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The Dynamics of the Performance–Risk Relationship Within a Performance Period: The Moderating Role of Deadline Proximity

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Risky organizational decisions are frequently made within the confines of performance periods with predefined durations and deadlines for achieving desired levels of performance. The relationship between performance and risk taking has been studied mostly across such periods but rarely within them. Building on the shifting-focus-of-attention model of organizational risk taking, we argue that the temporal proximity of deadlines regulates the focus of organizational attention within a performance period. Decision makers will focus their attention on attaining and maintaining aspirations early in a period; however, as deadlines approach, decision makers in underperforming firms will increasingly be likely to focus on ensuring survival, whereas decision makers in outperforming firms will increasingly be likely to focus on experimenting with slack resources. We propose that the relationship between performance and risk taking should thus be moderated by deadline proximity within a performance period. We tested and found support for our hypotheses in the context of 22,603 fourth-down decisions made by the 32 National Football League teams during the 2000–2005 regular season games. Our findings suggest that the notion of temporally bound performance periods and deadline proximity should play a more central role in attention-based frameworks of organizational risk taking.

Key words: risk taking; performance periods; deadlines; attention; shifting-focus model
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Introduction

Risk taking plays a central role in organizational theory. The "riskiness" of a decision is associated with the likelihood of adverse outcomes and the magnitude of potential loss (March and Shapira 1992, Shapira 1995, Sitkin and Pablo 1992, Slovic 2000). To the extent that a decision maker perceives "variation in the distribution of possible outcomes, their likelihoods, and their subjective values," a decision is considered risky (March and Shapira 1987, p. 1404); to the extent that organizational members are willing to put resources at stake for such choices, the organization is considered to be taking a risk. The willingness to take risks is frequently used as the theoretical basis for explaining when organizations are more likely to initiate change (Greve 1998), innovate (Zollo and Winter 2002), experiment (March 1991), learn from accidents (Baum and Dahlin 2007), and violate rules (Harris and Bromiley 2007, Lehman and Ramanujam 2009). Given such a wide-ranging impact on organizational processes and outcomes, understanding the determinants of organizational risk taking remains an enduring subject of inquiry.

According to the shifting-focus-of-attention model (March and Shapira 1992), risk taking is driven by performance, and the focus of organizational attention shapes this performance–risk relationship. A growing number of studies indeed draw upon the shifting-focus model to understand the conditions under which organizations are more or less likely to engage in risky behaviors (e.g., Audia and Greve 2006, Desai 2008, Miller and Chen 2004). The model and its recent extensions (i.e., Chen and Miller 2007, Iyer and Miller 2008) posit that attention may be focused on one of three objectives—attaining and maintaining aspiration levels, ensuring survival, or utilizing slack resources—and much of the research in this domain has therefore sought to better understand the conditions under which attention is likely to shift between these reference points.

We seek to build on the shifting-focus model by examining how risk taking varies across time within performance periods. Risky organizational decisions are

frequently made within the confines of performance periods with predefined durations and deadlines for achieving desired levels of performance. The main aim of prior research has largely been to understand how the performance–risk relationship varies *across* these performance periods by explaining how risk-taking behaviors observed in one period are related to performance levels measured at the end of the preceding period. These studies have typically measured performance at discrete regular intervals, such as an annual financial performance (Audia and Greve 2006, Miller and Chen 2004), biannual (Greve 1998) or annual market share analysis (Baum et al. 2005) or quarterly sales (Mezias et al. 2002). Few of these studies, however, have examined whether and how the relationship between performance and risk taking might vary *within* a performance period.

The absence of studies that have examined the performance–risk relationship within a performance period is surprising for at least two reasons. First, organizations regularly measure, monitor, and manage performance throughout each period (Carp 2003). Even though an organization might formally report performance at the end of a period, its members will receive performance feedback and respond to it throughout the period. Given that performance can vary throughout the course of a period, it is also reasonable to expect risk taking to vary correspondingly. Second, the notion of a performance period naturally implies a deadline for attaining desired levels of performance. The temporal proximity of deadlines has been shown to shape perceptions of current performance (Humphrey et al. 2004, Waller et al. 2002), expectations of future performance (Chen 2008), and behavioral tendencies (Chen et al. 2008, Gersick 1988, Staudenmayer et al. 2002). As a result, deadline proximity can be expected to shape the performance–risk relationship within a given period.

The objective of this study is therefore to examine the moderating effects of deadline proximity on the performance–risk relationship. We propose that the availability of time before the end of a given period represents a unique type of resource that can be used for making and implementing decisions and for managing their consequences. We further propose that changes in this resource can potentially trigger shifts in the focus of organizational attention. When more time is available early on in a period, attention is more likely to be directed at attaining and maintaining an aspired level of performance. As less time is available and the deadline draws nearer, attention is increasingly likely to be redirected at ensuring survival in underperforming firms or at utilizing slack resources in outperforming firms. In this way, deadline proximity regulates the focus of organizational attention within the performance period.

By examining the moderating effects of deadline proximity, we hope to extend the current understanding of organizational risk taking in several ways. First, we offer one of the first studies to examine variations in the performance–risk relationship within a performance period and thereby draw attention to the need for better understanding the dynamics of risky decision making within such periods. Second, we add to the growing body of research that seeks to understand the particular conditions under which organizational attention is likely to shift between foci (e.g., Audia and Greve 2006, Chen and Miller 2007, Desai 2008). Third, and more generally, we respond to calls for studies that more explicitly take into account the role of time in key organizational processes (Ancona et al. 2001, Gavetti and Rivkin 2007, Mitchell and James 2001, Zaheer et al. 1999) by demonstrating that these foci of organizational attention are better understood when defined within the context of temporally bound performance periods.

We examine the moderating effects of deadline proximity in the context of National Football League (NFL) games. Specifically, we examine whether the time remaining before the end of a game affects the relationship between a team's score and its willingness to take risks. There are several reasons why American football games offer an ideal context for studying the performance–risk dynamics within a performance period. Aspiration levels are unambiguous because teams enter each game hoping to score more points than their opponent when the game ends. Teams receive ongoing feedback about their performance throughout each game, and risky decisions can therefore be directly linked to this feedback. Moreover, these decisions are discrete events that can be easily observed on a decision-by-decision (i.e., play-by-play) basis across time. The particular decision examined here involves varying amounts of risk that can be captured in terms of likelihoods of outcomes and potential loss.

The risky decision of interest in this study is the option of "going for it" on fourth down. When a team gets possession of the ball (i.e., the offensive team), the team has up to four plays, or downs, to move the ball at least 10 yards toward the opponent's end of the field. If the ball is moved 10 yards, the team is allowed another set of four downs. The fourth-down play is unique in that it presents the offensive team with a set of well-defined choices, and each decision made potentially carries a significant amount of risk. For example, the team may "punt," or kick the ball to the other team, thereby giving the ball to the opponent and yet ensuring, in most cases, that the opposing team must cover a greater distance in order to score. Another option, field location permitting, would be for the team to attempt a field goal. A third choice would be for the team to attempt a fourth-down conversion by trying to move the ball the remainder of the distance needed for a first down. The last option of "going for it" is traditionally considered the riskier alternative, as illustrated by the intense media coverage of a single fourth-down conversion attempt made by the

New England Patriots during a game against the Indianapolis Colts (Everson and Albergotti 2009, Wilbon 2009). The Patriots faced a fourth-down situation at their own 28-yard line with two yards to go for a first down and two minutes and eight seconds remaining before the end of the game. They attempted a fourth-down conversion but failed, and they consequently handed over possession of the ball to the Colts at a location that made it much easier for the Colts to score. The Patriots lost the game, and commentators talked for several days about how the Patriots "risked everything on one play" (Marot 2009). Our study examines decisions such as these and tests our propositions using 22,603 fourth-down decisions made by the 32 NFL teams across 1,520 regular season games during the 2000–2005 seasons.

Theory and Hypotheses

The Effects of Performance and Attention on Risk Taking

Our core thesis is that risk taking can be best understood by considering three factors—*performance* relative to aspiration levels, the focus of organizational *attention*, and the availability of *time* as determined by the proximity of deadlines. The shifting-focus-of-attention model (March and Shapira 1992) serves as our foundation for understanding the former two factors. According to the model, the willingness of an organization to take risks is driven by its performance, and the nature of this relationship is determined by whichever reference point is the focus of organizational attention.

The original formulation of the shifting-focus model identified two alternative reference points—the aspiration level and survival—and recent extensions of the model (Chen and Miller 2007, Iyer and Miller 2008) have suggested a third reference point—slack. The aspiration level as a reference point is grounded in the classic behavioral theory of the firm (Cyert and March 1963) that conceptualizes organizations as goal-seeking entities chasing performance targets or aspired levels of performance. These aspiration levels can be based on an organization's own past performance or on the performance of other organizations (Bromiley 2004, Greve 1998) and might refer to different types of financial or nonfinancial resources such as capital assets, political support, market share, organizational capital, or even reputation (Levinthal 1991, March and Shapira 1992). The aspiration level is the "smallest satisfactory level of performance" (Schneider 1992, p. 1053) and is the borderline between perceived success and failure (Greve 2003b). However, organizational attention may not necessarily be focused on this aspiration level all of the time. It may sometimes be focused on survival—the exhaustion of resources (March and Shapira 1992), or more generally, the threat of "distress" (Altman 1983, Iyer and Miller 2008). Alternatively, it may sometimes be focused on slack—resources in excess of current performance (Chen and Miller 2007, March and Shapira 1992) accumulated through outperforming aspirations (Chen 2008, Levinthal and March 1981). Considering these three foci of attention, four different conditions are possible: firms may be performing below aspirations and focused on either aspirations or survival, or they may be performing above aspirations and focused on either aspirations or slack (Chen and Miller 2007, Iyer and Miller 2008). To understand the relationship between performance and risk taking, we first consider this relationship separately for each of these conditions and then combine them to offer a risk function for the entire range of the performance spectrum.

First, when organizational performance is below the aspiration level, managers may find themselves concerned with either attaining aspirations or ensuring survival. When attention is focused on aspirations, decision makers engage in a problemistic search for alternative courses of action that could resolve the performance shortfall (Cyert and March 1963). The greater the shortfall, the more intensive and broad is the search for possible solutions to the performance problem. As the search grows in intensity and breadth, the likelihood of risk taking and the amount of risk taken increases as firms engage in such activities as exploration (March 1991), change (Greve 1998), innovation (Bolton 1993, Greve 2003a), and even financial misrepresentations (Harris and Bromiley 2007). When attention is focused on aspirations, the performance–risk relationship should thus be negative such that risk taking increases as performance worsens. When attention is focused on survival, however, managers tend to become rigid (Staw et al. 1981) and restrict the amount of information they process, only attending to familiar information (Starbuck et al. 1978). They sometimes also develop a stronger need for security and are motivated to avoid negative consequences in order to preserve safety (Lopes 1987). At the organizational level, hierarchies tend to become more mechanistic, with centralized authorities and formalized processes (Hermann 1963) that emphasize efficiency and cost reductions (Starbuck 1992) or fewer new strategic initiatives (D'Aveni 1989). When attention is focused on survival, the performance–risk relationship should thus be positive such that risk taking decreases as performance worsens.

Second, when organizational performance is above the aspiration level, managers may find themselves concerned with either maintaining aspirations or experimenting with excess resources. When attention is focused on aspirations, there is little incentive for changes to well-known routines (Greve 2003b); instead, existing routines (Levitt and March 1988) and the status quo (Samuelson and Zeckhauser 1988) are reinforced. Managers tend to be risk averse and are motivated to avoid any actions that could cause performance to fall

below aspirations (March and Shapira 1987). The desire to extend existing resources is weaker than the desire to overcome failure (Audia and Greve 2006, Kahneman and Tversky 1979), and thus risk taking is less sensitive to changes in performance above the aspiration than to changes below it. When attention is focused on slack, however, managers tend to relax controls and allow for more experimentation (Singh 1986) in the form of innovation (Greve 2003a), investments in research and development (Nohria and Gulati 1996), and the acquisition of other firms (Iyer and Miller 2008). When attention is focused on slack, the performance–risk relationship should thus be positive such that risk taking increases as more resources are obtained.

A combined risk function that depicts risk taking across the entire spectrum of performance can be derived by collectively considering the conditions described above. We derive this function based on the assumptions of the relative distance rule that is outlined in the original formulation of the shifting-focus model (March and Shapira 1992) and is most commonly discussed in empirical examinations of the model (e.g., Chen and Miller 2007, Iyer and Miller 2008). Based on this attention allocation rule, attention will be focused on whatever reference point is closest. In other words, the closer an organization's performance is to its aspiration level, the greater the probability that attention will be focused on it. On the other hand, the further an organization's performance is from its aspiration level, the greater the probability its members will focus on survival or slack. Prior studies have tested these propositions by classifying which firms are likely threatened by bankruptcy and which firms are not, and then comparing the two risk functions produced by this classification (e.g., Miller and Chen 2004). However, this approach suffers from the possible misclassification of firms because there is no discrete point at which all firms will shift their focus of attention (Chen and Miller 2007); it also does not allow for variation within firms at slightly varying levels of performance. To avoid these potential shortcomings, we examine the effects of performance on risk taking across the entire range of the performance spectrum by creating a combined risk function. For performance below the aspiration level, this combined risk function can be created using a weighted average of the aspiration- and survival-focused risk functions with preferential weight placed on the aspiration-focused function for performance levels closer to the aspiration level; the result is an inverted U-shaped performance–risk relationship for performance levels below the aspiration level (Carp 2003). For performance above the aspiration level, risk taking is less sensitive to changes in performance in the neighborhood of the aspiration level (Audia and Greve 2006) but should increase when performance is far above the aspiration level and the likelihood of a slack focus is higher; the result is a positive performance–risk relationship for performance levels above the aspiration level.

HYPOTHESIS 1A (H1A). *For performance below the aspiration level, the performance–risk relationship is inverted U-shaped.*

HYPOTHESIS 1B (H1B). *For performance above the aspiration level, the performance–risk relationship is positive.*

Recent research has sought to build on the shifting-focus model as described previously by examining organizational conditions under which attention may shift from aspirations to survival or slack. For example, in a study of Japanese shipbuilding firms, small firms were more likely than their larger counterparts to shift attention to survival at low levels of performance because small firms have "limited resources and are vulnerable to levels of low performance that do not normally threaten large firms" (Audia and Greve 2006, p. 92). In a study of capacity expansions among U.S. railroad companies, underperforming organizations with limited operating experience or without public endorsement were more likely than their more experienced and supported counterparts to shift attention to survival (Desai 2008). In a study of manufacturing firms, those underperforming firms facing bankruptcy were less likely than those not threatened by bankruptcy to acquire another firm; moreover, outperforming firms were more likely to acquire another firm if they had considerable slack (Iyer and Miller 2008). These studies suggest that organizational factors may indeed play a role in how attention is focused and thereby moderate the performance–risk relationship. In the following section, we offer a situational-level moderating variable that we believe should also direct organizational attention—deadline proximity.

The Moderating Effects of Deadline Proximity

Whereas the above discussion focused on the effects of *performance* and *attention* on risk taking, we now turn to the third factor introduced earlier—the availability of *time* based on deadline proximity. Performance feedback typically occurs within the context of well-established performance periods with predefined durations and deadlines for achieving desired levels of performance. For example, sales goals are often set in the context of quarters and years (Mezias et al. 2002), earnings estimates are provided on a quarterly basis (Chen 2008), projects are planned with specified completion dates (Conlon and Garland 1993, Humphrey et al. 2004, Staudenmayer et al. 2002), and sports games are played for prespecified durations. Even one-time events such as initial public offerings (IPOs) are usually planned with a particular date in mind (Chen et al. 2008). Even though scholars usually define aspiration levels solely in terms of desired levels of performance, organizational members inherently define them in terms of deadlines for attainment as well (March and Simon 1958). Moreover, organizational members seek to measure and monitor

performance throughout each performance period (Carp 2003). It is therefore reasonable to expect organizations to respond to performance feedback throughout a given period.

We propose that the relationship between performance and risk taking varies with deadline proximity. We argue that deadline proximity regulates the focus of organizational attention such that the salience of possible foci—aspirations, survival, and slack—will vary according to the amount of time remaining before an approaching deadline. Attention is most likely to be focused on that which is most salient, and decision makers "vary their focus of attention depending on the . . . characteristics of the situation" (Ocasio 1997, p. 190). The availability of time is indeed one of the critical dimensions that shapes and regulates organizational attention (Stinchcombe 1968). Moreover, the depletion of various resources (e.g., firm size, see Audia and Greve 2006; experience, legitimacy, and age, see Desai 2008) has been shown to prompt switches in the focus of attention, and we posit in a similar fashion that the availability of time provides "productive opportunities" (Penrose 1959) to make and implement decisions that will affect performance outcomes. As time is exhausted, its depletion will increase the probability that attention will shift away from the aspiration level and toward either survival (for underperforming firms) or slack (for outperforming firms). We discuss next how the salience of each focus changes as a deadline approaches.

Decreased Salience of Aspirations. Aspiration levels are established at the start of each performance period, and it seems that organizational members establish aspirations that are considered attainable. Theoretical arguments for the formation and adaptation of aspirations are grounded in the idea that organizations adjust their behavior according to experience (March and Simon 1958) and that organizations seek to learn from their own experiences and from the observable experiences of their peers in such a way that possible-to-reach aspirations are set (Lant 1992). Because entities seek consistency in thought and action (Festinger 1957), it is difficult to imagine a firm investing in ventures and embarking on aspirations that its members consider clearly unattainable; the very process of establishing an aspiration level suggests a high degree of initial commitment to it. We expect that at the onset of a performance period, attaining and maintaining aspirations will be the chief concern of organizational members. In other words, attention is much more likely to be directed at the aspiration level early on. This preferential allocation of attention to the aspiration level early in a performance period should be evident in the nature of the performance–risk relationship such that the relationships proposed in our first hypothesis should be weaker. The inverted U-shaped performance–risk relationship for performance below the aspiration level should be largely linear and negative, and any curvilinear effects should be weak. The proposed positive performance–risk relationship for performance above the aspiration level should also be weaker early in a period than later in it.

This preferential allocation of attention to the aspiration level should decrease as the performance period progresses because of decision makers' considerations of future expectations. When decision makers evaluate performance, they consider not only current performance but expected future performance as well (March and Shapira 1987). They attempt to categorize their future state as either "likely outperforming" or "likely underperforming," and they make decisions based on these prospects (Chen 2008). Recent empirical evidence suggests that the same level of financial performance may result in different levels of R&D expenditures depending on analysts' forecasts of future performance (Chen 2008). Because performance occurs within the context of a performance period, we posit that decision makers will make ongoing estimations about end-of-period performance—that is, whether or not they expect to achieve their aspirations by the associated deadline.

As deadlines become more proximal, estimations of end-of-period performance will vary in at least two ways, and we expect both to result in a less salient aspiration level. First, decision makers are more likely to concern themselves with end-of-period performance expectations as deadlines approach. Classic theories of organizations point to the role that deadlines and urgency play in motivating and enabling change (March and Simon 1958). Awareness of an approaching deadline also acts to change decision makers' cognitive schemata about stimuli such as performance feedback (Staudenmayer et al. 2002). For example, individuals are more concerned with negotiation outcomes as deadlines draw near (Druckman 1994, Stuhlmacher et al. 1998). Project groups are more acutely aware of impending deadlines around the midpoint of a period, and this awareness causes them to take stock of their progress and adjust their behaviors (Gersick 1988, 1989; Labianca et al. 2005; Waller et al. 2002). Construction crews grow more concerned with project completion near a deadline (Humphrey et al. 2004). Organizations often engage in deadline-induced remediation by aggressively hiring prestigious executives and directors closer to their planned IPO date (Chen et al. 2008). This body of research suggests that an approaching deadline may cause decision makers to make choices that are increasingly based on their expectations about future end-of-period performance.

Second, decision makers believe that they are able to make estimations of end-of-period performance with less uncertainty as deadlines approach. Decision makers tend to discount information about outcomes that

are delayed into the future because of the high uncertainty about the occurrences of unforeseen intervening events (Loewenstein and Prelec 1992, Samuelson 1937, Shelley 1994). They also tend to overweight information that they perceive as certain (Allais 1953, Tversky and Kahneman 1992). Preferences for immediacy and certainty appear to operate through a common psychological mechanism (Keren and Roelofsma 1995), and more recent research suggests that delay and uncertainty are indeed equated in the minds of decision makers such that any outcome set in the future "must of necessity entail uncertainty about what the outcome will actually be" (Weber and Chapman 2005, p. 105). In the same vein, managers will estimate end-of-period performance levels with less perceived uncertainty as deadlines draw near. As decision makers develop what they believe to be a clearer "cognitive image" of the future, these estimations should have a greater impact on each decision made (Gavetti and Levinthal 2000).

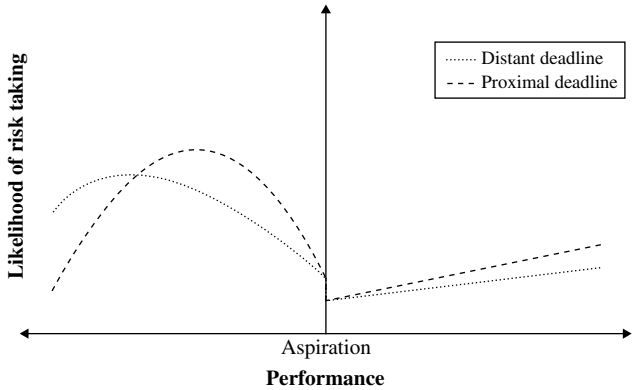
We have argued that as deadlines approach, managers grow increasingly concerned with end-of-period performance and will place greater weight on their estimations because these estimations will be made with less perceived uncertainty. Managers in underperforming firms are more likely to categorize their end-of-period state as likely underperforming; managers in outperforming firms are more likely to categorize their end-of-period state as likely outperforming. As decisions are made in the light of these estimations, the salience of survival increases for underperforming firms and the salience of slack increases for outperforming firms. Attention is consequently more likely to shift from the initial aspiration focus to either survival or slack as deadlines approach.

Increased Salience of Survival for Underperforming Firms. Decision makers in underperforming firms tend to grow increasingly concerned with ensuring the survival of the firm and its reputation as deadlines approach. With less uncertainty than early in the period, they categorize their end-of-period state as likely underperforming, and these expectations will inform ongoing decisions. For the same level of performance below aspirations, ensuring survival will more likely be the focus of attention, and the same performance shortfall that was once interpreted as a "problem" situation to resolve (Cyert and March 1963) will more likely be interpreted as a "threat" to avoid (Staw et al. 1981).

This increased salience of survival produces changes in risk-taking behaviors. Managers in underperforming firms that are focused on survival tend to consider themselves as having less control over aspiration attainment as deadlines approach (Langer 1975, March and Shapira 1987). Perceptions of controllability give managers a certain degree of confidence to aggressively respond to performance shortfalls as repairable discrepancies rather than threats to survival (Boyle and Shapira 2008, Forlani 2002, Mone et al. 1998). When perceived control is high, risk is believed to be more manageable, and decision makers are likely to take greater risks in the face of adversity (March and Shapira 1987). As deadlines approach and perceived control decreases, managers in underperforming firms that are focused on survival should engage in less risky alternatives. A behavioral perspective would argue that these managers fall prey to learned helplessness (Abramson et al. 1980), responding with greater rigidity because they are unable to generate alternatives (Staw et al. 1981). A normative perspective would argue that these managers feel obliged to avoid putting their firms in peril (March and Shapira 1987), and they therefore develop a stronger aversion to taking risks (Lopes 1987). Both perspectives are indeed consistent with the proposition that underperforming firms will exhibit less risk taking when focused on survival (Audia and Greve 2006, Miller and Chen 2004).

The increased salience of survival for underperforming firms implies that the curvilinear risk function proposed earlier for performance below the aspiration level should become stronger as deadlines approach. Hypothesis 1A was derived from the traditional shifting-focus model and assumed that attention was allocated to aspirations or survival on the sole basis of relative distance of performance from the aspiration level. However, we have argued here that the aspiration level should receive a preferential allocation of attention early in a performance period and that survival should receive an increasing allocation as deadlines approach. This means that when deadline proximity is introduced as a moderating variable, the inverted U-shaped performance–risk relationship proposed for performance below the aspiration level should strengthen as deadlines become more proximal (see Figure 1).

Figure 1 Hypothesized Moderating Effects of Deadline Proximity



Notes. The hypothesized moderating effects of deadline proximity are shown. The dotted curves represent the performance–risk relationship early in a performance period, whereas the dashed curves represent the relationship when the deadline is more proximal.

HYPOTHESIS 2 (H2). *For performance below the aspiration level, deadline proximity moderates the performance–risk relationship such that it becomes stronger* (*a more pronounced inverted U-shaped*) *as deadlines approach.*

Increased Salience of Slack for Outperforming Firms. Decision makers in outperforming firms tend to grow increasingly concerned with utilizing slack as deadlines approach. With fewer chances that an unforeseen event will damage the favorable level of performance, a successful finish to the period is expected with less uncertainty. For the same level of performance above aspirations, slack will more likely be the focus of attention, and the same amount of excess resources that was once interpreted as a "success" (Cyert and March 1963) will now more likely be interpreted as an "opportunity" for experimentation (Baum et al. 2005). A shift of attention to slack means that "managers will be more likely to make search decisions based on the amount of slack rather than on recent [financial] performance" and irrespective of "fluctuations in short-term performance" (Chen and Miller 2007, p. 371).

Decision makers respond to this increased salience of slack by taking more risks. When attention is focused on aspirations in the early stages of the performance period, the primary concern of managers in outperforming firms is the avoidance of any risky actions that might cause performance to fall below the aspiration level (March and Shapira 1987). As the deadline approaches and favorable end-of-period performance estimations become less uncertain, managers in outperforming firms should perceive greater control over aspiration attainment. They grow in self-confidence and consider themselves skilled at managing risks (Langer 1975, March and Shapira 1987); this increased perceived control elicits increased risk taking (Forlani 2002). Decision makers believe that they have the luxury to explore new alternatives that might further the organization's success (March 1991, March and Shapira 1992). They engage in behaviors considered too risky earlier in the period because the excess resources can act as a buffer against any possible short-term ebbs and flows of performance (Chen and Miller 2007, Iyer and Miller 2008, Nohria and Gulati 1996). This means that when deadline proximity is introduced as a moderating variable, the proposed positive performance–risk relationship for performance above the aspiration level should strengthen as deadlines become more proximal (see Figure 1).

HYPOTHESIS 3 (H3). *For performance above the aspiration level, deadline proximity moderates the performance–risk relationship such that it becomes stronger* (*more positive*) *as deadlines approach.*

In sum, we have proposed that the relationship between performance and risk taking is inverted U-shaped for performance below the aspiration level and positive for performance above it (Hypotheses 1A and 1B). We have also proposed that deadline proximity moderates these relationships such that they are strengthened as deadlines approach (Hypotheses 2 and 3).

Data and Methods

Study Context

We tested these hypotheses using data from play-by-play decisions made by the 32 franchise teams that comprise the National Football League. (For readers unfamiliar with American football, we provide an overview of the rules in the appendix; for additional details, refer to http://www.nfl.com.) There are several reasons why football games provide an ideal context for testing our hypotheses. First, the game provides a "natural" aspiration level (Greve 2003b) because each team aspires to win the game by having scored at least one point more than the opposing team at the end of the game. Teams with scores far below this aspiration level not only lose the game at hand but also face the threat of losing reputational stock because of adverse publicity and fan reactions. For example, after a series of significant losses during the 1980 season, fans of the New Orleans Saints were prompted to put paper bags over their heads during games because they were embarrassed, players were prompted to deny their membership in the team because they had become "the league's doormats," and the media were prompted to dub the team the "New Orleans Aints" because their performance was so poor (Durso 1987). The firm's reputational stock was depleted, and the focus of attention was likely on avoiding the threat of future embarrassment. The consequences of this poor performance 30 years ago still echo today when the Saints suffer an embarrassing loss (Fleming 1996) and even sometimes when they triumph victoriously (Tenorio 2009). A focus of attention on the survival of its reputation seems evident in their September 24, 2000 contest against the Philadelphia Eagles, a game included in the data set of this study. With a seven-point deficit and two minutes remaining on the clock in the first half, the Saints chose to go for it on fourth down with two yards to go on the Eagles' 42-yard line. However, of the four fourth-down decisions afforded the Saints in the second half before the two-minute warning, they chose to go for it only once, even though they were still trailing in the score. It is unclear whether they were unable to fully consider the nonroutine alternative of going for it because they had become rigid (Staw et al. 1981) or if they were more averse to taking risks later on because they were trying to preserve their reputation and avoid another news headline dubbing them the "Aints" (Lopes 1987). It is clear, however, that in the face of poor performance, they were more likely to go for it early on and through the midpoint of the game than toward the end of the

game. The Eagles, on the other hand, chose to go for it on fourth down with two yards to go on the Saints' 31-yard line with a 14-point lead and 3:27 left on the clock; apparently, they believed their lead was enough of a buffer to warrant the risk. This example highlights the roles of aspirations, survival, and slack in the study context.

Second, each game represents a distinct performance period with a predefined duration and deadline for attaining the aspiration level. Each game lasts 60 minutes, and teams have continuous access to information about the remaining time via the game clock, as well as ongoing feedback about their performance via the scoreboard. Each decision is recorded throughout these performance periods on a decision-by-decision basis, allowing for the examination of changes in risk taking across time within each performance period.

Third, each game provides several opportunities for teams to respond to performance feedback by engaging in risky decisions, and the opportunity for risk taking is especially apparent in fourth-down situations. The risk-averse choice in most fourth-down situations is to either punt the ball or attempt a field goal. The routine nature of these alternatives is evidenced in that teams chose to either punt or attempt a field goal in 89.45% of fourth-down plays in our data set. The most likely outcome in punting the ball is that the opposing team will take possession of the ball on its half of the field (86.79% of all punts resulted in this possession). The most likely outcome in attempting a field goal is success (79.93% of field goal attempts were successful), and the most common outcome in the event of an unsuccessful field goal attempt is that the opposing team takes possession of the ball on its half of the field. By contrast, the risky choice in most fourth-down situations is to go for it. The nonroutine nature of this alternative is evident in that teams chose to attempt a conversion in only 10.55% of all fourth-down plays. The most likely outcome in attempting a fourth-down conversion is that the opposing team will obtain possession of the ball at an advantageous field location. Only 46.00% of conversion attempts in our data set were successful, whereas teams handed possession of the ball over to the opposing team 54.00% of the time.

Fourth, the process through which these risky decisions are made is consistent with traditional conceptualizations of the firm (i.e., Cyert and March 1963, March and Simon 1958). This study context admittedly has several idiosyncratic features such as the fact that teams compete against only one other team at a time, performance is assessed based on winning games rather than on raw point accumulation, the length of each performance period or game is only 60 minutes, referees are constantly present to monitor and regulate plays, and so on. However, several features suggest that the process through which risky decisions are made during a football game is similar to that of most "traditional" organizations. For example, each team comprises distinctly identifiable groups or subunits such as offense, defense, and special teams, each with its own set of coaches. Members of each of these groups on and off the field are able to communicate, coordinate, and deliberate with one another between many decisions of game play. Unlike most other team sports where actions and decisions about next plays are very fluid, emerging almost spontaneously in the natural flow of the game, there is a temporal gap of about 30 seconds between each play in an American football game and teams are able to opt for a timeout so that even more time can be spent considering the various alternatives. In this respect, the episodic process of risky decision making in this study context resembles the information-based decision-making processes observed in a wide range of organizational settings.

Data

Data came from all regular season games played during the 2000–2005 seasons. Each season consists of 17 weeks during which each team plays 16 games. Our original data set consisted of 23,965 fourth-down decisions from 1,520 games.[1, 2] After removing some plays for theoretically significant reasons, our final data set used for analysis consisted of 22,603 fourth-down plays.[3]

Variables

Risk Taking. The variable *risk taking* was measured in terms of an offensive team's choice of play on a fourth down and was coded as a binary variable (0 = no risk taking, i.e., team punted or attempted a field goal on the fourth down; 1 = risk taking, i.e., the team attempted a fourth-down conversion). Punting and kicking the ball were treated equally (as less risky alternatives) for two reasons: first, the choice between the two alternatives is primarily determined by field location rather than performance, and second, it was unclear whether one of these two alternatives is riskier than the other. We do not propose that going for it on fourth down always entails a great deal of risk or that punting the ball or attempting a field goal entails no risk. We argue instead that a fourth-down conversion attempt represents more risk than these alternatives in most situations.

Our operationalization of risk as a binary variable differs from the notion of "bet size," often used to measure the riskiness of decisions in tests of classical utility theory (Samuelson 1937), prospect theory (Kahneman and Tversky 1979), and managerial theories of risk taking (e.g., March and Shapira 1992, Shapira 1995). Even though many decisions do afford organizational members the option to decide how much of their resources they want to place at stake for a given decision (e.g., how much to invest in research and development; see Greve 2003a),

many other decisions of interest do not (e.g., a radio station changing its format, see Greve 1998; a firm deciding to acquire another firm, see Iyer and Miller 2008; a bank choosing to develop a nonlocal syndicate tie, see Baum et al. 2005). Fourth-down decisions are similar to these in that they are binary in nature.

Fourth-down decisions can, however, vary in the level of risk entailed. We have taken this into account by identifying two variables that are especially important for determining the riskiness of a fourth-down decision: *yards to go for first down* and *yards to go for touchdown* (i.e., field location). Recall from our earlier discussion that we consider a decision as risky to the extent that likelihoods are variable and that potential outcomes entail losses. When many yards are needed for a first down, teams are less certain that a conversion attempt will be successful. Running plays designed to move the ball many yards carry a greater chance of a tackle; passing plays, which are often implemented for covering greater distances, carry the possibility of an interception or incompletion. These unpredictable obstacles involved in a longer play make the likelihood of success more uncertain and thus riskier. When many yards are needed for a touchdown (i.e., the field location is far from the opponent's end zone), the potential cost of an unsuccessful fourth-down conversion attempt is greater. An unsuccessful attempt would result in handing the ball over to the opposing team closer to the focal team's end zone, which means the opposing team would have to move the ball a shorter distance to score. Even if the opposing team does not score during that possession, they are within closer proximity of field goal range. That the opposing team would gain possession of the ball at a more desirable field location that is within striking distance for scoring points makes the potential loss of an unsuccessful attempt riskier when there are more yards to go for a touchdown. Therefore, we measured risk taking as the choice to attempt a fourth-down conversion, but we also controlled for yards to go for a first down and yards to go for a touchdown.

Performance. The variable *performance* was measured as the difference between the focal team's score and the opposing team's score plus one point. For example, if the offensive team had six points and the opposing team had nine points, then the offensive team's performance was coded as -4 for that play.

To take into account the different effects of performance below and above aspiration levels, we followed prior research convention (Audia and Greve 2006, Greve 1998) and created a spline function (Greene 1993). Performance at or below the aspiration level ($P \leq AL$) equals 0 when performance is above the aspiration level and equals performance minus aspiration when performance is at or below it. Performance above the aspiration level ($P > AL$) equals 0 when performance is at or below the aspiration level and equals performance minus aspiration when performance is above it. An indicator variable (1 if $P \leq AL$ and 0 if $P > AL$) was also included in each model to allow the curve to "jump" at the aspiration level rather than forcing the two functions to intersect at the same point (Greve 1998). Also included was a squared term (for performance at or below the aspiration, $P^2 \leq AL$) to allow for the proposed curvilinear nature of the performance–risk relationship.

Deadline Proximity. The variable *deadline proximity* was measured as the number of minutes and seconds remaining to play the game at the time of each play. Each game lasts 60 minutes and consists of four 15-minute quarters. Because of qualitative differences between quarters (i.e., there is discontinuity at the end of the second quarter because of the halftime break), we verified the results reported here by repeating the analysis using the number of quarters remaining as the measure of deadline proximity; the results were consistent with what is reported. Thus, we present the results using minutes remaining because this measure offers greater variance.

Control Variables. In addition to the two previously discussed risk-related control variables (i.e., *yards to go for first down* and *yards to go for touchdown*), we included several other control variables that could potentially influence fourth-down decisions in a football game: (a) the total number of points held by the offensive team, because teams may respond differently to the same point spread depending on their total score (e.g., a larger absolute score may instill greater confidence in the ability to score against the opponent at hand); (b) whether the opponent is in the same division or conference, because games played against teams in the same division and conference are more heavily weighted in determining postseason playoff eligibility, and thus more is at stake; (c) home-field advantage, because teams playing in their own stadium may feel more confident as a result of the familiarity of their home environment (Hall et al. 2007); and (d) the week of the game within the overall season, as more may be at stake during later games in the season (e.g., postseason/playoff eligibility).

Data Analysis Model

Given the dichotomous nature of *risk taking*, our dependent variable, data were analyzed using logistic regression models. Fixed-effect estimations were used to account for the unobservable heterogeneity between the 32 teams and also to account for any potential within-year effects over the six years of data. The estimation and tests of coefficient significance were carried out using the xtlogit function in STATA. We report the odds ratios, log likelihood, and chi-square test for each model as evidence of the effects of individual variables and the overall fit of each model. We also report an analysis of marginal effects as a test of our hypotheses.

Table 1 Descriptive Statistics

Variable	Mean	SD	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) *Risk taking*	0.11	0.307										
(2) *Performance* (≤aspiration)	−4.74	6.834	−0.24**									
(3) *Performance* (>aspiration)	2.92	5.633	−0.05**	0.36**								
(4) *Minutes remaining*	30.07	16.633	−0.16**	0.20**	−0.27**							
(5) *Total points*	8.89	8.984	0.01*	0.26**	0.69**	−0.66**						
(6) *Yards to go for 1st down*	7.83	5.841	−0.21**	−0.05**	−0.04**	−0.02**	−0.01*					
(7) *Yards to go for touchdown*	50.31	24.227	−0.23**	−0.01+	−0.03**	0.05**	−0.02*	0.24**				
(8) *Same division*	0.75	0.434	0.00	0.02**	−0.01+	0.01	−0.02**	0.01	0.00			
(9) *Same conference*	0.42	0.493	0.00	−0.01	0.01+	0.00	−0.01	0.00	0.00	0.19**		
(10) *Home-field advantage*	0.49	0.500	0.00	0.12**	0.11**	−0.01+	0.08**	−0.02**	−0.03**	0.01	0.00	
(11) *Week of season*	9.18	4.962	0.03**	0.00	0.00	0.00	0.01	−0.01+	−0.02*	−0.04**	0.05**	0.00

Note. Number of observations (N) = 22,603.
$^{+}p < 0.1$; $^{*}p < 0.05$; $^{**}p < 0.01$.

Results

Table 1 provides play-level descriptive statistics of key independent and control variables, and Table 2 provides a game-level frequency distribution of the fourth-down conversion attempts. The average number of conversion attempts observed per game was 1.57, and most games (76.84%) had at least one conversion attempt. The frequency distribution illustrates the nonroutine nature of fourth-down conversion attempts and also points to the appropriateness of using logistic regression for analyzing the data. Table 3 provides the distribution of fourth-down conversion attempts by quarter and shows that conversion attempts were more likely later in the game. Table 4 provides the distribution of performance across quarters and offers a comparison between fourth-down plays when performance was above and below aspiration levels.

Table 5 provides the results of the logistic regressions using team- and year-level fixed effects.[4] Values provided are odds ratios. Model 1 is the null model with only control variables. The effects of the risk-related control variables were significant as expected. Specifically, the likelihood of a fourth-down conversion attempt was greater when fewer yards were needed for a first down (odds ratio = 0.826, $p < 0.01$) and when fewer yards were needed for a touchdown (odds ratio = 0.976, $p < 0.01$). In addition, the odds ratio for minutes remaining (0.946, $p < 0.01$) suggests that the likelihood of a fourth-down conversion attempt was greater when fewer minutes on the clock remained. Models 2 and 3 show the results of the logistic regression of the hypothesized effects (H1A and H1B in Model 2, and H2 and H3 in Model 3).

Hypothesis 1 proposed that the performance–risk relationship is inverted U-shaped for performance below the aspiration level (H1A) and positive for performance above it (H1B). For this hypothesis to be supported, the coefficients for both below-aspiration terms should be negative (i.e., odds ratios below 1.0) and the coefficient for the above-aspiration term should be positive (i.e., an odds ratio above 1.0). The overall fit of Model 2 was satisfactory (i.e., $LR\,\chi^2 = 3{,}755.00$, $p < 0.01$), and the likelihood ratio (LR) test for improvement over the null model (Model 1) was significant ($\Delta LR\,\chi^2 = 168.87$, $p < 0.01$). For performance at or below aspirations, both the linear and quadratic terms were negative and significant (odds ratio for $P \le AL = 0.883$, $p < 0.01$; odds ratio for $P^2 \le AL = 0.999$, $p < 0.01$), indicating an inverted U-shaped relationship. For performance above the aspiration level, the performance term was not significant. The performance-below-aspiration terms and performance-above-aspiration terms were significantly different from each other ($\chi^2 = 168.87$, $p < 0.01$), indicating a sensitivity to the aspiration level.

Table 2 Frequency Distribution of Total Fourth-Down Conversion Attempts per Game

No. of conversion attempts	Frequency (no. of games)	Percentage	Cumulative percentage
0	352	23.16	23.16
1	474	31.18	54.34
2	382	25.13	79.47
3	167	10.99	90.46
4	99	6.51	96.97
5	33	2.17	99.14
6	7	0.46	99.60
7	5	0.33	99.93
8	1	0.07	100.00

Notes. The number of conversion attempts is the sum of all fourth-down conversion attempts by both teams in a game. $N = 1{,}520$ games.

Table 3 Distribution of Fourth-Down Conversion Attempts by Quarter

Quarter	Total fourth downs	Conversion attempts	Percentage
1	5,280	323	6.12
2	6,532	552	8.45
3	5,267	468	8.89
4	5,524	1,042	18.86
All	22,603	2,385	10.55

Table 4 Distribution of Performance by Quarter

	Performance at or below aspiration level				Performance above aspiration level			
Quarter	*N*	Mean	SD	Min	*N*	Mean	SD	Max
1	4,529	−2.91	3.334	−22	751	4.96	2.777	17
2	4,201	−7.04	5.706	−36	2,231	6.67	4.599	27
3	3,096	−9.78	7.876	−43	2,171	9.37	6.910	41
4	3,063	−11.12	9.263	−50	2,461	10.71	7.959	48
All	14,889	−7.19	7.298	−50	7,714	8.55	6.692	48

Notes. Range values (i.e., Min and Max) indicate distance from the aspiration level. Because the aspiration level is one point ahead of the opponent's score, these values range from −50 to 48 rather than −49 to 49.

Hypothesis 2 proposed that for performance below the aspiration level, the inverted U-shaped performance–risk relationship becomes stronger (more pronounced) as deadlines approach. Hypothesis 3 proposed that for performance above the aspiration level, the positive performance–risk relationship also becomes stronger as deadlines approach. To test for these moderating effects of deadline proximity, interaction terms were created between minutes remaining and each of the three performance variables (i.e., $P \leq AL$, $P^2 \leq AL$, $P > AL$). The overall fit of Model 3 was satisfactory ($LR\,\chi^2 = 4{,}281.62$, $p < 0.01$), and the likelihood ratio test for improvement over Model 2 was also significant ($\Delta\, LR\,\chi^2 = 544.05$, $p < 0.01$). In addition, each of the interaction terms between minutes remaining and performance was significant (odds ratio for $P \leq AL = 1.011$, $p < 0.01$; odds ratio for $P^2 \leq AL = 1.000$, $p < 0.01$; odds ratio for $P > AL = 0.998$, $p < 0.01$). These results are in the expected direction and are necessary to test for support of our hypotheses, but alone, they are insufficient. Because of the intrinsically nonlinear nature of these limited dependent variable models, the impact of an explanatory variable (i.e., the marginal effect of a variable) cannot be assessed simply with the significance of the variable's estimated model coefficient. Instead, the marginal effect of each variable varies with the value of all other model variables.

Table 5 Fixed-Effects Logistic Regression Analysis for the Likelihood of a Fourth-Down Conversion Attempt

Predictor	Model 1	Model 2	Model 3
Total points	0.941** (0.003)	1.007 (0.005)	1.014** (0.005)
Yards to go for 1st down	0.826** (0.006)	0.813** (0.006)	0.801** (0.006)
Yards to go for touchdown	0.976** (0.001)	0.973** (0.001)	0.972** (0.001)
Same division	0.969 (0.054)	1.025 (0.059)	1.046 (0.062)
Same conference	1.008 (0.050)	0.997 (0.051)	0.999 (0.052)
Home-field advantage	1.019 (0.049)	1.177** (0.059)	1.167** (0.060)
Week of season	1.020** (0.005)	1.023** (0.005)	1.026** (0.005)
Minutes remaining	0.946** (0.002)	0.975** (0.002)	1.019** (0.003)
Performance (≤aspiration)		0.883** (0.008)	0.669** (0.012)
Performance^2 (≤aspiration)		0.999** (0.000)	0.993** (0.001)
Performance (>aspiration)		0.994 (0.007)	1.038** (0.010)
Indicator variable		1.120 (0.110)	0.857 (0.092)
Performance (≤aspiration) × *Minutes remaining*			1.011** (0.001)
Performance^2 (≤aspiration) × *Minutes remaining*			1.000** (0.000)
Performance (>aspiration) × *Minutes remaining*			0.998** (0.000)
No. of obs. (*N*)	22,603	22,603	22,603
Log likelihood (*LL*)	−5,959.1881	−5,604.5008	−5,341.1916
$LR\,\chi^2$	3,045.63**	3,755.00**	4,281.62**
df	13	17	20
$\Delta\, LR\,\chi^2$		168.87**	544.05**

Notes. Team-level and year-level fixed effects were included in the analysis. Numbers reported represent odds ratios; standard errors are shown in parentheses.

$^{+}p < 0.1$; $^{*}p < 0.05$; $^{**}p < 0.01$.

To test for these moderating effects of deadline proximity, interaction terms were created between minutes remaining and each of the three performance variables (i.e., $P \leq AL$, $P^2 \leq AL$, $P > AL$). The overall fit of Model 3 was satisfactory ($LR\,\chi^2 = 4{,}281.62$, $p < 0.01$), and the likelihood ratio test for improvement over Model 2 was also significant ($\Delta\, LR\,\chi^2 = 544.05$, $p < 0.01$). In addition, each of the interaction terms between minutes remaining and performance was significant (odds ratio for $P \leq AL = 1.011$, $p < 0.01$; odds ratio for $P^2 \leq AL = 1.000$, $p < 0.01$; odds ratio for $P > AL = 0.998$, $p < 0.01$). These results are in the expected direction and are necessary to test for support of our hypotheses, but alone, they are insufficient. Because of the intrinsically nonlinear nature of these limited dependent variable models, the impact of an explanatory variable (i.e., the marginal effect of a variable) cannot be assessed simply with the significance of the variable's estimated model coefficient. Instead, the marginal effect of each variable varies with the value of all other model variables.

Following Wiersema and Bowen (2009), we conducted a formal analysis of marginal effects in our logistic regression models. Table 6 reports the marginal effect of the performance variable at different levels of performance and for different levels of deadline proximity. Both sets of intervals for which the effects are reported (i.e., 14-point intervals for performance and the middle of each quarter for deadline proximity) are representative of the context of this study. Figure 2 offers a graphical representation of these effects along the entire range of performance at the midpoint of each quarter.

Hypothesis 1 was tested using the marginal effects at the game level (i.e., inclusive of all quarters) estimated from Model 2. The values indicate the change in likelihood of going for it on fourth down based on a one-point positive change in performance. Given that in our context most changes in performance occur in 7-point increments, a discussion of the marginal effects for 7-point increments is most illustrative. If a team is 14 points below its aspiration level and scores a touchdown plus the point after touchdown, leaving the team only 7 points below its aspiration level, the likelihood of

Table 6 Marginal Effects of Performance on the Likelihood of a Fourth-Down Conversion Attempt

	Performance – Aspiration						
	−42	−28	−14	0	14	28	42
All quarters	−0.0026	−0.0044	−0.0039**	−0.0022**	−0.0006**	−0.0004**	−0.0003**
	(0.0062)	(0.0028)	(0.0005)	(0.0003)	(0.0002)	(0.0001)	(0.0000)
1st quarter	−0.0163	−0.0011	0.0004**	0.0066**	−0.0013**	−0.0005**	−0.0002*
	(0.0213)	(0.0009)	(0.0001)	(0.0014)	(0.0002)	(0.0001)	(0.0001)
2nd quarter	−0.0099	−0.0031	−0.0009*	0.0001	−0.0009**	−0.0005**	−0.0003**
	(0.0111)	(0.0022)	(0.0003)	(0.0005)	(0.0002)	(0.0000)	(0.0001)
3rd quarter	0.0068*	−0.0047+	−0.0098**	−0.0036**	−0.0003	−0.0002+	−0.0002*
	(0.0031)	(0.0028)	(0.0008)	(0.0002)	(0.0002)	(0.0001)	(0.0001)
4th quarter	0.0353**	0.0002	−0.0352**	−0.0055**	0.0005*	0.0006+	0.0008
	(0.0020)	(0.0026)	(0.0016)	(0.0004)	(0.0002)	(0.0004)	(0.0006)

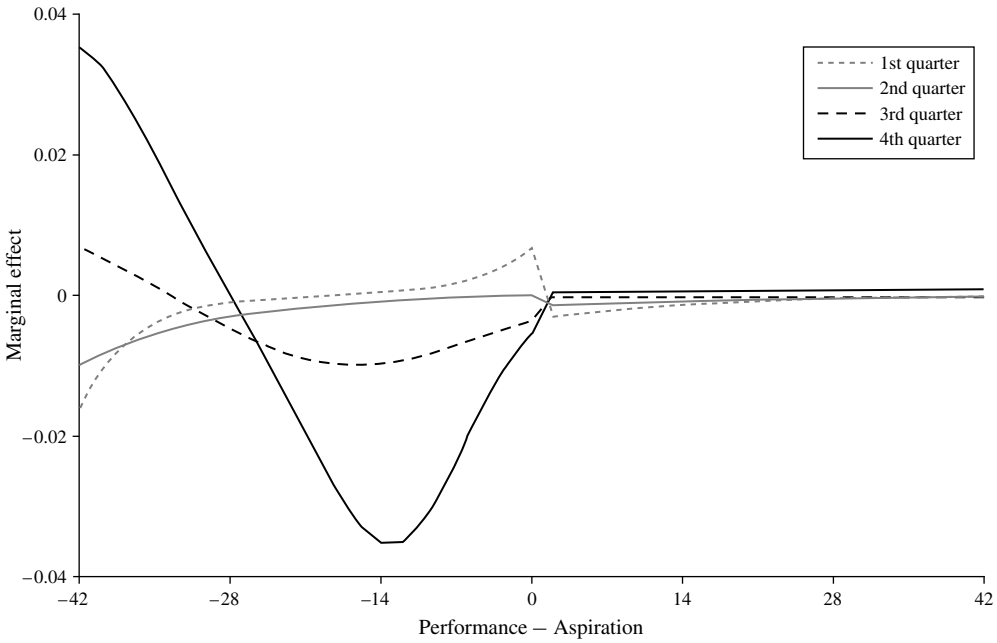
Notes. The marginal effects at the game level (All quarters) were estimated using Model 2. The marginal effects by quarters were estimated using Model 3 while holding minutes remaining at the middle of each quarter (i.e., 53 minutes for the 1st quarter; 38 minutes for the 2nd quarter; 23 minutes for the 3rd quarter; and 8 minutes for the 4th quarter).

$^{+}p < 0.1$; $^{*}p < 0.05$; $^{**}p < 0.01$.

that team going for it on its next fourth down is 2.73% lower (marginal effect at −14 points = −0.0039) than before the touchdown was scored. The marginal effects at the game level suggest support for Hypothesis 1A but not for Hypothesis 1B.

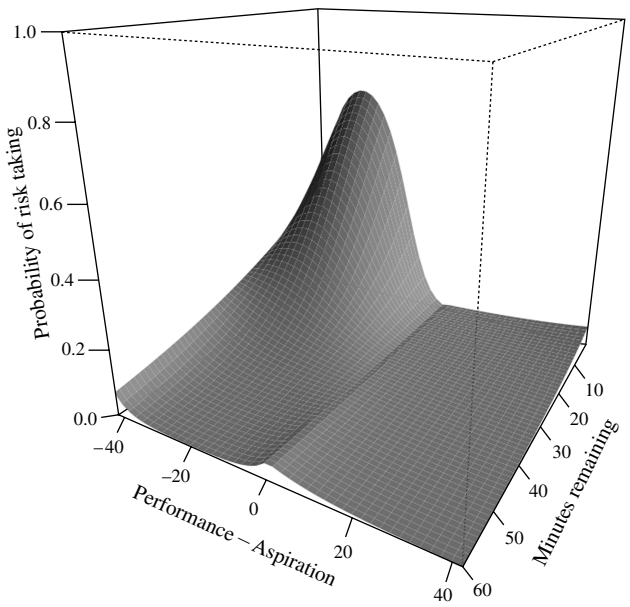
Hypotheses 2 and 3 were tested using the marginal effects by quarter estimated from the Model 3 parameters. For performance below the aspiration level, these values become increasingly negative from the first quarter to the fourth for performance intervals just below the aspiration level, and the values become increasingly positive for performance intervals far below the aspiration level. In the second quarter, if a team is 14 points below its aspiration level and it scores a touchdown plus the point after touchdown, the likelihood of that team going for it on its next fourth down is 0.63% lower than before the touchdown was scored. In the fourth quarter, if a team with the same 14 points below its aspiration level scores a touchdown plus the point after touchdown, the likelihood of that team going for it on its next fourth down is 24.64% lower than before the touchdown was scored. Alternatively, in the fourth quarter, if a team 42 points below its aspiration level scores a touchdown plus the point after touchdown, the likelihood of that

Figure 2 Marginal Effects of Performance on the Likelihood of a Fourth-Down Conversion Attempt



Notes. These marginal effects were estimated using Model 3 while holding minutes remaining constant at the middle of each quarter (i.e., 53 minutes for the 1st quarter; 38 minutes for the 2nd quarter; 23 minutes for the 3rd quarter; and 8 minutes for the 4th quarter). Control variables were held constant at their means.

Figure 3 Summary of Estimated Predicted Probabilities of a Fourth-Down Conversion Attempt



Notes. These values were estimated using Model 3 and show the marginal effects across the entire range of performance and minutes remaining. Control variables were held constant at their means.

team going for it on its next fourth down is 24.71% higher than before the touchdown was scored. Taken together, these values indicate that an inverted U-shaped relationship between point spread and the likelihood of going for it emerges and strengthens as the game progresses. Hypothesis 2 is thus supported. An unexpected finding, the marginal effects were found to be positive and significant in the first quarter for values just below the aspiration level (at -14 points, marginal effect $=$ 0.0004, $p < .01$). For performance above the aspiration level, the marginal effects are negative and significant in first and second quarters and are positive and significant, albeit small, in the fourth quarter. Hypothesis 3 is thus also supported.

Figure 3 is a three-dimensional plot of the estimated predicted probabilities of risk taking across the entire range of values for performance and minutes remaining. For performance below the aspiration level, the performance–risk relationship becomes increasingly negative as the period progresses and fewer minutes remain; as the deadline approaches, an inverted U-shape emerges and strengthens throughout the period. For performance above the aspiration level, the relationship does become positive and also strengthens with deadline proximity, but these effects are weak. Taken together, these lend strong support for Hypothesis 2 and weak support for Hypothesis 3.

Discussion and Conclusion

Risky organizational decisions are frequently made within the confines of performance periods with predefined durations and deadlines for achieving desired levels of performance. We built on the shifting-focus-of-attention model and proposed that deadline proximity regulates the focus of organizational attention by varying the salience of aspirations, survival, and slack. We therefore set out in this paper to examine the moderating effects of deadline proximity on the relationship between performance and risk taking within a performance period. Our hypotheses were largely supported by the results of our analyses of 22,603 fourth-down decisions made by the 32 NFL teams across 1,520 games over six seasons. As expected, the likelihood of a team attempting a risky fourth-down conversion was largely determined by how many points the team had scored relative to its opponent. For performance below the aspiration level, the inverted U-shaped performance–risk relationship was more pronounced the more proximal the deadline; for performance above the aspiration level, the positive performance–risk relationship was more positive. The effects of performance on risk taking were thus moderated by deadline proximity such that the relationship became stronger as the end of each game drew nearer.

Our findings are consistent with our argument that decision makers are primarily concerned with attaining and maintaining aspirations early in a period; however, as deadlines approach, decision makers in underperforming firms are increasingly likely to focus on ensuring survival, whereas decision makers in outperforming firms are increasingly likely to consider experimenting with slack resources. The relationship between performance and risk taking was unexpectedly slightly positive for performance levels just below the aspiration level early in the performance period. It may be that a slight performance shortfall immediately after the commencement of a period elicits a hasty gamble by organizations for which one successful bet would remedy the problem; it may alternatively be an anomaly caused by the performance intervals of the football context. Regardless, this unexpected finding points to the need for a better understanding of how decisions are made in the neighborhood of the aspiration level in the beginning of a performance period.

This study extends our understanding of organizational risk taking in several ways. First, this study demonstrates that the relationship between performance and risk taking varies within a performance period. Prior studies have exclusively examined changes in this relationship from one period to the next and seem to implicitly assume that the relationship remains unchanged within a given period. Although this assumption is reasonable when applied to risky decisions that organizations encounter infrequently (e.g., acquisitions, see Iyer and Miller 2008; entry and exit from market segments, see Greve 1998; initiating new strategic relationships, see Baum et al. 2005), it may be untenable when

applied to risky decisions that organizations encounter far more frequently in their operations. Our findings provide evidence that, for such operational decisions, the relationship between performance and risk taking changes within and throughout a performance period. This study therefore also highlights the importance of carefully considering the nature of risk-taking behaviors that are measured to empirically test theoretical propositions (Miller and Bromiley 1990).

Second, this study identifies deadline proximity as a potential trigger of shifts in the focus of organizational attention. The shifting-focus model and its recent extensions posit that whether attention is focused on aspirations, survival, or slack depends on the relative distance between current performance levels and each reference point. We lend support for these arguments but also extend them by suggesting that the availability of time to make and implement future decisions should be recognized as a unique resource that can prompt switches in the focus of attention as it is depleted. Our findings suggest that attention is preferentially allocated to the aspiration level early in a performance period but is increasingly likely to shift to survival or slack later in the period. This study therefore adds to the growing body of research that seeks to understand the particular conditions under which organizational attention is likely to shift between foci.

Third, this study suggests that theoretical conceptualizations of these foci of attention should take into account the notion of temporally bound performance periods. Our findings demonstrate that even underperformance within a given period can trigger risk-taking behaviors that are consistent with a survival focus. It is, of course, unlikely that underperformance within a single period would cause organizational members to focus on absolute survival, because this would typically require large and cumulative performance shortfalls over multiple periods that threaten the solvency of the firm. Nevertheless, our findings suggest that even within a single period, the perception that end-of-period performance will be short of aspirations might trigger behaviors that are consistent with survival-related concerns. Our findings similarly suggest that outperformance within a single period can trigger risk-taking behaviors that are consistent with a slack focus. The perception that end-of-period performance will exceed aspirations might trigger concerns for leveraging excess resources for purposes other than ensuring success within the given period. This study therefore adds to our understanding of how organizational members interpret reference points within a period.

Despite the strengths of this study, some limitations should be noted. First, the study context might be highly specific, and future research is needed to determine the extent of the generalizability of these findings. There is indeed growing recognition that the competitive processes present in professional sports provide useful insights into organizational behaviors (e.g., professional bowling, see Abrevaya 2002; professional baseball, see Allen et al. 1979; American football, see Carter and Machol 1978; Romer 2006; professional basketball, see Staw and Hoang 1995), and we have noted how the decision-making processes in our study context are consistent with those in many "traditional" organizational contexts. Our findings may be especially generalizable to highly competitive winner-take-all contexts with short performance periods. Second, the study context does not offer a clear way to measure the focus of attention, per se. Aspirations, survival, and slack are typically defined in terms of resource accumulation (Audia and Greve 2006, Bourgeois 1981, March and Shapira 1992), however, and we believe that our methodology is consistent with this conceptualization and that the observed changes in the performance–risk relationship indeed suggest shifts of attention. Future research should seek to explicitly measure the focus of attention; how to measure and even conceptualize the focus of attention on slack should be a high priority given its recent introduction into tests of the shifting-focus model as a third reference point (e.g., Chen and Miller 2007, Iyer and Miller 2008).

This study also points to several questions for future research. First, how might various characteristics of performance periods create variations in the moderating effects of deadline proximity? For example, periods can vary in their duration; the periods examined in this study lasted only 60 minutes, but in other contexts they may last weeks or months or even years. It is possible that longer durations may create more ambiguity among members (Labianca et al. 2005) and therefore weaken the effects of deadline proximity. Deadlines might also vary in terms of whether they are established by internal versus external agents, and it is possible that externally set deadlines may create perceptions of greater rigidity (Waller et al. 2002) and therefore strengthen the effects of deadline proximity. Second, how do shifts in attention occur within each performance period? Punctuated equilibrium models of change and transformation (e.g., Gersick 1991, Tushman and Romanelli 1985, Romanelli and Tushman 1994) suggest that groups, organizations, and even societies sometimes engage in radical rather than gradual change. It is possible that shifts in organizational attention from aspirations to survival or slack might also occur in a punctuated fashion under some conditions. Third, how might different linkages between subsequent periods create variations in the effects of deadline proximity? The games examined in this study were zero-sum or winner-take-all in nature (Frank and Cook 1995), such that each new game started with a clean slate on the scoreboard despite the fact that long-lasting reputations can be shaped based on a single game. Some contexts may alternatively allow for accumulated resources to be carried over from one period to the next and

potentially create weaker effects of deadline proximity. Fourth, how do organizational members interpret performance feedback from a given period in light of higher-order aspirations? Performance periods and their respective aspirations are often hierarchical in nature such that success within a given performance period is instrumental toward the attainment of higher-order aspirations. For example, an annual financial performance period is made up of quarterly financial performance periods, and in the current context, a team's seasonal performance is made up of its performance across several games. The higher- and lower-order periods are each likely to be temporally bound by some form of deadline, and future research should examine how the two might work together to affect risk taking in organizations.

Although this study offers a descriptive theory of what firms do, it stands to offer useful insights for the practicing manager as well. The management of risk is a critical managerial function (March and Shapira 1987, Miller and Chen 2004), and this study suggests that efforts to encourage desirable as well as mitigate undesirable risk taking must take into account the role of deadline proximity. Managers may be able to encourage desirable risk taking by imposing deadlines (March and Simon 1958), adjusting the typicality of their times and dates (Labianca et al. 2005), modifying employee reminders about the proximity of deadlines (Waller et al. 2002), or creating temporal shifts that enable the consideration of new alternatives (Staudenmayer et al. 2002). Risk taking can also be managed by controlling whether performance feedback is framed in terms of attaining and maintaining aspirations, avoiding threats, or experimenting with excess resources. However risk taking is managed, the role of performance, attention, *and* deadlines should be considered when doing so.

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Appendix

Basic Rules of American Football
This text is reprinted from Romer (2006, pp. 363–364) and describes the basic rules of American football that are relevant to this study. Complete rules of the game can be found at http://www.nfl.com.

"A football field is 100 yards long. Each team defends its own goal line and attempts to move the ball toward its opponent's. The yard lines are numbered starting at each goal line and are referred to according to which team's goal line they are closer to. Thus, for example, the yard line 20 yards from one team's goal line is referred to as that team's 20-yard line.

"The game begins with a kickoff: one team puts the ball in play by kicking the ball from its own 30-yard line to the other team. After the kickoff, the team with the ball has four plays, or downs, to move the ball 10 yards. If at any point it gains the 10 yards, it begins a new set of four downs. Plays are referred to by the down, number of yards to go for a first down, and location. For example, suppose that the receiving team returns the opening kickoff to its 25-yard line. Then it has first and 10 on its own 25. If it advances the ball 5 yards on the first play, it has second and 5 on its own 30. If it advances 8 yards on the next play (for a total of 13), it now has first and 10 on its own 38. The team with the ball is referred to as the offense, the other team as the defense. If a team advances the ball across its opponent's goal line, it scores a touchdown. A touchdown gives the team 6 points and an opportunity to try for an extra point, which almost always produces 1 point. If a team has a first and 10 within 10 yards of its opponent's goal line, it cannot advance 10 yards without scoring a touchdown. In this case, the team is said to have first and goal rather than first and 10.

"On fourth down, the offense has three choices. First, it can attempt a conventional play. If the play fails to produce a first down or touchdown, the defense gets a first down where the play ends. Second, it can kick (or 'punt') the ball to the defense; this usually gives the defense a first down, but at a less advantageous point on the field. Third, it can attempt to kick the ball through the uprights located 10 yards behind the opponent's goal line (a 'field goal'). If it succeeds, it scores 3 points. If it fails, the defense gets a first down at the point where the kick was made, which is normally 8 yards farther from its goal line than when the play started. (If the field goal was attempted from less than 20 yards from the goal line, however, the defense gets a first down on its 20-yard line rather than at the point of the attempt.) After either a touchdown or a field goal, the scoring team kicks off from its 30-yard line, as at the beginning of the game. The final (and by far the least common) way to score is a safety: if the offense is pushed back across its own goal line, the defense scores 2 points, and the offense puts the ball in play by kicking to the other team from its 20-yard line (a 'free kick').

"The game is divided into four 15-minute periods. At the beginnings of the second and fourth quarters, play continues at the point where it left off. At the beginning of the third quarter, however, play begins afresh with a kickoff by the team that did not kick off at the beginning of the game."

Endnotes
[1]Pre- and postseason games were not included in the data set because such games likely hold different meanings for teams (Romer 2006), and thus, patterns in risk taking throughout pre- and postseason games may be substantially different from regular season games.

[2]Fourth-down decisions that occurred during overtime periods were also excluded from the data set. If the two teams are tied (have equal scores) at the end of the regular performance period, an overtime period is played in a "sudden-death" format in which the first team to score any number of points in any way wins the game. However, they were not included in the data set because the rules of the overtime period are different, and performance may take on different meanings.

[3]Previous research in this same context (e.g., Romer 2006) suggests that the meaning of risk may change very late in the game. For example, a fourth-down conversion attempt is still

the riskier alternative if the other team or both teams have an opportunity for another ball possession and, hence, another opportunity to affect the score. However, going for it may actually be the less risky alternative if no additional possessions are possible. In American football, there is a two-minute warning at the end of the fourth quarter that indeed makes the end of the game and the reduced opportunities to possess the ball very salient to teams. Because of the qualitative difference with these last two minutes of the game, we have removed the last two minutes of each game so as to present a more conservative test of our hypotheses. In total, 1,362 data points were removed as a result.

[4]Additional analyses for robustness are available by request from the authors. These analyses include an "alternative aspiration level" to test whether teams aspire to simply attain more points than their opponent or to maintain recently held point spreads. They also include separate models for a conversion-attempt-versus-kick decision when within field goal range and for a conversion-attempt-versus-punt decision when outside field goal range. In all cases, the results are qualitatively consistent with what is reported in this paper.

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