

Tournament Theory: Thirty Years of Contests and Competitions

Brian L. Connelly
Auburn University

Laszlo Tihanyi
Texas A&M University

T. Russell Crook
University of Tennessee

K. Ashley Gangloff
Auburn University

Tournament theory is useful for describing behavior when reward structures are based on relative rank rather than absolute levels of output. Accordingly, management scholars have used tournament theory to describe a wide range of inter- and intraorganizational competitions, such as promotion contests, innovation contests, and competition among franchisees. While the use of tournament theory has gained considerable momentum in recent years, the ideas that underlie the theory have become blurred and potentially useful insights remain trapped within disciplines. We, therefore, provide a synthesis of the theory's foundational concepts, review its use in the management literature, identify advancements from related disciplines that may be imported to management research, and delineate the steps likely to be critical to moving the theory forward. Our hope is this review will make tournament theory more accessible and salient to management researchers with a view toward developing more nuanced versions of the theory and applying it in a wider range of contexts.

Keywords: *compensation, bonuses, and benefits; franchising; promotion systems; innovation management; industrial economics*

Lazear and Rosen's tournament theory . . . passes the smell test: The more grotesque your boss's pay and the less he has to do to earn it, the bigger the motivation for you to work for a promotion.

—Harford (2006: 1)

Corresponding author: Brian L. Connelly, Auburn University, 415 W. Magnolia Ave., Auburn, AL 36849, USA.

E-mail: bconnelly@auburn.edu

The ratio of CEO-to-worker pay in large public companies has risen steadily from 40:1 in 1982 to 354:1 in 2012 (AFL-CIO, 2013). Why is this gap so large? Tournament theory attempts to answer this question and, more generally, offer a means of describing the design and governance of rank-order competitions (Eriksson, 1999; Henderson & Fredrickson, 2001; Lazear & Rosen, 1981). There are, however, several factors that precipitate a review of tournament theory. First, conceptual and methodological developments have occurred within silos so that potentially useful insights remain trapped within specific applications of the theory, resulting in a theoretical domain that is only loosely connected between disciplines (Nippa, 2010). A review can help bring together these discipline-specific advances under a single umbrella. Second, management scholars employing the theory almost universally derive their conceptual arguments from Lazear and Rosen (1981), who were specifically focused on optimum labor contracts. A review could help describe the theory in generalized forms, consolidate progress made since the theory's inception, and provide an underpinning for future theorizing. Third, few have explored the boundary conditions of tournament theory or identified gaps in the literature as a whole. A review affords the opportunity, therefore, of identifying what tournament theory adds beyond existing managerial theories and why it should have an expanded role in management research.

As the opening quotation suggests, the application of tournament theory originates in and revolves around how to explain large differentials in prize structures, such as disproportionately high chief executive officer (CEO) salaries. Given a number of simplifying assumptions, tournament theorists show that relative rank-order prizes are superior to pay-for-performance compensation mechanisms because they motivate a broader base of employees who strive for promotion, rather than focusing on a single individual. As with gladiators of the past or today's professional tennis players, tournament theory suggests that participants are best motivated to perform when prizes (i.e., surviving for the gladiator, advancing for the tennis player, or being promoted for the office employee) are not contingent on absolute output but instead are a function of winners and losers. As a result, small differences in performance can result in large differences in payouts. One of the attractions of the theory in this most basic form has been its formal rigidity and inherent testability (Becker & Huselid, 1992; Eriksson, 1999; Rosen, 1986).

Tournament theory arose out of the labor economics literature more than 30 years ago (Lazear & Rosen, 1981). Since then, it has expanded to a wide range of other disciplines, such as law (Anabtawi, 2005), ecology (Zabel & Roe, 2009), psychology (Nieken & Sliwka, 2010), and finance (Kale, Reis, & Venkateswaran, 2009). For instance, scholars have examined how NASCAR drivers balance risk taking and crowding as they square off to determine a winner (Bothner, Kang, & Stuart, 2007), how judges sit on increasingly prestigious courts (e.g., circuit, district, superior) with the ultimate prize being the U.S. Supreme Court (Choi & Gulati, 2004), and how contract growers vie to supply broiler chickens to Perdue and Tyson (Knoeber & Thurman, 1994). These examples illustrate tournaments where reward structures are based on relative rank (i.e., performance) rather than absolute levels of output (Lazear & Rosen, 1981).

Tournament theory has also gained considerable momentum in the management literature. It has frequently been employed to help explain compensation structures (e.g., Messersmith, Guthrie, Ji, & Lee, 2011). However, tournament theory has also informed management research exploring other rank-order contests (Bothner et al., 2007; Boudreau, Lacetera, &

Lakhani, 2011; Gillis, McEwan, Crook, & Michael, 2011; Morgan & Wang, 2010). Management scholars have repeatedly found that tournaments are an integral, and sometimes invisible, part of the organizational landscape (Cappelli & Cascio, 1991; DeVaro, 2006).

In this review we describe tournament theory's main concepts, define its key constructs, and delineate its predictive relationships. We review research in management journals over the past 30 years that have either used tournament theory or conducted experiments to advance our understanding of the principles of tournament theory. We also review tournament theory research in several other disciplines with a view toward identifying key advances in the theory that could potentially inform management research. Last, we explore some of the limitations and boundary conditions of extant research on tournament theory and lay the groundwork for future research. We hope this review spurs management researchers to consider how tournament theory might be useful to help explain a broad range of organizational phenomena.

Fundamentals of Tournament Theory

Although there were some predecessors (e.g., Rosenbaum, 1979), Lazear and Rosen (1981) may be credited with the original formulation of tournament theory, and Rosen (1986) with subsequent extensions. The basic idea of a tournament for these authors was that firms induce effort from employees by effectively pooling some portion of wages from all the employees at one rank into the wages at the next highest rank, giving each the opportunity to win promotion to that rank. Key early studies developing the theory include an examination of contest factors by Nalebuff and Stiglitz (1983), consideration of consecutive elimination tournaments by Rosen (1986), and empirical examination of the relationship between prize levels and performance by Ehrenberg and Bognanno (1990). Lambert, Larcker, and Weigelt (1993) also contributed to this stream of literature by using different theoretical perspectives, finding direct support for several theoretical assumptions of tournament theory. Knoeber and Thurman (1994) compared the performance predictions by tournaments and linear performance evaluation structures of chicken growers, finding that growers' behavior was unaffected by changes in the absolute level of prizes and thus confirming an important assumption of mixed tournaments. Scholars subsequently generalized the principles of tournament theory, applying them to athletes (Frick, 2003), professors (Gomez-Mejia, Trevino, & Mixon, 2009), lawyers (Price, 2003), and drug dealers (Levitt & Dubner, 2009), among others.

Key Constructs

Tournaments are conceptualized as contests in which actors compete for a prize that is awarded based on relative rank and is designed to incent an optimal level of effort (Becker & Huselid, 1992; Lazear, 1999). The prize is "optimal" when it maximizes the productive output of the tournament, including all participants (Knoeber, 1989; Knoeber & Thurman, 1994; Lazear & Rosen, 1981). If the prize spread (e.g., the difference between post- and prepromotion wages) is too small, contestants are not incented to compete so that the total productive output of the tournament drops. A prize spread that is too high can also be detrimental because it induces so much effort that contestants must be broadly compensated, again reducing tournament efficiency. Tournament design, therefore, involves strategically choosing optimal prize spreads that maximize productive output of the tournament.

A key idea underlying tournament theory is that there are clear winners and losers. The win percentage is the likelihood that any given contestant will win the prize. It is a function of both the actor's own willingness and ability to compete and the tournament size, which is determined by its breadth (i.e., the number of unique competitors) and its depth (i.e., the number of possible levels). The arguments that underlie winning and losing presuppose the existence of rational economic actors who seek to maximize their individual utility, with the prize as a predominant motive. In addition to effort, each actor's likelihood of winning is also a function of irreducible random components, such as weather in sports tournaments, biases in legal tournaments, and serendipitous discoveries in innovation contests.

Foundational Principles

The primary mechanisms underlying tournament theory are best illustrated by examining a tournament in its simplest form: a two-player contest with identical risk-neutral actors (Knoeber & Thurman, 1994; Lazear & Rosen, 1981). In this model, let q measure the lifetime output or performance of the two contestants. Their output is a function of their level of effort or investment (μ) and a random component (ε) that could be something like luck or noise. For contestant j , his or her output formally is,

$$q_j = \mu_j + \varepsilon_j.$$

The two players both put forth effort to win the tournament, and their actions are costly. We represent the cost of putting forth effort μ by $C(\mu)$. The rules of two-player tournaments frequently specify that contestants can receive one of two fixed prizes. The winner of the tournament receives W_1 and the loser receives W_2 , where $W_1 > W_2$. The prize W_1 is given to the contestant with the higher performance. The loser, who receives W_2 , has the lower performance.

Let us consider the probability of winning the higher prize (W_1) by contestant i . If P denotes the probability of winning W_1 and both contestants' investment costs are the same $C(\mu)$, then the contestants can receive the following payoff:

$$P[W_1 - C(\mu)] + (1 - P)[W_2 - C(\mu)] = P(W_1 - W_2) + W_2 - C(\mu).$$

Considering a tournament with contestants j and k , the probability that j wins the tournament is,

$$P = \text{prob}[q_j > q_k] = \text{prob}[\mu_j - \mu_k < \varepsilon_k - \varepsilon_j]$$

When each contestant uses investment (μ_i) to maximize his or her payoff, we can conclude that,

$$\frac{\partial P}{\partial \mu_i}(W_1 - W_2) - C'(\mu_i) = 0$$

and

$$\frac{\partial^2 P}{\partial \mu_i^2}(W_1 - W_2) - C''(\mu_i) < 0, i = j, k.$$

The first equation includes the first derivative of P with respect to μ (e.g., the probability of winning changes with the change in investment), and the 0 value of this equation indicates a potential maximum or minimum point. The second derivative of P with respect to μ in the second equation is negative, which suggests that the first derivative is decreasing with the increase of μ (i.e., concave down). The two equations together, therefore, indicate a maximum point, which can be illustrated with an inverted U-shaped graph. In a two-player tournament, the Nash solution takes place when both contestants maximize their payoffs while the opponent's investment is fixed. In this equilibrium state, the marginal cost of investment (C') equals V , or its marginal value, and the difference between the prizes indicates the optimum solution,

$$\frac{\partial P}{\partial \mu_i}(W_1 - W_2) = V.$$

These equations highlight the two most foundational predictions of tournament theory. Specifically, they suggest that the contestants' investments (and their outputs) are based on how the change in their investment influences the probability of winning the contest. Their investments are also the negative function of their marginal costs, $C(\mu_i)$. Thus, the first testable prediction is that the actor's level of effort increases with the spread between the winning and losing prize. The second is that only the difference between prizes W_1 and W_2 matters to these two contestants, rather than the absolute sizes of their winnings (Knoeber & Thurman, 1994).

These two main testable implications of tournament theory have enjoyed appreciable empirical support through the years, principally from research in labor economics and sport (Bull, Schotter, & Weigelt, 1987; Ehrenberg & Bognanno, 1990; Gibbs, 1994). Many early studies laid the empirical groundwork and initially established the theory's validity (e.g., Baker, Jensen, & Murphy, 1988; McLaughlin, 1988; Nalebuff & Stiglitz, 1983; O'Keefe, Viscusi, & Zeckhauser, 1984). Subsequent studies, however, also outlined its limitations in explaining some aspects of human behavior and examined several relevant boundary conditions (e.g., Henderson & Fredrickson, 2001; Lambert et al., 1993; Main, O'Reilly, & Wade, 1993).

Extensions of the Two-Player Model

Tournament theory researchers have extended the two-player model in different directions, and we outline five important ways in which the theory has developed beyond this basic formulation. First, a critical extension of the theory that received early attention involves incorporating multiple players. McLaughlin (1988) derives expressions for the optimum prize differential and contestant effort in tournaments with n players. With more contestants, the probability of winning is reduced. It is less obvious that the optimum prize differential increases with tournament size while level of effort remains unaffected. When a contestant in a tournament with multiple players marginally increases his or her effort, it increases the probability of winning, but less so as n increases. Therefore, the prize differential must increase with n .

Second, tournament theorists have begun to incorporate aspects of actor heterogeneity (Nippa, 2010). Knoeber and Thurman (1994) describe how it is important in the above

formulas that contestants do not differ with respect to their abilities. If contestants are aware of their own abilities and those of others, then it is no longer the case that the contestant who puts forth the most effort wins. This results in lower levels of effort because less able actors know they are less likely to win the tournament, which confounds the equations above. Tournament designers may account for contestant heterogeneity by forming subcontests, wherein contestants compete with a more homogeneous subgroup (Gomez-Mejia et al., 2009) or by handicapping, which increases the win percentage for disadvantaged actors (Pfeifer, 2011).

Third, some expressions of tournament theory challenge the simplifying assumption that contestants operate independently (Main et al., 1993). In an interdependent environment, compensation based on individual performance may not make sense because it fosters undue competition among contestants. This changes the optimization formulas because the value proposition becomes not only a function of the cost of effort, but also sabotage. That is, contestants may benefit not only from increasing their own productivity but also from reducing others', but there is a cost associated with both types of effort. Lazear (1998) describes how prize differentials, therefore, must be reduced when players exhibit uncooperative behavior.

Fourth, some studies have drawn attention to the importance of the tournament's environment. As shown in the formulas above, the optimum level of effort for a given prize differential increases with the random component ϵ . In environments where luck or exogenous shocks play an important role, firms should use a larger prize differential to offset the effort-reducing effects of randomness. Lazear (1998) points out that this may be particularly important in comparisons of compensation policies across industry or national contexts.

Last, scholars have extended this model to examine how value functions change in sequential tournaments (Rosen, 1986). The ratio of prizes in sequential tournaments increases by level because the value functions include not only the higher prize at that level, but also the value of the possibility to compete for larger prizes at higher levels. As a result, there is a convex relationship between prize differential and tournament level for risk-averse contestants. The flip side of that coin, however, is that there is no further prize to be won at the highest level. For this reason, tournament theory predicts an extraordinarily large prize differential at the highest level of a sequential tournament, such as for CEO pay in an internal promotion contest. In Table 1 we summarize some of the definitions described above.

Tournament Theory in Management Research

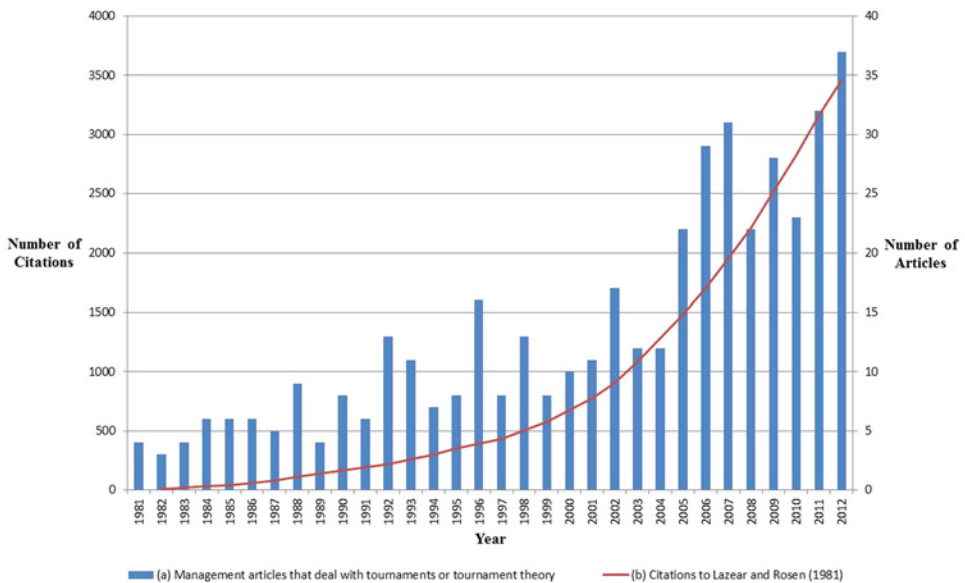
To assess how management researchers have applied tournament theory, we searched the major academic journals using the keywords *tournament* and *tournament theory* for the years 1981 through 2012. We selected the following 20 journals (in order of those that ultimately yielded the most tournament theory citations): *Academy of Management Journal* (66), *Management Science* (45), *Strategic Management Journal* (34), *Journal of Management* (33), *Organization Science* (30), *Journal of Management Studies* (27), *Academy of Management Review* (26), *Administrative Science Quarterly* (25), *Journal of Organizational Behavior* (19), *Human Relations* (18), *Journal of Applied Psychology* (18), *Organizational Behavior and Human Decision Processes* (18), *Human Resource Management* (16), *Journal of Labor Research* (11), *Group & Organization Management* (9), *Organization Studies* (9),

Table 1
Primary Constructs

Construct	Description	Pertinent Citations
Tournament	A contest wherein actors compete for a prize that is awarded based on relative rank.	Lazear & Rosen, 1981 Rosen, 1986
Prize	Reward for tournament winner(s) designed to incent the effort of all contestants. This may be monetary or have monetary value attached to it, but it could also be about prestige, privilege, or the possibility of competing in successive tournaments.	Knoeber & Thurman, 1994 Moldovanu, Sela, & Shi, 2007
Prize spread (for "prize," some also use compensation, wage, pay, or inter-rank; for "spread," some also use dispersion, disparity, inequality, or gap)	In sequential tournaments, the difference between the prize for winning the current tournament and that for winning the next highest level. In promotion contests this reduces to the wage spread between workers at their current level and what they would be earning at the next level.	Becker & Huselid, 1992 Messersmith, Guthrie, Ji, & Lee, 2011
Prize optimization	The prize spread that maximizes the ratio of actor effort to prize. If too small, actors are not incented to exert effort. If too high, actors take on additional risk of losing the contest and need to be separately compensated for that risk.	DeVaro, 2006 Kepes, Delery, & Gupta, 2009
Tournament size	The combination of a tournament's breadth (i.e., number of unique competitors) and depth (i.e., number of possible levels).	Che & Gale, 2003 Boudreau, Lacetera, & Lakhani, 2011
Win percentage	The likelihood that any given actor will win a prize. This is an important predictor of motivation.	Chen, Ham, & Lim, 2011 Taylor & Trogdon, 2002
Actor heterogeneity	Differences among actors that could influence tournament variables and their final relative rank.	Bothner, Kang, & Stuart, 2007 Shaw & Gupta, 2007
Handicapping	Adjusting incentives or processes to account for heterogeneity, increasing (decreasing) the win percentage for disadvantaged (advantaged) actors.	Pfeifer, 2011 Frick, 2003
Tracking	Creating subcontests (i.e., tracks within contests) to account for heterogeneity so actors may compete with a more homogeneous subgroup.	Gomez-Mejia, Trevino, & Mixon, 2009 Nippa, 2010
Sequential elimination (hierarchical tournaments)	Actors that win a tournament then compete in another tournament against other winning actors.	Choi & Gulati, 2004 O'Neill & O'Reilly, 2010

Personnel Psychology (8), *Journal of International Business Studies* (6), *Journal of Business Venturing* (5), and *Entrepreneurship Theory & Practice* (5). We also examined the reference sections of identified articles to find other potentially important articles. Last, we conducted an ancestry search of management articles referencing either of two seminal articles: Lazear and Rosen (1981) and Becker and Huselid (1992). In Figure 1, we depict the citation count growth of Lazear and Rosen (1981) and the growth trajectory of tournament research in management.

Figure 1
Growth of Tournament Theory in the Literature.



Different types of tournaments generally involve their own unique sets of research questions, methods, and relationships examined. Therefore, we organize our review of the management literature around five substantive domains that use tournament theory. We did not include articles that examine concepts central to tournament theory, such as competition or pay inequality, without specifically invoking a tournament model. In Table 2 we summarize the contributions of key management articles for each domain (this table includes a few articles not from our initially targeted management journals and one academically minded book that arose from our reference and ancestry searches).

Pay Dispersion

Every year news organizations devote attention to the apparently exorbitant salaries that go to the highest paid CEOs, with special attention devoted to those who appear to enrich themselves at the expense of other employees in the organization (Connelly, Haynes, Tihanyi, & Devers, 2011). Management scholars have heeded these public calls for attention by exploring the antecedents and consequences of pay dispersion (Gupta, Conroy, & Delery, 2012), which refers to the amount of difference in pay between levels of an organization (scholars interchangeably combine any of the terms *pay/earnings/wage* with any of the terms *disparity/dispersion/discrepancy/gap/differential/inequality/variation*). Such studies have examined the gap in pay between the CEO and other members of the top management team (TMT; Carpenter & Sanders, 2002), between executives and other employees (Wade,

Table 2
Key Management Articles Utilizing Tournament Theory

Article	Dependent Variable(s)	Unit of Analysis	Study Design	Key Tournament Theory Concepts Addressed
Pay dispersion Messersmith, Guthrie, Ji, & Lee, <i>Journal of Applied Psychology</i> (2011)	Turnover	Manager; TMT	HLM <i>Archival data</i>	<ul style="list-style-type: none"> • Prize spread is associated with increased likelihood of turnover • Prize spread effects are contingent on market pay level, incentive intensity, and an actor's "share" of the total compensation
Fredrickson, Davis-Blake, & Sanders, <i>Strategic Management Journal</i> (2010)	Pay dispersion; firm performance	TMT	Cross-sectional time series regression <i>Archival data</i>	<ul style="list-style-type: none"> • Prize spread reflects actor heterogeneity • Prize spread may lead to undesirable levels of conflict between actors if they have reason to believe they should receive similar prizes • Prize spread is negatively related to organizational performance, particularly when it is more than can be justified • Tournament and prize structure designers are influenced by social-psychological factors that affect comparisons among actors
Kepes, Delery, & Gupta, <i>Personnel Psychology</i> (2009)	Workforce productivity; firm performance	Firm	Hierarchical regression <i>Archival and survey data</i>	<ul style="list-style-type: none"> • Prize spread effects on productivity are contingent on whether the prize is performance based or politically based • Prize spread effects are greater on proximal outcomes (e.g., productivity) than distal outcomes (e.g., firm performance)
Ensley, Pearson, & Sardeshmukh, <i>Journal of Business Research</i> (2007)	Cohesion; conflict; potency	TMT	<i>t</i> tests; SEM <i>Survey data</i>	<ul style="list-style-type: none"> • Prize spread effects on negative behavioral consequences are different depending on firm type (e.g., family vs. nonfamily firms)
Shaw & Gupta, <i>Personnel Psychology</i> (2007)	Quits	Firm	Hierarchical regression <i>Survey data</i>	<ul style="list-style-type: none"> • Prize spread, basis for the prize, and communication about the prize have differential effects on the retention of heterogeneous actors based on quality
Siegel & Hambrick, <i>Organization Science</i> (2005)	Firm performance	TMT	Cross-sectional multiple regression <i>Archival data</i>	<ul style="list-style-type: none"> • Prize spread is more detrimental to firms that require collaboration • Tournaments may foster aggressive and competitive behavior
Carpenter & Sanders, <i>Journal of Management</i> (2004)	Firm performance	TMT	Two-stage least squares regression <i>Archival data</i>	<ul style="list-style-type: none"> • Prize spread between the top actor and the next level is negatively related to performance • Tournament structures that favor collective action are applicable to situations requiring coordination and cooperation
Bloom & Michel, <i>Academy of Management Journal</i> (2002)	Pay structure; turnover; managerial tenure	Firm	HLM; logistic regression <i>Archival data</i>	<ul style="list-style-type: none"> • Risk and uncertainty may require greater prize spread to attract, retain, and motivate top actors • Higher prize spread leads to lower tenure and greater turnover

(continued)

Table 2 (continued)

Article	Dependent Variable(s)	Unit of Analysis	Study Design	Key Tournament Theory Concepts Addressed
Canyon, Peck, & Sadler, <i>Strategic Management Journal</i> (2001)	Compensation; pay dispersion; firm performance	Manager; TMT	Multivariate regression <i>Archival data</i>	<ul style="list-style-type: none"> • Prize spread is positively related to tournament size • Prize spread within a team is marginally related to organizational performance
Henderson & Fredrickson, <i>Academy of Management Journal</i> (2001)	CEO-TMT pay dispersion; firm performance	Firm; TMT	Multiple regression <i>Archival data</i>	<ul style="list-style-type: none"> • The relationship between prize and hierarchical level is convex • The need for coordination influences prize spread • Tournaments with large prize spreads can motivate more effort but also may unwittingly promote counterproductive behavior • Prize spread increases with tournament size
Bloom, <i>Academy of Management Journal</i> (1999)	Player performance; team performance	Player; team	HLM; autoregressive modeling <i>Archival data</i>	<ul style="list-style-type: none"> • Greater prize spread is associated with lower individual and group performance where interdependencies are important
Lambert, Larcker, & Weigelt, <i>Administrative Science Quarterly</i> (1993)	Compensation	Manager	Cross-sectional multiple regression <i>Archival and survey data</i>	<ul style="list-style-type: none"> • Ranked position moderates the prize spread—performance relationship
Pfeffer & Langton, <i>Administrative Science Quarterly</i> (1993)	Satisfaction; productivity; collaboration	Department; professor	Multiple regression <i>Archival and survey data</i>	<ul style="list-style-type: none"> • The relationship between prize and hierarchical level is convex • The prize spread between the top prize relative to the next lower prize is greater than that between other levels in the hierarchy • The greater the prize spread, the lower the actors' satisfaction and productivity and the less likely it is that actors will collaborate to increase productivity
Cappelli & Cascio, <i>Academy of Management Journal</i> (1991)	Wage premium	Jobs	OLS regression <i>Archival and survey data</i>	<ul style="list-style-type: none"> • Positions at the top of the hierarchy command prize premiums • Prize spread motivates actors that are currently competing in the tournament as well as those that are not even participating in the tournament yet
O'Reilly, Main, & Crystal, <i>Administrative Science Quarterly</i> (1988)	Compensation; pay disparity	Industry; firm; TMT; BOD member; manager	Multiple regression <i>Archival data</i>	<ul style="list-style-type: none"> • No support was found for tournament theory predictions
Actor effort in promotion tournaments Pfeffer, <i>Journal of Labor Research</i> (2011)	Education; experience; wages; promotion	Employee	Probit regression; Cox proportional hazards regression; OLS regression <i>Archival data</i>	<ul style="list-style-type: none"> • Handicapping increases the win percentage for disadvantaged actors • Handicaps are granted based on various actor characteristics including gender

(continued)

Table 2 (continued)

Article	Dependent Variable(s)	Unit of Analysis	Study Design	Key Tournament Theory Concepts Addressed
Gomez-Mejia, Trevino, & Mixon, <i>International Journal of Human Resource Management</i> (2009)	Named professorships	Professor	Logistic regression <i>Archival data</i>	<ul style="list-style-type: none"> Tracking can account for actor heterogeneity Agreed-on metrics for ranking influence actor performance Perceptions of tournament fairness influence actor effort and collaboration
O'Neill & O'Reilly, <i>Journal of Organizational Behavior</i> (2010)	Income attainment; hours worked per week	MBA graduate	HLM <i>Survey data</i>	<ul style="list-style-type: none"> Actor heterogeneity leads to success of higher quality actors in early rounds, but over time, effort is a better determinant
DeVaro, <i>Strategic Management Journal</i> (2006)	Worker performance	Employee; firm	Probit regression <i>Survey data</i>	<ul style="list-style-type: none"> Relative performance determines promotion of skilled actors Prize spread is associated with higher levels of individual performance Tournament participants and those running the tournament operate together to determine tournament outcomes
Orrison, Schotter, & Weigelt, <i>Management Science</i> (2004)	Effort-level decisions	Tournament	Wilcoxon signed-rank test; Mann-Whitney <i>Experiment</i>	<ul style="list-style-type: none"> Behavior is invariant to tournament size when the proportion of high prizes is constant High percentage of large prizes may result in reduced effort
Greenwood & Empson, <i>Organization Studies</i> (2003)	Conceptual	Firm	Review and propositions	<ul style="list-style-type: none"> Tournament size can reduce the inefficiency effects of discrimination Intense loyalty and organizational commitment may be attributed to tournament style (up or out) organizational structures
Innovation contests Adamezyk, Bullinger, & Moslein, <i>Creativity and Innovation Management</i> (2012)	Conceptual	n/a	Literature review	<ul style="list-style-type: none"> Tournaments fall into two broad categories: economic and management Tournaments can teach communication, teamwork, and technical skills Tournaments can be used to generate new solutions to old problems Five elements essential to tournament design include the (a) attraction of potential contestants to the tournament, (b) facilitation of participants, (c) sponsorship (financial or otherwise), (d) number and structure of contest phases, and (e) replication
Lakhani, Lifshitz-Assaf, & Tushman, working paper (2012)	Conceptual	Firm	Review and theoretical framework	<ul style="list-style-type: none"> Tournament organizers (a) generate a pool of contestants and (b) select the best one Tournaments may be most efficient where solution knowledge is widely distributed but selection knowledge is concentrated

(continued)

Table 2 (continued)

Article	Dependent Variable(s)	Unit of Analysis	Study Design	Key Tournament Theory Concepts Addressed
Boudreau, Lacetera, & Lakhani, <i>Management Science</i> (2011)	Problem-solving performance	Problem; innovation contest	Linear panel-data regression; quantile regression <i>Quasi-experiment</i>	<ul style="list-style-type: none"> Increases in tournament size increases the likelihood that at least one contestant will find a winning solution Parallel path effects coexist with incentive effects Higher levels of problem uncertainty increase the parallel path effect of increases in tournament size and reduces the negative incentive effect Tournaments can be used to generate "revolutionary" innovation Prizes other than financial compensation can be used to motivate higher levels of actor performance Indivisible prizes can reduce cooperation among actors Communities and markets respond differently to different prizes Some firms may choose a "nested" tournament structure in which actors are in communities <i>and</i> markets as to reap the benefits of both Tournaments allow multiple rounds to filter contestants that are weak Tournaments open to the public can generate a wider variety of solutions Tournaments closed to the public allow firms to maintain propriety Tournaments can be iterative where eliminated contestants can reenter the contest at later rounds For better output, tournament organizers alter tournament size and actor heterogeneity The type of problem that needs solving should be considered in tournament design Actor heterogeneity can mitigate the negative effect of underinvestment associated with increases in tournament size Reciprocal rewards such as reputation or credit can induce knowledge sharing and other benefits to tournament organizers Institutions, fields, communities, and organizations have different effects on actor participation and behavior Prizes can be managed via legal or normative mechanisms
Morgan & Wang, <i>California Management Review</i> (2010)	Conceptual	Contestant; innovation contest	Descriptive and prescriptive approach to the use of innovation tournaments	
Boudreau & Lakhani, <i>MIT Sloan Management Review</i> (2009)	Conceptual	Firm	Descriptive and prescriptive approach to the use of innovation tournaments	
Terwiesch & Ulrich, <i>Academic Text</i> (2009)	Conceptual	Contestant; Innovation contest	Review and typology of innovation contests	
Terwiesch & Xu, <i>Management Science</i> (2008)	Problem-solving performance	Innovation contest; firm	Deductive	<ul style="list-style-type: none"> For better output, tournament organizers alter tournament size and actor heterogeneity The type of problem that needs solving should be considered in tournament design Actor heterogeneity can mitigate the negative effect of underinvestment associated with increases in tournament size Reciprocal rewards such as reputation or credit can induce knowledge sharing and other benefits to tournament organizers Institutions, fields, communities, and organizations have different effects on actor participation and behavior Prizes can be managed via legal or normative mechanisms
Murray & O'Mahony, <i>Organization Science</i> (2007)	Conceptual	Contestant; firm; community; field; institution	Review of multilevel influences on innovation contests	
Franchising Combs, Ketchen, & Short, <i>Entrepreneurship Theory & Practice</i> (2011)	Conceptual	n/a	Introduction to a special issue	<ul style="list-style-type: none"> Tournament theory can work in conjunction with other theories to provide a more complete understanding of organizational phenomena The effectiveness of tournaments is contingent on a range of boundary conditions

(continued)

Table 2 (continued)

Article	Dependent Variable(s)	Unit of Analysis	Study Design	Key Tournament Theory Concepts Addressed
Gillis, McEwan, Crook, & Michael, <i>Entrepreneurship Theory & Practice</i> (2011)	Multiunit franchising	Franchisor	OLS regression <i>Survey data</i>	<ul style="list-style-type: none"> Tournaments can exist without being publicly acknowledged Actors exert greater effort when they perceive opportunity for gain even if they should lose the tournament The use of tournaments is contingent on various firm and market factors
Kidwell & Nygaard, <i>Entrepreneurship Theory & Practice</i> (2011)	Conceptual	Franchisor	Review and propositions	<ul style="list-style-type: none"> Reporting of results lends to market control as it allows for social comparison
Management experiments in tournament theory Boyle & Shapira, <i>Organization Science</i> (2011)	# of points risked	Contestant	OLS regression <i>Archival data</i>	<ul style="list-style-type: none"> Actor attention on survival and aspirations differ based on relative rank Leaders or high performers take more risks to maintain relative rank
Chen, Ham, & Lim, <i>Management Science</i> (2011)	Effort level	Tournament	<i>t</i> test; OLS regression <i>Experiment</i>	<ul style="list-style-type: none"> Favorites and underdogs exhibit differential effects Even advantaged actors increase effort as prize spread increases
Bothner, Kang, & Stuart, <i>Administrative Science Quarterly</i> (2007)	Risk-taking behavior	Race; season	Logistic regression <i>Archival data</i>	<ul style="list-style-type: none"> Crowding from below increases risk taking and competitiveness Zero-sum tournaments force actors to react to one another's attempts to advance
Becker & Huselid, <i>Administrative Science Quarterly</i> (1992)	Driver performance; driver safety	Race	Fixed-effects modeling <i>Archival data</i>	<ul style="list-style-type: none"> Incentive effects diminish as prize spread increases Tournaments may motivate undesirable behavior Some tournaments require cooperation to advance
Harder, <i>Administrative Science Quarterly</i> (1992)	Player performance; selfish/cooperative behavior	Player	OLS regression <i>Archival data</i>	<ul style="list-style-type: none"> Prize spread effects are greater on over-rewarded actors than on under-rewarded players Under-rewarded actors behave less cooperatively and more selfishly while over-rewarded actors behave more cooperatively
Weigelt, Dukerich, & Schotter, <i>Organizational Behavior and Human Decision Processes</i> (1989)	Effort-level decisions	Experimental group	ANOVA <i>Experiment</i>	<ul style="list-style-type: none"> Actors exert similar levels of effort when ability is equivalent In unfair tournaments, the effort levels of advantaged and disadvantaged actors are high, but not significantly different

Note: ANOVA = analysis of variance; BOD = board of directors; HLM = hierarchical linear modeling; OLS = ordinary least squares; SEM = structural equation modeling; TMT = top management team.

O'Reilly, & Pollock, 2006), and among employees at different levels within an organization (Cowherd & Levine, 1992; Pfeffer & Davis-Blake, 1987).

Tournament theory has been foundational to this line of research, and tournament theorists generally argue that pay dispersion has positive effects, such as promoting competition and providing incentives for the best to rise above others (Fredrickson, Davis-Blake, & Sanders, 2010). One early study that compared the predictions of tournament theory with a social comparison model of CEO compensation did not find support for the tournament model (O'Reilly, Main, & Crystal, 1988). However, later empirical research in management journals uncovered evidence in favor of the theory's basic premises regarding compensation structures (Cappelli & Cascio, 1991; Conyon, Peck, & Sadler, 2001; DeVaro, 2006).

These studies also show that positions at the highest levels of the organization command disproportionate premiums relative to positions at other points in the hierarchy (Conyon et al., 2001). Managers who compete in the final tournament at the highest level (i.e., CEOs) have no future horizon and therefore need to be incented in other ways. One common mechanism is to make the difference between winning and losing at the final level so great that managers behave as if the tournament had an infinite number of levels (Fredrickson et al., 2010).

Despite reasonably consistent support for tournament theory's main predictions, management scholars have also put forward some important boundary conditions to the theory. For example, while tournaments with large prize spreads can motivate more effort, they may also promote counterproductive behavior (Henderson & Fredrickson, 2001). Others point out that there are adverse side effects of outsized pay dispersion at the final level of the tournament, such as reduced teamwork and poor decision making among the TMT (Hayward & Hambrick, 1997). Consistent with this idea, Kepes, Delery, and Gupta (2009) found that a wider pay spread is associated with lower productivity when determined by politics. Pay dispersion is also negatively associated with turnover of the firm's top performers when managers emphasize performance-based wage increases, but less so when managers emphasize seniority-based wage increases (Shaw & Gupta, 2007). Management scholars may be attributed with extending tournament theory by incorporating its potentially adverse effects on turnover (Bloom & Michel, 2002).

Management researchers have also uncovered some unique findings about pay dispersion. For instance, some have found that greater wage differentials are especially important as the probability of promotion decreases (Lambert et al., 1993). In addition, pay dispersion at various levels throughout the organization not only motivates employees participating in the tournament, but can also serve as an incentive for employees outside of the immediate job ladder who desire to be in the tournament (Cappelli & Cascio, 1991). Some have also explored the effects on tournament outcomes when pay dispersion varies for different participants, finding that it increases the likelihood of people dropping out of the tournament (Messersmith et al., 2011). Last, emerging research shows some evidence that certain shareholders appear to favor tournament-style compensation structures while others may discourage it (Connelly, Haynes, et al., 2011).

One limitation of research in this area of research is that, for most tournaments, the prize is presumed to be the actors' predominant motive. Research that incorporates more complex social understandings of actor objectives may be beneficial. For example, in Herzberg's (1968) model, people must overcome what he refers to as "hygiene" factors before they can

be satisfied at work. Tournament structures may create scenarios where hygiene factors are not met, resulting in job dissatisfaction. For instance, tournaments promote competition among participants, which can strain interpersonal relationships, create an isolated work environment, and introduce job uncertainty. Individuals vary in their pursuit of extrinsic versus intrinsic rewards, and competitions might lower intrinsic rewards for many contestants (Twenge, Campbell, Hoffman, & Lance, 2010). If tournament theorists overemphasize extrinsic, at the expense of intrinsic, rewards, the academic community may develop an undersocialized view of tournaments that does not fully incorporate individuals' willingness to participate in tournaments, human factors pertaining to competition, or motivational factors other than the prize.

Actor Effort in Promotion Tournaments

Research on incentive and productivity in internal promotion contests is less ubiquitous than that which explores compensation structures. This is likely because it is difficult to obtain accurate data on individual performance in many jobs, which is precisely what makes tournaments appealing as a reward mechanism in the first place. Nevertheless, there is some evidence within the management literature that individual effort increases more with compensation spread than with compensation levels (Brown, Sturman, & Simmering, 2003; Pfeffer & Langton, 1993; Shaw, Gupta, & Delery, 2002), though some have also found evidence to the contrary (Bloom, 1999) and others have sought to reconcile contradictory findings (Beaumont & Harris, 2003; Jirjahn & Kraft, 2007).

Management researchers have devoted particular attention to actor effort in tournaments that require collaboration (Bloom, 1999; Siegel & Hambrick, 2005). For instance, in a unique test of CEO and TMT compensation, Carpenter and Sanders (2002) find that internal alignment of TMT compensation is positively associated with success of the management team. Supporting this idea, Harder (1992) examines effort expended by basketball players, finding that over-rewarded players are more cooperative and under-rewarded players are more selfish in their style of play. Ensley, Pearson, and Sardeshmukh (2007) extend the notion to family firms, finding that promotion tournaments in this context can increase conflict and hinder employee performance.

This line of research has also added some unique insights to tournament theory predictions about differences in actor effort in promotion tournaments. For example, Pfeifer (2011) examined promotion tournaments involving mixed genders, finding that, although women did not have a lower chance of promotion than men, there was some "negative handicapping" that required women to fulfill higher standards for both hiring and promotion. Greenwood and Empson (2003) examined promotion tournaments in an up-or-out career system. This is unique insofar as losers do not have the opportunity to compete in further tournaments, but these authors found that promotion incentive still proved to be a strong motivator of actor effort. In contrast, O'Neill and O'Reilly (2010) examined sequential tournaments in the form of careers, finding that heterogeneity among tournament participants (in this case, MBA graduates) leads to success for better-equipped actors in early rounds, but effort was a more significant determinant of winning in later rounds.

A key assumption underlying actor effort in tournaments is the notion of information asymmetry between actors and principals. However, some contexts call for tournaments

wherein participants and those running the tournament work together to determine outcomes (DeVaro, 2006). Therefore, this area of research would benefit from further study of how information sharing shapes actor effort, handicapping, and tournament productivity. Many tournaments, such as government requests for proposals, are structured to ensure that all participants have exactly the same information, but scholars might seek to identify both the antecedents and consequences of scenarios that compromise these safeguards.

Innovation Contests

Tournament theory has also been an appropriate framework for explaining the structure, design, and outcomes of innovation contests (Terwiesch & Xu, 2008). Ideas, much like job performance, can be difficult to measure in absolute terms, and the generation and development of ideas are certainly difficult to monitor. It is often important that actors seeking creative solutions to a problem operate independently to minimize the potential for incrementalism or building off the preconceived notions of others. Taken together, these factors suggest that tournament theory is an appropriate conceptual lens for examining innovation contests (Frick, 2003). Tournament theory has been informative for the design of innovation contests and useful for explaining the results of specific contests, such as the TopCoder programming competition (Boudreau et al., 2011; Terwiesch & Ulrich, 2009).

Some have described how innovation contests can be structured to best match the nature of the problem and objectives of the firm (Morgan & Wang, 2010). For example, when the objective is to create revolutionary ideas where the solution is highly uncertain, tournaments may yield more creative solutions when firms use large prize differentials for winners and when they increase the number of contestants participating. In contrast, when objectives are more evolutionary, greater rivalry is associated with decreased contestant effort, even though it increases the likelihood that at least one contestant will find a solution (Boudreau et al., 2011). Competitor heterogeneity can reduce the efforts of all contestants by discouraging the effort of weaker competitors, who perceive increased probability of losing, and stronger competitors, who reduce effort because of the weaker field (Terwiesch & Xu, 2008). Furthermore, some have described innovation as a recombination of different sets of knowledge and ideas, which leads to “recombinant uncertainty” (Fleming, 2001). Tournaments can maximize the recombinant uncertainty of their outcomes by discouraging collaboration among competitors.

Similar to findings in other applications of tournament theory, management scholars have also found that innovation contests can generate unintended behavior. For example, the relatively indivisible rewards of tournaments can reduce cooperation where it is required, such as when contestants must share common information and tools, or increase collusion between competitors in contests such as competitive bidding processes (Morgan & Wang, 2010). While scholars tend to agree that tournament theory appropriately explains innovation contests and their participants’ behaviors, some suggest notable departures from typical tournament theory principles. For instance, some note how innovators are often motivated by nonpecuniary prizes, such as recognition and self-satisfaction (Murray & O’Mahony, 2007). Others explain that tournament-style contests may not always be the most efficient means to solve innovation problems. For instance, Lakhani, Lifshitz-Assaf, and Tushman (2012) suggest that innovation tournaments are best suited to scenarios where knowledge about

potential solutions are widely distributed but knowledge about which solutions are preferred is concentrated, rather than vice-versa.

Franchising

Organizations that use franchising have become a central part of management research in recent decades (Combs, Michael, & Castrogiovanni, 2004). Researchers describe how franchising introduces the problem of free riding, because if franchisees cut corners they receive the immediate benefits of cost savings but share the long-term burden of dissatisfied customers with the umbrella organization (Brickley & Dark, 1987). Tournament theory describes a solution to this problem. Tournaments in franchising allow for higher levels of information asymmetry because rewards are based on outcome, rather than process, and allow for reduced monitoring because some monitoring is pushed down to the level of the multiunit franchise (Norton, 2003).

In these tournaments, franchisors offer additional units as the prize for the best performing franchisees (Gillis et al., 2011). Such a scenario is well suited to tournament theory predictions for a variety of reasons. Identifying and monitoring franchisees is costly and difficult to implement, so large prizes of multiple units can serve as an efficient mechanism to optimize and rank the effort of competing franchisees (Kidwell & Nygaard, 2011). Tournaments for additional units serve as both reward and incentive because they bring significant wealth to winners and improve the performance of all competing franchisees (Hussain & Windsperger, 2009). In fact, franchisees have been shown to exert greater effort not only because they perceive an opportunity to win, but also because the business growth that comes from tournament participation is enough of a reward (Gillis et al., 2011). Some might suggest that actor independence could inhibit information flows that enable franchisors to enhance operational effectiveness. At the same time, franchising tournaments could uncover new information, such as the managerial ability of franchisees through regular reporting of their achievements, and comparative benchmarking could spur franchisees on to new ideas and ways to compete.

Management Experiments in Tournament Theory

A subset of studies in the management literature are focused less on applying tournament theory in organizational contexts than advancing precepts of the theory by way of experiments. These appear in two main varieties: those that examine individuals (usually students) in controlled contests and those that use sporting events as a natural experiment to understand tournament theory principles.

Controlled experiments typically seek to unpack the intricacies of actor behavior in tournaments. In an experiment on tournaments among undergraduates, Weigelt, Dukerich, and Schotter (1989) found that competitors choose similar levels of effort when they have equivalent capability. However, in unfair tournaments, where some competitors are perceived to have an advantage, both the advantaged and disadvantaged competitors continued to exhibit similar levels of effort. We know from prior studies that increasing prize spread increases actor effort, but Chen, Ham, and Lim (2011) added that even advantaged competitors increase their effort as the prize spread expands. On the other hand, Orrison, Schotter, and Weigelt

(2004) found that actor behavior is invariant to tournament size when the proportion of high prizes is kept constant. In fact, their results suggest that competitors tend to reduce effort when there is a high percentage of large prizes as compared to a more distributed prize structure.

Sporting contests have informed tournament theory researchers working in a variety of disciplines (Frick, 2003), and management is no exception. For instance, Bothner et al. (2007) explore NASCAR crash data, finding that risk taking is more likely when there are more individuals competing in the tournament. Also, these authors find that competitive crowding (i.e., adjusting effort to match other participants) fosters increased competitiveness within and across levels, and crowding initiated by lower-ranked actors exacerbates aggressiveness more so than crowding by higher-ranked actors. Boyle and Shapira (2011) add to the discussion of risk preferences in tournaments by examining contestants in a game show. They find that tournament leaders are more prone to engage in risky behavior than those falling behind, and that tournament leaders focus more on their aspirations whereas laggards shift between aspiration and survival.

As managerial experiments in tournament theory move forward, one way scholars might be able to advance our understanding would be by continuing to address, and relax, some of the theory's key underlying assumptions. Of course, tournament theory assumes economic actors characterized by rational decision making with complete information (Lazear & Rosen, 1981). Studies that inject decision constraints and managerial cognitive biases into tournament theory's predictive relationships would add value to this area of study. Accounting for information differences among tournament participants might yield a more complete explanation of the productive efficiency of tournaments, and researchers may find that tournaments arrive at suboptimal outcomes that are a function of a complex set of actor biases. For example, the fundamental attribution error is a cognitive bias that may be particularly consequential for hierarchical tournaments. If tournament participants have difficulty attributing negative outcomes to their own behavior as opposed to external circumstances, this could diminish the effectiveness of hierarchical tournaments and compound the likelihood of repeated failures.

Key Insights From Other Disciplines

Studies from other disciplines reveal important insights that, if brought to the management literature, could inform our studies and shape our understanding of how tournament theory might be applied. We, therefore, describe recent findings from three other disciplines and discuss the potential for cross-pollination with management research.

Labor Economics

Similar to research in management, labor economists have also found empirical support for tournament theory predictions regarding pay dispersion and actor effort (Eriksson, 1999; Main et al., 1993). Using a longitudinal sample of CEOs of more than 600 U.S. corporations, Bognanno (2001) found evidence for tournament-like conditions, including high rates of promotion from within and increasing pay gaps with increasing levels of hierarchy. The study also showed that CEOs received outsized rewards from promotion and their pay was

partly determined by the number of hierarchical levels. Another study by Baker, Gibbs, and Holmstrom (1993) showed that increased tenure in a position resulted in a drop in real pay for the executive. In contrast, rewards given for promotions increased with hierarchical level at an increasing rate.

In addition, labor economists continue to employ tournament theory, and more recent studies provide new insights. For example, some have used tournament theory to help describe why productive output often peaks after individuals are promoted within a hierarchical organization. This is sometimes referred to as the *Peter Principle*, or the notion that people are promoted to their level of incompetency (Peter & Hull, 1969). The Peter Principle suggests a fundamental inefficiency in the promotion process wherein tournament participants rise one level higher than they should. Many have argued that performance declines following promotion arise because individuals encounter some tasks, postpromotion, that they are less competent of performing (Dilger, 2003). Lazear (2004), however, suggests this effect is not due to an inability to perform at the final level of promotion, but instead offers a tournament theory solution. Participants win tournaments they should win (i.e., the “right” person is promoted to the appropriate level), but then reduce effort at their final level because they are not incented to compete for the next higher level (cf. Barmby, Eberth, & Ma, 2011).

Labor economists have also begun to incorporate the economic value of winning into tournament theory formulas. Coffey and Maloney (2010) study how the “thrill of victory” matters to contestants and induces increased effort. These authors find that contestants appear to put forth their best effort when they perceive they have a reasonable chance of winning. Related to this, Brown (2011) finds that when superstars enter tournaments, “average” contestants adjust their expectations downward and perform worse than when superstars are absent. Management researchers might consider the extent to which competition and the thrill of victory affect organizational tournaments (e.g., salesperson-of-the-year tournaments) and how they might interact with wage differentials to spur increased effort and performance (Franke, 2012).

Sport Management

Sporting events are a natural context for examining tournament theory, and sport management scholars have advanced their own nuances of the theory. For instance, sport management research has shed light on the selection of tournaments in which actors choose to participate (Rhoads, 2007). Two studies on competitive runners (Lynch & Zax, 2000; Maloney & McCormick, 2000) confirm that participants with greater ability are more likely to choose tournaments with the greatest prize spread. Hood (2006) adds that, for “star” players, the purse is not enough because decisions to enter tournaments are determined in part by participants’ past performance in the same tournament. Human resource management scholars studying recruitment might be especially interested in what these findings mean for attracting and retaining star talent in organizations.

Sport management researchers add that gender may moderate the incentive effects of prize spread. Some have found that men appear to be more incented by prize spread than women (Lallemant, Plasman, & Rycx, 2008), though others have found evidence to the contrary and that women may be motivated by other factors (Maloney & McCormick, 2000). Women may not respond as strongly to bonus payments, whereas such payment increases

performance dispersion among men (Frick, 2003). Management scholars might research the extent to which these findings generalize to organizational contexts by exploring, for example, gender differences in the relationship between wage dispersion and productive output in organizations.

Sport management researchers have also added to our understanding of risky or aggressive behavior among tournament participants. Groothuis, Groothuis, and Rotthoff (2011) show that ulterior goals, beyond the prize spread, may affect risk propensities in tournaments. Using data from auto racing, some studies find support for a risk hypothesis that suggests nonlinear rewards may be associated with more risky behavior (Depken & Wilson, 2004; Schwartz, Isaacs, & Carilli, 2007). Management researchers might ask whether nonlinear reward structures increase risky behavior among employees as well. Furthermore, in a study of golfers on the PGA tour, Hood (2008) finds that inconsistency arising from playing to win (a form of risky behavior) is more beneficial when the prize spread is greater. Stated differently, tournament participants win more often when they are less consistent, even with a slightly worse-than-average performance. Organizational scholars might examine whether this is also true of individuals competing for promotions—are they more likely to win when they adopt less consistent (riskier) behavior, even when such behavior results in lower average performance?

Marketing

Given that firms spend more than \$26 billion annually on sales contests, it is no surprise that tournament theory has been a useful theoretical lens for marketing researchers as well (Garrett & Gopalakrishna, 2010). The focus in this literature has been on how to create optimal designs of rank-order tournaments as a short-term motivational device that increases salespeople's efforts (Kalra & Shi, 2001). In addition to contests among salespeople, studies in marketing also use tournament theory to help explain consumer behavior, intrafirm competition between brands, and interfirm competition for shelf space (Desiraju, 2004).

One way marketing researchers have contributed to tournament theory is by focusing on tournaments where individuals compete as part of a group (Kalra & Shi, 2001). These studies find that, in tournaments among groups (e.g., sales territories) of imbalanced quality, participants in stronger groups exert just enough effort to match others' effort, because they assume that the strength of the group will secure a win (Syam, Hess, & Yang, 2012). Participants in weaker groups exert minimal effort in deference to their diminished likelihood of winning, resulting in shirking among both strong and weak groups (Lim, Ahearne, & Ham, 2009). Another study examines participants' perceptions of their group, concluding that group satisfaction is positively related to favorable tournament outcomes such as individual satisfaction and performance (Grant, Cravens, Low, & Moncrief, 2001). Management researchers would do well to incorporate aspects of group affiliation. For instance, some franchisees may be at an inherent disadvantage in franchise tournaments if they are part of a group (e.g., Alabama franchisees) that is not as strong or cohesive as another group (e.g., Northern California franchisees).

Another way marketing studies contribute to tournament theory research is by exploring the temporal orientation of participants. For example, a recent study of sales contests among life insurance salespeople showed that the use of rank-order tournaments resulted in better

short-term performance (Garrett & Gopalakrishna, 2010). However, using sales contests can also lead to a reduced emphasis on building long-term customer relationships and a correspondingly increased use of manipulative behavior with customers. Repeated contests exacerbate the problem because they force salespeople to shortchange customer service expectations (Oliver & Anderson, 1994). This line of research suggests that tournaments reward short-term accomplishments at the expense of long-term objectives (Poujol & Tanner, 2009). This could have implications for management research on corporate governance. Principals have varied time horizons, some preferring short-term and others preferring long-term performance. Do the former facilitate intrafirm tournaments and the latter discourage them? If so, how do managers competing in promotion tournaments manage these competing voices?

Future Research: Moving Tournament Theory Forward

Integrating With Other Theories

We found several studies that compare tournament theory with other theories, such as agency theory, behavioral theory, and the managerial power model (Conyon et al., 2001; Henderson & Fredrickson, 2001; Lambert et al., 1993; Vieito, 2011), but little emphasis on integrating it with other theories. For example, because the majority of empirical examinations of tournaments are centered on the extent to which winners are motivated to perform, we anticipate that integrating insights from expectancy theory could be beneficial. Expectancy theory focuses on individuals' motivation, asserting that it is shaped by beliefs that individual effort can yield some level of desired performance (Vroom, 1964). Motivation is also shaped by beliefs that this desired performance, in turn, is strongly related to an outcome of interest (such as a promotion or pay raise). Within expectancy theory, a key tenet is the notion of valence, which is the extent to which an individual values an outcome (Behling & Starke, 1973).

To integrate equity theory into tournament theory, scholars might consider differentiating between the valence of different outcome structures (i.e., prizes such as prestige, pay, power), and accounting for individual differences. Individuals value different outcomes (Twenge et al., 2010), and certain prizes might be more important at one stage of the career (e.g., pay early on) versus another (e.g., promotions), for males versus females, or for people across generations. In addition, tournaments might not provide the requisite motivational power as a tournament's size gets too large because many tournament contestants perceive their chances of winning are reduced and put forth less effort (Coffey & Maloney, 2010). An important question for future inquiry is how tournaments, the valence of different prizes, and tournament size work together to elicit nonlinear patterns of motivation among contestants.

Social network theory also holds promise for reframing the questions we ask about tournaments. The assumptions of tournament theory are highly restrictive, which is useful for arriving at formulaic solutions, but risky in that theory can become divorced from social realities (Baker et al., 1988; Nippa, 2010). Managers often work in teams, which makes ranking difficult. Moreover, winners and losers in intraorganizational tournaments, unlike sport competitions, have to continue to work together (Main et al., 1993). Incorporating constructs and relationships from social network theory could help place tournaments more squarely within their organizational contexts. Social network theorists might describe tournament

participants in terms of their centrality (number of social connections to other tournament participants) or access to structural holes (extent to which they connect disconnected others; Borgatti & Foster, 2003).

One way social network theory might inform tournament theory is by exploring the influence of the social characteristics of participants on tournament outcomes. For instance, participants with higher degree centrality might leverage their position to improve their odds of winning and could be more prone to collusion or cooperative behavior that decreases efficiency of the tournament. In a network characterized by a “small world” topology, there could be important differences between tournament participants who reside at the network core as opposed to those who reside near the periphery, especially if peripheral actors are more prone to risky behavior (Krackhardt, 1997). One might also examine the role of structural holes on tournament outcomes. If actors in an innovation tournament have many connections that are all connected to each other, it could result in high levels of “echo,” where contestants confirm one another’s presuppositions and are less likely to innovate based on unique information (Burt, 2005).

Last, signaling theory could improve our understanding of tournaments and how they are affected by the flow of information (Spence, 1973). A foundational assumption of tournament theory is information asymmetry among participants (i.e., actor independence) and between participants and principals. Signaling theory describes how parties might overcome that asymmetry by communicating about unobservable qualities via observable signals (Connelly, Certo, Ireland, & Reutzel, 2011). To use signaling theory, some actors must want to communicate information about how they are better than others (Spence, 2002), so it becomes especially pertinent as researchers incorporate actor heterogeneity into tournament models.

Signaling in tournaments could make them either more or less efficient. Tournament results are determined by outcomes rather than process, which is why they reduce monitoring costs. However, if participants signal principals about the process, or ways in which outcomes may not reflect participants’ true unobservable quality, they could improve the accuracy of tournament rankings. For instance, contestants who ranked second in a promotion contest could send signals about some inordinately adverse conditions under which they had to compete, suggesting their ranking should be weighted higher. This form of signaling could improve the efficiency of tournaments if signals are costly and honest. At the same time, heterogeneous actors could also signal competitors about their superior ability and likelihood of winning the contest, which would have adverse effects on overall productivity of the tournament.

Applying in New Contexts

Most empirical tournament theory research in the management literature examines individual-level tournaments, leaving open the opportunity for applying tournament theory to business-unit and firm-level phenomena. One important application that appears to have been overlooked revolves around internal capital decisions. The BCG and GE McKinsey Stoplight matrices reveal that many firms have competitions among business units. Tournament theory could help explain optimum competitive parameters, handicapping, or how such tournaments compare with more equitable distribution of resources. Other

applications of tournament theory at the business unit level could include decisions about where to locate value chain activities, what businesses will be divested, or which units receive choice resources (e.g., office space).

Research leveraging tournament theory's tenets to examine interfirm competitions is also needed. For example, anecdotal evidence suggests that many entrepreneurs start businesses with the purpose of eventually selling them (i.e., via an exit strategy). Tournament theory might be useful for exploring how acquirers screen potential targets. Buyers may use tournaments to motivate entrepreneurs, since they cannot monitor the effort of entrepreneurs but can rank their outcomes. Other interfirm applications of tournament theory might include a tournament of suppliers that are competing to be selected, alliance partners competing for greater participation with a firm, or publicly traded firms competing for the highest quality, long-term investors.

Within the firm, management researchers might use tournament theory to consider new forms of contests among individuals, such as expatriates competing for plumb assignments or directors competing in a tournament for additional directorships. We also did not find tournament theory research employing multiple levels analysis. Scholars might examine how a tournament among individual scientists for resources in a research organization interacts, or interferes, with tournaments among business units within the same organization. Some organizations may create cultures where tournaments are an accepted practice and an integrated part of the company at all levels. Researchers might consider, therefore, the difficulty of introducing tournaments in organizational climates that are unfamiliar with them.

One potentially interesting context from a data collection perspective is the military, which is characterized by a strong need for coordination and a hierarchical promotion system. We can think of few contexts requiring more cooperation than large deployments to dangerous parts of the world. Military service members could be motivated in part by pay, but they are likely to be motivated by other factors as well. To the extent that military promotion contests invoke competition instead of cooperation, harmful outcomes could occur.

Globalizing Its Predictive Relationships

A growing body of literature shows that pay dispersion, which historically is tournament theory's central focus, appears to be spreading globally (Oxelheim & Randoy, 2005). One reason is that international entries often force firms to compensate their executives at higher levels as a result of previously imposed tournaments. For example, at the time of its acquisition, the CEO of U.S.-based Chrysler was paid eight times more than the CEO of its German acquirer, Daimler. Although the ratio of CEO-to-worker pay is still an order of magnitude greater in the United States than elsewhere, many countries are moving closer to U.S. models. This suggests that the United States may effectively be exporting pay practices to other countries, so scholars would do well to consider how tournaments might emerge in other countries and cultures (Wahlgren, 2001).

When applying theories globally, researchers have found it helpful to consider a country's formal institutions, such as laws and regulations, and informal institutions, such as norms and values (North, 1990; Scott, 1995). We expect that both formal and informal institutions could play a key role in the extent to which firms employ tournament-based compensation structures. Research shows that formal institutions often exhibit strong

pressures on firm policies and practices (Holmes, Miller, Hitt, & Salmador, 2013). Formal institutions that are particularly relevant include those laws and regulations that govern the exchange of labor for pay, minimum level of wages, working hours, hiring and firing of employees, taxation and benefits, and rights to unionize. Extensive formal constraints of this nature could make it more difficult for firms to use compensation tournaments. Informal institutions may also be important to pay differentials in compensation tournaments (Tosi & Greckhamer, 2004). Studies examining the effects of informal institutions have shown that justice norms vary in different national and organizational cultures, and societal values and beliefs are often incorporated into organizational practices and codes of conduct (Cowherd & Levine, 1992). Therefore, it is reasonable to expect that national cultural values will influence the economic value participants ascribe to a tournament's prize spread (e.g., Osberg & Smeeding, 2006).

Country-level formal institutions may affect other types of tournaments as well. For example, a growing body of literature suggests that firms engage the political system through politicians to cultivate relationships (Lux, Crook, & Woehr, 2011). This raises the question of whether a country's formal institutions foster or inhibit politicians from establishing behind-the-scenes tournaments that reward firms (e.g., with a prize of contracts or favorable policy) for their lobbying and campaign contributions. In addition, politicians may set up tournaments between countries to attract foreign direct investment, and again here a country's formal institutions could play an important role in determining the efficiency of such tournaments. Formal institutions may also affect different types of tournaments by changing the likelihood of winning. In many countries, foreign firms have to work with a domestic partner to enter the market (Tang, 1990). Doing so could force foreign firms to engage partners for their political connections, increasing their likelihood of winning but decreasing productive output of the tournament.

Country-level informal institutions may also have far-reaching implications for other types of tournaments. Evidence suggests that tournament prizes might be less important motivators, and even frowned upon, in some cultures. Earley and Gibson (1998) showed that individualists and collectivists have different preferences for rewards; individualists prefer compensation based on their singular input, but collectivists prefer more equitable, group-based prize structures, regardless of input (Hofstede, 2001). Thus, a key question for researchers is the extent to which prize spreads maximize productive efficiency of tournaments in individualistic as compared to collectivist cultures. Related to this, one might ask whether prize spreads are more consequential when actors compete against people from the same cultural background.

Another potentially important implication of country-level effects of tournaments involves the outcome effects on subsequent turnover, or who remains after a tournament concludes. High performers generally turn over at higher rates than low performers, though these effects can be mitigated by compensation (Trevor, Gerhart, & Boudreau, 1997). Recent evidence suggests that the relationship between individual performance and turnover varies across countries; a key implication is that the potential for tournaments to affect turnover, and by extension performance, may be limited in other cultures (Sturman, Shao, & Katz, 2012). Because most studies invoking tournament theory involve large U.S.-based firms, samples from a wider array of countries could uncover different results or country-level effects.

Table 3
Proposed Typology of Tournaments

Tournament Type	Description	Example
Need-based	Actors compete for the reward of resources or access to needed resources, with the possibility of multiple or divisible rewards. Resources are desirable but scarce, so tournaments are a logical means of distributing them.	Competitions among departments, strategic business units seeking capital, or fledgling firms competing for potential buyers.
Competence-based	Actors are not necessarily trying to win, but instead are trying not to lose; the reward is punishment avoidance.	The managerial contests of GE's "Neutron Jack" Welch, who annually fired the bottom 10% of employees. Also, prospective university students who seek to clear a bar by attaining requisite grade point averages and test scores.
Activating	The reward for this type of contest is intrinsic or status-oriented. These tournaments are "activating" in the sense that being a winner is a reward in itself, so that prize spread is of marginal importance.	Salesman-of-the-year contests or best-teacher awards in business schools.
Winner-take-all	There is an indivisible final prize, such as money or a new position. These are most consistent with the original context in which tournament theory was developed, where contestants sacrifice some level of compensation or benefits in their current state in the hope of winning the much larger reward associated with the next higher state.	Members of a TMT who compete for the job of CEO.
Hierarchical	Tournaments where an actor's main goal is to advance to the next highest tournament.	Mid- or entry-level employees compete to be promoted to increasingly higher levels within an organization, or franchisees seek rights from franchisors to build additional units.

Note: TMT = top management team.

Developing a Typology of Tournaments

While researchers have applied tournament theory to a range of contexts, the literature may be at a point where it would be useful to develop taxonomies (classification by numerically defined observable characteristics) and typologies (conceptually based, intuitive groupings) of tournaments (Rich, 1992). Classification of organizational phenomena has a long history in organizational analysis and has frequently served as an important aid for comparison, theory development, and hypothesis testing (Bell & Kozlowski, 2002; Rohm & Swaminathan, 2004). In Table 3, we offer one possible way of doing so, cataloging tournaments into five types corresponding roughly with the tournament reward.

The basic typology we propose is a set of monothetic groups built around observable characteristics and intuitive categorization, or an "essential-traditional" typology (Rich, 1992). Such typologies can provide the basis for midrange theorizing about

the relationships and forces at work on specific types and be a precursor to the eventual development of polythetic typologies (Bailey, 1973). Future research might seek to validate our proposed typology by empirically examining its utility and accuracy in representing reality (Harzing, 2000), or scholars might attempt to create more subtle or multidimensional typologies.

Identifying Antecedents and Boundary Conditions

While research has focused mainly on the tournament outcomes, the literature would benefit from further consideration of its antecedents. That is, when is tournament theory most appropriate? Scholars have begun to describe some of the most basic factors under which the theory is most likely to be most useful (Frick, 2003; Morgan & Wang, 2010). For example, tournaments are effective in situations where the effort of individual actors is difficult or expensive to monitor and when performance is difficult to judge in absolute terms. This is because rewards are allocated by rank order, so one does not need to evaluate the actor's processes or level of effort. Tournaments are also best suited to scenarios where rewards are relatively indivisible. In addition, tournaments are apropos for scenarios wherein the system is subjected to common underlying externalities, such as technical breakdowns, economic cycles, or environmental shocks, because all actors are subjected to the same uncertain conditions. Future research might explore a richer set of antecedents, such as personality characteristics of the participants, administrative heritage of the organization, time horizon of a tournament's principals, or industry norms and approaches taken by competitors.

Conversely, it would be important to further our understanding of the theory's boundary conditions. That is, in which scenarios is tournament theory more limited? One, discussed earlier, is that tournaments do not appear useful when cooperation is needed for interdependent work situations (Pfeffer & Langton, 1993; Siegel & Hambrick, 2005). Because tournaments fuel contestant competition (Henderson & Fredrickson, 2001), caution should be used in structuring pay when interdependence is central to a task at hand. Another is that tournament theory may not be well suited to describe how to motivate individuals to expend effort over the long haul (Poujol & Tanner, 2009). Although tournaments encourage strong short-term effort from contestants, the theory does not explain how to continue to motivate winners once a tournament concludes, especially if winners have achieved the highest rank. Last, tournaments may be less useful in scenarios where participants identify themselves with tournament outcomes and are likely to make social comparisons with other participants. In these situations, participants are unable to divorce their performance in the tournament with their own self-worth, which could reduce tournament productivity owing to perceived unfairness and increased political behavior (Kepes et al., 2009; Vroom, 1964). In Table 4, we provide a matrix of potential research questions wherein we overlay these directions for future research onto the five substantive domains of tournament theory research in management.

Conclusion

Lazear (1998) observed that "the salary of the vice president acts not so much as motivation for the vice president as it does as motivation for the assistant vice presidents" (p. 226). Tournament theory provides a testable means of explaining why firms use escalating

Table 4
Directions for Future Research

Substantive Domain	Directions for Future Research				
	Integrating With Other Theories	Applying in New Contexts	Globalizing Predictive Relationships	Developing a Typology of Tournaments	Antecedents and Boundary Conditions
Pay dispersion	What signals (positive or negative) do the widening pay gaps associated with tournaments send to capital markets?	Does pay dispersion between academics and administrators in higher education affect the productive output of faculty members (e.g., research)?	Are U.S. institutional investors "exporting" tournament-style pay practices to firms they own overseas?	How does horizontal pay dispersion among a TMT interact with vertical pay dispersion (between CEO and TMT) in a winner-take-all tournament?	Is wide CEO-to-worker pay useful in some industries but not others, or even preferred by some principals but not others?
Actor effort	Do more central actors leverage their position to discourage competition in promotion tournaments?	How useful are promotion tournaments in the military for inducing effort in high-risk (i.e., life-threatening) environments?	Are tournaments in collectivist cultures less effective at inducing effort than those in individualistic cultures?	How effective is prize spread for inducing effort in activating and competence-based tournaments versus winner-take-all tournaments?	Do participants reduce effort in tournaments where information asymmetry (between actors) is low but information uncertainty is high?
Innovation contests	Are innovation contests among a "small world" of participants less effective than more dispersed networks?	How effective are innovation tournaments that occur pre-IPO as compared to post-IPO?	How can software contests handicap participants to level the playing field for participants from multiple countries?	Which types of tournaments are best suited to developing revolutionary outcomes?	How does reward divisibility affect tournament participation and outcomes?
Franchising	How can franchisors use valence of different outcomes to maximize efficiency of tournaments among franchisees?	How effective are tournaments among franchisees for early-stage versus late-stage franchisees?	How do national borders affect competition among franchisees for multiunit awards?	Do competence-based tournaments among franchisees have negative long-term effects?	Are some forms of franchising less well suited to tournaments than others?
Experiments in tournament theory	Are peripheral or core actors in a tournament more prone to risk-taking behaviors?	How effective are tournaments among individuals with varying cognitive ability or with certain splinter skills?	How might tournament theory predictions be affected by participants with vastly different cultural biases?	Are participants with different personality characteristics attracted (or averse) to certain types of tournaments?	Are tournaments that mimic others more, or less, effective than first-mover tournaments?

compensation structures and, more broadly, helps explain the design and governance of rank-order competitions. Over the past three decades, researchers have expanded its use to a broad array of contests, and studies in many disciplines have imported the ideas to help explain their own phenomena (Cherry & Ellis, 2005; Price, 2003). We hope our review makes tournament theory more accessible to management researchers and leads them to broaden their use of the theory when studying the eclectic range of contests that occur within and between organizations.

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