208)	
CT × Involuntary notice				-0.0637				0.0193
				(0.0552)				(0.0180)
CO × Contract up	0.0239				-0.0132			
	(0.0213)				(0.0095)			
CO × Replacement		0.1150*				0.0292		
		(0.0628)				(0.0266)		
CO × Voluntary notice			-0.1194				0.0331	
			(0.0801)				(0.0221)	
CO × Involuntary notice				0.1210***				-0.0434**
				(0.0439)				(0.0180)
Contract up	-0.0429	0.0431	0.0428	0.0357	0.0939***	0.0578**	0.0575**	0.0571**
	(0.0815)	(0.0713)	(0.0706)	(0.0705)	(0.0273)	(0.0270)	(0.0269)	(0.0268)
Replacement	-0.0361	-0.5146*	-0.0185	-0.0333	0.0211	-0.0977	0.0255	0.0224
	(0.1994)	(0.3086)	(0.1986)	(0.2003)	(0.0920)	(0.1094)	(0.0907)	(0.0907)
Voluntary notice	0.0248	0.0315	-0.0503	0.0216	0.0119	0.0168	-0.0335	0.0156
	(0.1177)	(0.1165)	(0.1361)	(0.1180)	(0.0439)	(0.0437)	(0.0567)	(0.0441)

Involuntary notice	0.0358	0.0192	0.0314	-0.0665	0.0223	0.0239	0.0255	0.0579
	(0.1202)	(0.1210)	(0.1204)	(0.1617)	(0.0438)	(0.0422)	(0.0430)	(0.0548)
Control variables	Y	Y	Y	Y	Y	Y	Y	Y
N (rider-laps)	104,146	104,146	104,146	104,146	104,566	104,566	104,566	104,566
N (riders)	103	103	103	103	121	121	121	121
Log pseudolikelihood	-7744	-7742	-7744	-7743	-48304	-48305	-48306	-48304

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The omitted contractual condition is "Permanent". Conditional fixed effects pertain to the rider level. All models include time-varying controls, and vectors of fixed effects for rider rank at the start of the race, team rank at the start of the race, and lap numbers, teams, racetracks, and calendar years.

Biographical Sketches

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