Stretch Goals and the Distribution of Performance

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ABSTRACT

Many academics, consultants and managers advocate stretch goals to attain superior organizational performance. However, there is limited research exploring the effects of stretch goals on the distribution of performance. We explore the effects of goal difficulty on the mean, variance, and skewness of performance in two experimental studies. Participants were given either moderate or stretch goals for profit in a widely used management simulation with realistic dynamics. The stretch goals were achievable and well below optimal. Compared to moderate goals, stretch goals improved performance for a few, while most implemented policies that inadvertently led to bankruptcy, or, faced with that risk, abandoned the goal. Consequently, stretch goals led to higher performance variance and a right-skewed performance distribution but did not improve median performance. As a result of higher variance, stretch goals also led to lower risk adjusted performance. Furthermore, stretch goals generated large attainment discrepancies that increased perceived risk taking and undermined goal commitment. These two mechanisms help explain how stretch goals lead to high variance and a right skewed performance distribution. In complex environments, finding and following strategies to realize stretch goals is difficult and risky, and, instead, some managers adopt lower self-set goals or focus on survival. Depending on the risk preferences of managers, stretch goals might therefore be suboptimal even though a few organizations benefit. These findings extend theory on organizational goals and suggest caveats for the adoption of stretch goals.

Key Words: Goals, stretch objectives, aspirations, performance variance, skewed distribution

1.   Introduction

Goals or aspiration levels have long played an important role in organization theory (e.g., Cyert and March 1963; Simon 1964) and are central to understanding organizational decision making processes (Boyle and Shapira 2012; Sitkin, See, Miller, Lawless and Carton 2011). Goals shape how managers and workers interpret organizational performance, frame strategic responses, search for solutions, and, through performance feedback, adjust aspirations (Argote and Greve 2007; Barlas and Yasarcan 2008; Lant and Shapira 2008; Lant 1992; Martinez-Moyano, McCaffrey and Oliva *Forthcoming;* Mezias, Chen and Murphy 2002).

Many managers, consultants and academics advocate the use of stretch goals to improve organizational performance (Sitkin et al. 2011). Ambitious, stretch goals (sometimes called "BHAGs" – Big Hairy Audacious Goals) are intended to improve performance by disrupting complacency, promoting new ways of thinking, stimulating search and innovation, energizing employees, and guiding effort and persistence (for a recent review see Shinkle 2011). However, despite commentaries and cases extolling these benefits of stretch goals (for example, Collins and Porras 2002; Kerr and Landauer 2004; Peters and Waterman 1982; Slater 1999; Thompson, Hochwarter and Mathys 1997), there is limited evidence for these effects of stretch goals on organizational performance.

Contrary to the practitioner literature, which generally urges the adoption of stretch goals, research on goals questions whether stretch goals are always beneficial. By definition, stretch goals are difficult to achieve and, therefore, lead to substantial and persistent attainment discrepancies, which can have dysfunctional effects.

First, Sitkin et al. (2011) note that the search for high-performing strategies, motivated by stretch goals, can fail, implying that stretch goals could increase the variance in performance. Similarly, performance below aspirations increases the probability of risky organizational changes (Greve 1998; Lant and Shapira 2008) and risk taking more generally (Bromiley, Miller and Rau 2001). High risk taking can boost pay offs for some, while increasing the probability of low performance outcomes (Bromiley 1991; Larrick, Heath and Wu 2009), also increasing performance variance.

Second, although risk taking sometimes offers a large upside (some bets can yield huge pay-offs), the losses when those risks do not pay off are typically bounded. Organization failure (e.g.,

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bankruptcy) provides one lower bound to performance. And managers facing the risk of failure often abandon stretch goals in favor of the goal of survival (Boyle and Shapira 2012; March and Shapira 1987). By minimizing risk, managers focusing on survival constrain the distribution of low performance outcomes. Therefore, to the extent stretch goals increase risk taking they may generate a right-skewed performance distribution across organizations.

The effects of stretch goals on the variance and skewness of the distribution of performance have neither been explored theoretically nor investigated empirically. Typically, strategy and organization theory research restrict the analysis of performance to investigating differences in levels of performance (i.e., the mean effects) associated with different strategic and organizational choices[1]. Consequently, knowledge about how different strategic choices, including adopting stretch goals, affect performance distributions is limited (Andriani and McKelvey 2009; Mosakowski 1998). In this paper we begin to explore impacts of goals on the variance and skewness in organizational performance, focusing on the effects of stretch goals. The question guiding this research is:

> *What is the effect of organizational goal difficulty on the distribution of performance,*
> *including mean, variance, and skewness?*

To explore this question, we investigate the effects of goal difficulty on performance in two laboratory experiments employing a widely used, realistic business simulation. Participants take the role of the CEO entrepreneur leading a start-up in a mature industry making decisions in a complex market environment. We vary goals for financial performance to examine how stretch compared with moderate goals affect organizational performance.

2.   Relationship between Goal Difficulty and Performance

Two major research streams examine the relationship between goals and performance. The first research stream is grounded in the Carnegie tradition and shows that managers respond to attainment discrepancies–the difference between goals and actual performance–by engaging in varying levels of search and aspiration adjustment (Argote and Greve 2007; Cyert and March 1963). Together the

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[1] Exceptions include the work on risk taking examining the relationship between longitudinal variance in firm-specific returns and performance (Bromley et al. 2001) and the simulation work on exploration and exploitation in organizational learning (March 1991).

mechanisms of search and aspiration adjustment act to eliminate the attainment discrepancy between the aspirations and performance over time (Lant and Shapira 2008).

The second research stream flows from organizational psychology and provides empirical evidence that specific, challenging goals increase performance on well-structured tasks compared with Do-Your-Best goals (for reviews of this extensive research area see: Locke and Latham 2002, 2013). The motivational effect of specific, challenging goals is the primary mechanism driving performance improvements on well-structured tasks (Wood and Locke 1990).

Findings from these two research streams have advanced our understanding about the relationship between goals and performance. However, there has been limited theoretical analysis or empirical examination of the effects of stretch goals on the variance and skewness in organizational performance. Our work builds on these two research streams by examining the effects of stretch goals on the distribution of performance across organizations (i.e., mean, variance, and skewness). The focus is on contributing to the literature on organizational goals. First, we examine the effect of stretch goals on the variance in organizational performance. Second, we extend the analysis to examine the effect of stretch goals on the skewness in performance. Third, we examine the effect of stretch goals on the expected level of organizational performance, specifically, the goal main effect. The combined effects of stretch goals on the variance in and skewness of performance challenge the widely assumed positive goal main effect on organizational performance.

2.1   Stretch Goals and Performance Variance

Sitkin et al. (2011) theorize that stretch goals have positive performance effects for high performing organizations with slack and negative performance effects for low performing organizations without slack. The implication is that adopting stretch goals increases performance variance across organizations. Two mechanisms help explain this impact of stretch goals on variance in performance: risk taking and goal commitment.

First, performance below a goal increases risk taking, including search for and implementation of new, untested strategies and organizational changes—as long as performance is safely above the survival point (Argote and Greve 2007; Bromiley et al. 2001; March and Shapira 1987). Stretch

compared with moderate goals create larger attainment discrepancies and therefore higher risk taking (Knight, Durham and Locke 2001). Taking more risk involves more extensive search for and trials of new strategic options in attempts to reduce attainment discrepancy (Bromiley et al. 2001; Greve 1998, 2003). The search process generates a wide range of potential strategies with different performance payoffs (Siggelkow and Rivkin 2006; Winter, Cattani and Dorsch 2007). By increasing risk taking, stretch goals can generate higher performance variance across organizations.

The second mechanism is that managers, facing large and sustained shortfalls in performance relative to a goal, reduce their commitment to those goals (Klein and Kim 1998). While some managers maintain high goal commitment and continue to pursue the objective, others become discouraged by failure and decrease their commitment to the goal. Stretch goals are motivating for the former group of managers (Sitkin et al. 2011). For the latter group, repeated failure to achieve stretch performance goals erodes self-efficacy and motivation, increases anxiety and stress, and reduces learning, goal commitment and performance. By inducing differences in goal commitment among managers, stretch goals can increase the variance in organizational performance.

Taken together, we hypothesize that these processes lead to higher performance variance for managers with stretch goals compared with moderate goals:

> *Hypothesis 1: Stretch compared with moderate organizational goals generate higher variance in performance.*

2.2 Stretch Goals and Skewness in Performance

Advocates of stretch goals typically assume that formally assigned organizational goals become the operational goals guiding managerial behavior. This assumption is valid for managers achieving performance near or above the assigned goal. They are likely to stay focused on the assigned goal. In the absence of disruptive changes in the environment, their performance remains at or above the assigned goal and the assigned goal remains the operational goal.

However, the assumption is not valid for managers performing persistently and significantly below the formal goals. Particularly in complex dynamic environments, search frequently does not yield superior strategies (Gary and Wood 2011; Sterman 2006). For example, it is difficult to determine which components of a successful strategy actually generate high performance (Fang

2012), and the presence of multiple local optima (a rugged strategy-performance landscape) degrades the efficacy of many search heuristics (e.g., Siggelkow and Rivkin 2006). Therefore, in complex environments many managers will not identify high-performing strategies that achieve stretch goals. Substantial and persistent performance shortfalls decrease goal commitment and lead to downward aspiration adjustment to reduce the attainment discrepancy (Forrester 1975; Lant 1992; Mezias et al. 2002). Instead of continuing to search and learn from performance feedback, these managers seek to sustain their self-image by assessing performance as satisfactory (Jordan and Audia 2012). Over time, current performance levels become the 'goal adopted in practice', replacing the assigned goals.

Some of these less successful managers adopt very poor strategies and face a threat to the survival of the organization (e.g., bankruptcy). These managers replace the assigned goal with the goal of survival (Boyle and Shapira 2012; March and Shapira 1987, 1992). Shifting to a survival goal converts a large negative attainment discrepancy ('I'm falling far short of the assigned goal,') into a small positive gap ('I'm not dead yet,'). Attempting to survive, these managers minimize risk. Local search dominates strategy development, learning is limited, and mental models become rigid (Bromiley 1991; Bromiley et al. 2001; March and Shapira 1992). Although some of these managers still go bankrupt, many survive, truncating the left (low performance) tail of the performance distribution.

Managers faced with persistent attainment gaps reduce the dissonance through goal erosion. Others, facing the risk of bankruptcy, adopt survival goals. Through these processes, stretch goals can generate a right skewed performance distribution. Some organizations achieve the stretch goals, a few go bankrupt or hover near bankruptcy, and most perform below the stretch goals but survive.

> *Hypothesis 2: Compared with moderate goals, stretch goals generate right-skewed performance distributions.*

2.3 Stretch Goals and Expected Organizational Performance

Research on goal setting in organizational psychology reports that specific, challenging goals increase performance on well-structured tasks compared with Do-Your-Best goals (Locke and Latham 1990, 2002). On these tasks, motivation positively influences performance by directing increased effort and attention towards achieving the goals. Advocates of stretch organizational goals make

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similar assumptions. They argue that stretch goals improve performance by disrupting complacency, promoting new ways of thinking, and increasing energy levels throughout the organization (Rousseau 1997; Slater 1999; Thompson et al. 1997).

However, in complex tasks, effort alone is not sufficient to increase performance. A meta-analysis of goal setting studies by Wood, Mento and Locke (1987) shows the magnitude of the goal-effect on performance decreases as task complexity increases. Difficult goals sometimes improve performance on complex tasks with multiple alternative strategies, but they also can decrease performance due to excessive searching (Earley, Connolly and Ekegren 1989; Wood et al. 1987). The combinatorial and dynamic complexity (Rivkin 2000; Sterman 2006) of typical business strategies is far greater than that in the tasks reviewed by Wood et al. (1987).

In addition, more difficult goals are associated with dysfunctional strategic persistence following radical environmental change (Audia, Locke and Smith 2000). Also, the Ordóñez, Schweitzer, Galinsky and Bazerman (2009) review argues that the beneficial effects of challenging goals have been overstated and that such goals can cause systematic harm. Similarly, Sitkin et al. (2011) argue that stretch goals reduce the performance of poor performing organizations with limited slack resources. Paradoxically, Sitkin et al. propose that these organizations are the most likely to adopt stretch goals in their efforts to boost performance.

The analysis above is inconclusive about the direction of the effect of stretch goals on the expected level of organizational performance. Adopting stretch goals increases the proportion of organizations that experience an attainment discrepancy. If goal commitment remains high, the motivational impacts of the discrepancy are strong, and search is likely to yield better strategies, then expected performance should increase. Alternatively, if the attainment discrepancy erodes goal commitment and motivation, or complexity leads to selection of poor strategies, then stretch goals reduce performance. As a default option, we adopt the generally accepted hypothesis of a positive performance effect of stretch compared with moderate organizational goals.

Hypothesis 3a: Stretch compared with moderate organizational goals increase performance.

Even if there is a positive main effect of stretch goals on performance, the arguments above regarding risk taking, eroding goal commitment, and the chance of selecting a poor strategy in

complex settings suggest the variance of outcomes may increase. If stretch goals increase the variance in outcomes (Hypothesis 1), risk-adjusted performance may actually fall even if stretch goals increase mean performance. Mosakowski (1998) speculated that the increase in performance achieved by adopting more difficult goals might be off-set by increasing risk. Depending on the risk preferences of managers, stretch goals might therefore be suboptimal and unattractive to managers even if they increase expected performance, particularly for managers who are risk neutral or risk averse.

Alternatively, if stretch goals increase mean performance more than they increase variance, then stretch compared with moderate goals would result in higher risk-adjusted performance. Consistent with Hypothesis 3a, we adopt the hypothesis of a positive risk-adjusted performance effect of stretch compared with moderate goals.

Hypothesis 3b: Stretch compared with moderate organizational goals increase risk-adjusted performance.

Figure 1 illustrates the hypothesized effects of stretch compared with moderate goals on the distribution of organizational performance. The top part of the figure shows the conventional wisdom regarding the impact of stretch goals on performance, specifically that stretch goals shift the performance distribution to the right while leaving the variance and skewness unchanged. The bottom part of Figure 1 shows the same hypothetical distribution for moderate goals and an alternative distribution under stretch goals with higher variance, increased right-skewness, and higher median performance resulting from the processes discussed above.

[Insert Figure 1]

3.   Methodology

We test these hypotheses through two experiments in which participants manage a simulated organization, with random assignment to stretch and moderate goal conditions.

3.1   The Simulated Organization

The People Express simulation is an interactive, computer-based management simulation of an airline operating in a competitive market. Participants take on the role of the Chief Executive Officer (CEO) of a start-up airline, making quarterly decisions for aircraft orders, employee hiring, average

fare, marketing expenditure and service scope. Their goals are to deliver on stretch or moderate profit goals over a forty-quarter simulation.

The management simulation is based on a real organization, People Express Airlines, and replicates many aspects of the business decision-making environment faced by managers in the actual organization. The competitive context includes a large number of interdependent variables with multiple feedback effects, time delays, nonlinear relationships, and accumulations (Graham, Morecroft, Senge and Sterman 1992). These features are common in the complex environments that managers operate in when making strategic decisions. The simulation has also been utilized in previous research (Bakken, Gould-Kreutzer and Kim 1992; Graham et al. 1992), and is used frequently in MBA and executive teaching.

Growing the simulated airline from startup to major carrier involves a number of trade-offs. For example, setting low fares increases customer demand. Rising demand can be met by expanding the fleet. However, meeting rising demand also requires employees who can provide high quality service, including reservations, check-in, boarding and de-boarding, baggage handling, and in-flight services. But expanding both the number and skills of employees takes time. Hiring and training delays can result in staffing shortages and skill dilution as decision makers seek to grow their fleet and customer base. Staff and skill shortfalls increase the workload, leading to long hours, fatigue and burnout. These factors increase employee turnover–further worsening working hours for the remaining employees–and increase the time experienced employees must spend recruiting and training new employees in a vicious cycle. New recruits are less skilled than experienced employees and, as the proportion of new recruits increases, average service quality decreases, undermining the reputation of the business in the marketplace, eroding demand growth and financial performance, with potentially irreversible outcomes.

If decision makers succeed in growing the business, competitors respond by cutting their fares to limit market share loss. Despite these difficulties, if decision makers adopt an appropriate strategy, it is possible to grow the airline profitably. Consistent with the simulation, the majority of low-cost, no-frills airlines have failed, both in the US and Europe (Button 2012). A few have survived (e.g., RyanAir, Spirit) and even fewer have profitably achieved scale (e.g., Southwest Airlines).

4. Study 1

To test Hypotheses 1-3, we designed an experimental study in which organizational profit goals are varied. Specifically, we investigate the effects on performance of stretch compared with moderate (more easily achieved) organizational goals.

4.1 Study 1 Participants

A group of 134 managers enrolled in an Executive MBA course participated in the simulation as a class exercise. The managers' average age was 36 and average work experience was greater than 10 years. They were randomly assigned to 50 teams with two or three members. There were 34 teams of three and 16 teams of two managers. Teams were randomly assigned either a stretch profit goal (n = 25) or moderate profit goal (n = 25). There were no differences in performance between groups composed of two or three members.

4.2 Study 1 Procedures

We adopt net income (profit) as the organizational performance measure for the simulated firm. Teams in the stretch (moderate) goal group were told, "The Board of Directors has set your Cumulative Net Income target equal to $315 ($60) million by the end of 10 years. This long term growth in profit will deliver the financial results that our shareholders expect." The stretch (moderate) goal represents a 38 %/year (22%/year) compound annual growth rate in cumulative profit. Both goal levels are achievable with a range of strategies. The stretch goal was based on the 90th percentile performance levels achieved in pilot tests in which decision makers were instructed "Do Your Best to maximize Cumulative Net income".

Teams were instructed to complete three simulation rounds (decision trials) of 40 quarters each, comprising 30 years of simulated experience. After each decision trial, participants received outcome feedback on their results for that trial plus their cumulative performance in all trials to date. After each simulation round of 40 quarters, the simulation was reset to the same initial values and the next simulation round began. Although the simulation is deterministic, the outcomes could be, and were, very different because different decisions result in different simulated responses of competitors, customers and employees. Ten teams only had time for two simulation rounds and one observation

(i.e., one team) was dropped from the analysis because the team made a data entry error in the simulation. Therefore all reported analyses are based on the 39 teams that completed all three rounds.

4.3 Study 1 Results

All hypotheses were tested using the performance data for the third simulation round, after the two learning rounds. For those participants whose firms go bankrupt, we use cumulative profit from the quarter in which the simulated organization goes bankrupt as the measure of performance for that year (note that, per standard accounting rules, bankruptcy occurs if firm *equity* falls below zero; cumulative net income when bankruptcy occurs can be negative or positive). Hypothesis 1 is examined with the Levene test for equality of variances between the stretch and moderate goal groups for Year 10 of the simulation. The Levene test does not require normality of the underlying data. To test Hypothesis 2, we use the D'Agostino Skewness test to compare the two goal conditions.

Hypothesis 3a is assessed using the Mann-Whitney nonparametric test, which does not require a normal distribution for cumulative profit. For continuous response variables, as in this case, a significant Mann-Whitney test indicates a significant difference in medians. As a robustness test, a median regression model is also estimated for Year 10 cumulative profit with the goal condition (moderate or stretch) as the independent variable and standard errors computed from 5,000 bootstrapping samples.

To assess Hypothesis 3b, we calculate the Sharpe ratio for each condition (the ratio of mean performance divided by the standard deviation for all teams in each condition) and compute the difference between the two. The Sharpe ratio is widely used in empirical finance to assess risk-adjusted performance (Sharpe 1994). We evaluate the null that the Sharpe ratios are equal in the two goal conditions by estimating the 95% confidence interval of the difference between the two ratios from 5,000 bootstrapping samples.

Figure 2 presents the performance distributions for cumulative profit in Year 10. Performance in the moderate goal condition does not depart from a normal distribution (Kolmogorov–Smirnov D[18] = .20, p = .07). In contrast, performance in the stretch goal condition is not normally distributed (Kolmogorov–Smirnov D[21] = .26, p < .01). In the moderate goal condition, 61% of the teams meet

or exceed the long run profit goal, 33% go bankrupt and the remaining 6% avoid bankruptcy but fall short of the goal. For decision makers assigned stretch goals, 19% meet or exceed the goal, 43% go bankrupt and the remaining 38% avoid bankruptcy but fall short of the goal.

[Insert Figure 2 here]

As a manipulation check of whether the stretch and moderate goals constitute substantively different levels of difficulty, we test whether the attainment discrepancy is statistically significantly different between the two conditions. The attainment discrepancy is the difference between actual performance and the goal (Lant 1992). Decision makers assigned stretch goals experience significantly larger attainment discrepancies (median attainment discrepancy = –\$309 million) compared with subjects in the moderate goal group (median discrepancy = +\$60 million) (Mann-Whitney's U = 75.00, z = -3.21, p < .01). The stretch goal is significantly harder to achieve than the moderate goal.

Tests of Hypotheses. Hypothesis 1, *Stretch compared with moderate organizational goals generate higher variance in performance*, is supported. At the end of Year 10, decision makers assigned stretch compared with moderate goals exhibit significantly higher performance variance (SD = \$219 million versus \$113 million: L[1, 37] = 8.29, p < .01).

Hypothesis 2, *Stretch organizational goals generate right-skewed performance distributions*, is marginally supported (one-sided D'Agostino skewness test, skewness = .87, z = 1.23, p = .107). In contrast, the performance distribution for moderate goals is not skewed (D'Agostino skewness = .36, z = .51, p = .30).

Hypothesis 3a, *Stretch compared with moderate organizational goals increase performance*, is not supported. Median performance under stretch goals (\$6 million) is not significantly higher than median performance under moderate goals (\$120 million) (Mann-Whitney's U = 180.00, z = -0.25, p = .81). As a robustness test, median (quantile) regression estimates for the effect of Goal Condition on median performance show that goal condition is not a significant predictor of median performance

($\beta_{\text{Goal\_Condition}}$ = -106.39, bootstrapped S.E. = 104.16, 95% Conf. Int. [-310.54, 97.76], pseudo R^2 = 0.03)[2].

Hypothesis 3b, *Stretch compared with moderate organizational goals increase risk-adjusted performance*, is not supported. The Sharpe Ratio for the stretch goal group is 0.66 compared to 1.00 for the moderate goal group; a lower value of risk-adjusted return under stretch compared with moderate goals which is opposite to the direction hypothesized. The difference between these Sharpe Ratios is not significant (Δ = 0.334, bootstrapped S.E. = 0.318, z = 1.05, 95% Bias Corr. Conf. Int. [-.2269807, 1.0279]).

5.   Study 2

In Study 2 we replicate the tests of Hypotheses 1-3 in Study 1 and extend that analysis to investigate the causal mechanisms connecting goals and the distribution of performance. Specifically, we examine how stretch compared with moderate goals affect Perceived Risk Taking and Goal Commitment using survey instruments. In Study 1, stretch goals led to larger attainment discrepancies than moderate goals. Large and persistent attainment discrepancies affect both risk taking and goal commitment. Research shows that larger attainment discrepancies increase risk taking (i.e., more extensive search for new strategies). For example, performance below aspirations increases the probability of risky organizational changes (Greve 1998; Lant and Shapira 2008) and risk taking more generally (Bromiley 1991; Bromiley et al. 2001; Larrick et al. 2009).

Hypothesis 4: Stretch compared with moderate organizational goals increase perceived risk taking.

Goal commitment is the determination to try for a goal and unwillingness to abandon or lower that goal. Large and persistent attainment discrepancies may undermine goal commitment if people come to believe the goal is not attainable (Hollenbeck and Klein 1987). Goals have no motivational effect if there is no commitment (Klein, Wesson, Hollenbeck, Wright and DeShon 2001). In addition, lower goal commitment indicates a greater willingness to abandon or lower the goal. When search

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[2] The model estimated was: **Performance = α + β(Goal Condition) + ϵ.**

does not prove effective, decision makers reduce the attainment discrepancy by adjusting aspirations downwards, converging over time on actual performance (Lant 1992; Mezias et al. 2002).

Hypothesis 5: Stretch compared with moderate organizational goals decrease goal commitment.

5.1 Study 2 Participants

Fifty-nine students from a large university participated in Study 2. Participants averaged 22 years of age, with 53% female. Eighteen percent were majoring in economics, 24 percent were majoring in management (i.e., marketing, accounting, finance, strategy, IT management, and organizational behavior) with the others majoring in a broad range of other fields. Individual participants were randomly assigned stretch (n = 30) or moderate (n = 29) profit goals.

5.2 Study 2 Procedure

Procedures are the same as in Study 1 with the following changes. Rather than teams, each participant followed instructions on an individual computer and managed their simulated firm independently. At the start of each lab session, the experimenter read the instructions aloud and participants then spent 25 minutes working through a set of introductory exercises to become familiar with the simulation[3]. After completing the introductory exercises, each participant received the performance goals for their simulated firm and completed a questionnaire to assess their perceived risk taking and goal commitment prior to beginning the first simulation round.

The same procedure was repeated for the second and third rounds. The first two rounds were treated as a learning phase. Therefore, prior to the third round testing phase, decision makers potentially had 80 decision trials, two complete simulation rounds of 40 quarters each, or twenty years of simulated experience, to learn about the management simulation and discover effective strategies.

Goal Manipulation: Study 1 examines the effect of stretch compared with moderate distal goals on cumulative profit at the end of 10 years. Distal goals are goals that are distant in time, while proximal goals are closer in time to the current situation, for example, profit for the end of the current year. Research shows that proximal goals are more effective than distal goals for complex tasks

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[3] The exercises are available upon request (and could be made available online).

(Latham and Seijts 1999). In complex settings, it is frequently difficult to understand how current decisions affect outcomes far in the future.

Combining proximal and distal goals may improve performance, particularly when goals are challenging, because proximal goals provide decision makers with more frequent and immediate feedback on goal attainment, potentially enabling them to make mid-course corrections early enough to attain the distal goal. Study 2 examines the robustness of the findings of Study 1 to this possibility by giving participants a combination of proximal and distal goals rather than a distal goal alone. The proximal goals consist of targets for cumulative profit in each year of the simulation that, if achieved, will attain the distal goal for final cumulative profit.

Participants received a table showing their annual (proximal) goals for cumulative profit (see Table 1 for the moderate and stretch goal targets). Goal levels were selected to represent moderate and stretch goals for cumulative profit for years 3 through 10 of the simulation and were chosen based on the results of a pilot study combining proximal and distal goals. No goal is assigned through year 2 because startups such as that represented in the simulation often initially lose money before becoming profitable. The average compound growth rate of cumulative profit in the stretch (moderate) goal condition is 47% year (29%/year). Although challenging, the stretch goal levels are well below what is achievable. We examined the performance of numerous benchmark strategies for managing the simulated firm. The benchmark strategies consist of simple decision rules for fleet acquisition, hiring, pricing, etc. The benchmark rules are not optimal, but constitute behaviorally realistic, boundedly rational heuristics such as 'hire enough people to replace employee attrition plus a certain number for each new aircraft acquired.' A plausible benchmark decision rule generates cumulative profit 265% higher than the stretch goal for year 10.

[Insert Table 1]

Participants were paid $5 for participating in the experiment plus an additional cash payment of $2 for each intermediate year (3-9) in which their cumulative profit met or exceeded the target for that year. Finally, a payment of $6 was made to participants if their cumulative profit in year 10 met or exceeded the final goal (Table 1). Participants meeting or exceeding their goals in all years of the

three trials would earn up to $65 (a maximum of $20 in each of the three rounds of the simulation, plus the $5 participation payment).

Perceived Risk Taking. Using well-established measures of perceived risk taking (Ganzach, Ellis, Pazy and Ricci-Siag 2008; Sitkin and Weingart 1995; Weber, Blais and Betz 2002), we developed a six-item, task-specific measure of perceived risk taking (Appendix A). Perceived risk taking was measured on a 10-point Likert scale anchored by 0 = "No Risk" and 10 = "Extreme Risk". Each participant's perceived risk taking score is the average across the six items. Decision makers were asked to complete the questionnaire before each simulation round (i.e., three times in total).

Goal Commitment. A five-item measure of goal commitment (Appendix B) was adapted from prior research (Klein et al. 2001). For each item, for example, "Quite frankly, I don't care if I achieve the annual goals or not," participants recorded their level of agreement on a ten-point scale where "strongly disagree" is coded 0 and "strongly agree" is coded 10. Goal commitment is the average across the five items (reverse coding some items to align the scale). Participants were asked to complete the questionnaire before each simulation round (i.e., three times in total).

5.3 Study 2 Results

Hypotheses 1-3 are tested as in Study 1. Hypotheses 4 and 5 are tested using MANOVA to assess differences in perceived risk taking or goal commitment between the two goal conditions. Figure 3 shows the distribution of performance for Study 2 in Year 10 for moderate and stretch goals. Consistent with Study 1, performance in the moderate goal condition does not depart from a normal distribution at the .05 level but is marginally significant (Kolmogorov–Smirnov $D[29] = .16$, $p = .06$). As expected, performance in the stretch goal condition is not normally distributed (Kolmogorov–Smirnov $D[30] = .25$, $p < .001$).

[Insert Figure 3 here]

In the moderate goal condition, 41% of participants meet or exceed the long run profit goal, 17% go bankrupt, and the remaining 42% avoid bankruptcy but do not achieve the long run profit goal. For decision makers assigned stretch goals, 13% achieve or exceed the long run profit goal, 23% go bankrupt, and the remaining 64% avoid bankruptcy but do not successfully achieve the long run goal.

As a manipulation check, we test whether the attainment discrepancy and the number of goals achieved in each year are significantly different between the two goal conditions. Decision makers assigned stretch goals experience significantly higher attainment discrepancies (Mann-Whitney's $U = 44.00$, $z = -5.93$, $p < .01$) between the assigned goal and their actual performance (median discrepancy = $694.0 million) compared with subjects assigned moderate goals (median discrepancy = $9.4 million).

In addition, decision makers assigned moderate goals achieve more of the intermediate, proximal goals than those assigned stretch goals. The former met an average of 5.2 of their eight goals. The latter met an average of 1.1 of eight goals. The stretch compared with moderate goals are significantly more difficult for participants to achieve (Mann-Whitney $U = 139.5$, $z = -4.66$, $p < .000$).

Tests of Hypotheses. Replicating the results of Study 1, Hypothesis 1: *Stretch compared with moderate organizational goals generate higher variance in performance,* is supported. At the end of Year 10, participants assigned stretch versus moderate goals exhibit significantly higher performance variance (SD = $526.6 million versus $114.5 million, respectively; $L[1, 57] = 13.15$, $p = .001$).

Hypothesis 2, *Stretch organizational goals generate right-skewed performance distributions,* is also supported. As seen in Figure 3 the performance distribution for the stretch goal condition is significantly right-skewed (one-sided D'Agostino skewness test, skewness = 2.38, $z = 2.90$, $p = .002$). In contrast, the performance distribution under moderate goals is not (one-sided D'Agostino skewness test, skewness = .93, $z = 1.45$, $p = .073$).

Hypothesis 3a, *Stretch compared with moderate organizational goals increase performance*, is not supported, replicating the results of Study 1. At the end of Year 10, the difference in cumulative profits of participants assigned stretch goals (Median = $185 million) compared to moderate goals (Median = $138 million) is not significant (Mann-Whitney's $U = 348.0$, $z = -1.32$, $p = 0.19$). Median (quantile) regression estimates for the effect of Goal Condition on median performance in Year 10 show that the goal condition is not a good predictor of median performance ($\beta_{Goal\_Condition} = 55.91$, bootstrapped S.E. = 47.96, 95% Conf. Int. [-40.14, 151.97], pseudo $R^2 = 0.02$)[4].

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[4] The model estimated was: **Performance = α + β(Goal Condition) + ε**.

Hypothesis 3b, *Stretch compared with moderate organizational goals increase risk-adjusted performance*, is not supported. The Sharpe Ratio for the stretch goal group was 0.67 compared with 1.31 for the moderate goal group. Opposite to the hypothesized direction, stretch compared with moderate goals yielded significantly lower risk-adjusted performance ($\Delta = 0.595$, bootstrapped S.E. = 0.258, z = 2.31, 95% Bias Corr. Conf. Int. [0.136, 1.168]).

Hypothesis 4, *Stretch compared with moderate organizational goals increase perceived risk taking*, is supported. As shown in Figure 4, perceived risk taking for those in the stretch goal condition prior to the third simulation round is higher ($\mu = 6.24$ out of 10) than for decision makers in the moderate goals condition ($\mu = 4.39$) (F[1,57] = 8.58, p < .01).

[Insert Figure 4 here]

Hypothesis 5, *Stretch compared with moderate organizational goals decrease goal commitment*, is supported. As shown in Figure 5, prior to round one of the simulation goal commitment is the same for both groups. However, goal commitment declines in rounds two and three for those assigned stretch goals. Prior to the final simulation round, goal commitment for decision makers assigned stretch goals ($\mu = 3.99$ on a ten-point scale) is significantly lower than the mean goal commitment level ($\mu = 6.12$ on a ten-point scale) for participants assigned moderate goals (F[1, 57] = 19.41, p < 0.001), increasing the probability of downward aspiration adjustments.

[Insert Figure 5 here]

Analysis of Decision Making. To further explore how stretch compared with moderate goals affect participant behavior, we examine decisions for two important strategic choices in the simulation: aircraft acquisition and employee hiring. Consistent with higher perceived risk taking, decision makers assigned stretch goals acquire more aircraft and hire more employees than those in the moderate goal condition. By the end of Year 10 in round three, decision makers assigned stretch goals expand the fleet to a median level of nine aircraft with over 665 total employees. Those in the moderate goal condition expand to a median level of four aircraft with 300 total employees. These differences in aircraft acquisition (Mann-Whitney's U = 276.0, z = -2.42, p < 0.05) and employee hiring are significant (Mann-Whitney's U = 273.00, z = -2.46, p < 0.05).

Decision makers assigned stretch compared with moderate goals adopt strategies favoring faster growth. However, as the tests of Hypothesis 3a show, most of those assigned stretch goals do not grow the fleet rapidly or profitably enough to achieve the stretch profit goals. Why is that the case?

Fleet growth and hiring must be coordinated to maintain service quality. Without adequate staffing, growth erodes service quality, driving passengers away and leading to large financial losses. Building a skilled workforce is complicated by hiring and training delays, and the impact of inexperienced employees on service quality, workload, burnout and turnover. The coordination challenge often undermines participants' attempts to grow the simulated airline (Graham et al. 1992). After a burst of fleet growth, service quality declines, load factor drops, and growth must be halted or the airline goes bankrupt (Graham et al. 1992). Participants who fail to coordinate growth in the fleet with human resources and service capacity must abandon the stretch goal in favor of either the goal of survival (if the airline is close to bankruptcy) or a lower aspiration level.

Top Performers in Stretch Goal Condition. We also examine who benefits from adopting stretch goals by comparing the top quintile in final cumulative profit to the remaining 80% of participants. The top 20% expanded to a median fleet of 40 aircraft and 2,709 employees compared with 6.5 planes and 464 employees for the others (Mann-Whitney's $U = 10.50$, $z = -3.20$, $p < 0.001$ for aircraft and $U = 10.00$, $z = -3.22$, $p < 0.001$ for employees). The top 20% in the stretch goal condition successfully identified strategies that allowed them to profitably coordinate growth of the fleet and employees so as to maintain service quality. The other 80% failed to do so.

6.   Discussion

Understanding the impact of different strategic choices on the distribution of performance is an important agenda for strategy and organization theory research. However, research on how different strategic choices–including setting different goal levels–affect the distribution of organizational performance is limited. These points are emphasized by Andriani and McKelvey (2009) and Mosakowski (1998). The results of the two experiments presented above show that: (1) stretch compared with moderate organizational goals increase the variance in performance across organizations, (2) stretch goals generate right skewed performance distributions, (3) stretch compared

with moderate goals decrease risk-adjusted performance, and (4) stretch goals increase perceived risk taking and decrease goal commitment. The effects of stretch goals on the variance in and skewness of organizational performance have not previously been explored theoretically or investigated empirically. Also, performance is rarely adjusted for risk in research on organizational goals. In addition, an increase in risk taking and a decrease in goal commitment are two mechanisms that underpin high variance and a right skewed performance distribution.

6.1 Limitations

There are a number of limitations to this research. Four are discussed here. First, we tested only two goal levels: stretch and moderate goals. However, organizations could and probably do adopt goals that span the continuum from easy, through moderate, more challenging, stretch, or even impossibly difficult goals. Research should investigate the effects of a wider range of goal levels on performance. Such research could explore nonlinearity in the relationship between goal difficulty and performance, with positive effects of moderately challenging goals giving way to negative effects as goals become more difficult.

Second, the performance goals that participants faced in our experiments were not adaptive. Participants who fell behind early in a round faced a more difficult situation than those who did well early. In many organizations goals are adaptive (Mezias et al. 2002). For example, percentage increases over current performance maintain constant goal difficulty levels even as realized performance varies. Goal adaptation is likely to be more important in realistic environments where performance depends on both the endogenous choices of the actors and exogenous shocks such as a recession. Recall, in our experiment, there are no stochastic changes or exogenous shocks. Adaptive goals could improve performance by preventing negative exogenous shocks from triggering low goal commitment, high risk taking, or other actions that could reduce performance. However, adaptive goals could lead to underperformance from goal erosion (Sterman 2000, Ch. 15).

Third, we assigned decision makers just one goal, cumulative profit. In practice, managers face multiple goals, including: profit, growth, share price and market share (Short and Palmer 2003). Many organizations evaluate managerial performance using a diverse set of metrics. Pursuit of multiple

goals requires tradeoffs in focusing managerial attention and other resources (Ethiraj and Levinthal 2009). It seems unlikely that multiple goals would generate a positive goal main effect with no effect on the variance in and skewness of performance under stretch goals, but research should confirm this.

Fourth, stretch goals may lead to other unintended effects including capability traps (Repenning and Sterman 2002), corrosion of organizational culture, unethical behavior, or illegal activity (Ordóñez et al. 2009), as seen in Enron, Satyam, WorldCom, and other scandals. Our experiments do not explore these issues, limiting the negative effects stretch goals might activate.

6.2 Implications for Theory

The findings reported above make four contributions to research on organizational goals. First, the results show goal difficulty increases the variance in performance. This finding supports speculations by Mosakowski (1998) and Sitkin et al. (2011) that stretch goals benefit some organizations but not others. Our results show that variance in performance among organizations is an organizational outcome and should not be treated as error around a goal main effect.

Advocates of stretch goals focus on the potential for higher performance, but typically neglect the effects on risk (the distribution of outcomes), implicitly assuming that the variance of the outcome distribution remains constant. However, we find that stretch compared with moderate goals increase risk taking and result in higher variance in performance. Higher performance variance could still be attractive if the increase in mean performance is large enough, just as some investors prefer more volatility in investment returns in exchange for higher average return.

We find, however, that stretch goals do not lead to higher risk-adjusted performance (our second contribution). In contrast, Study 2 shows stretch goals lead to a statistically significant drop in risk-adjusted performance, as measured by the Sharpe ratio. Whether individual managers should choose to impose stretch goals on their organization despite the increase in risk depends on their attitudes towards risk. Those with large appetites for risk may still prefer stretch goals. However, for those who are risk-neutral or risk averse, the results indicate that stretch goals may be inferior to more moderate goals because the increase in performance variance, including the risk of bankruptcy, can offset or outweigh the improvement in mean performance.

Third, the findings show that stretch goals generate a right skewed performance distribution with only a few high performers, testing and extending Mosakowski's (1998) theoretical analysis examining whether stretch goals are a rule for riches for organizations. In our experiments stretch goals are a rule for riches for a few organizations, but not for all.

The analysis also extends prior theory by proposing and testing mechanisms that generate the right skewed performance distribution. Specifically, we show that the shape of the distribution is a function of the positive effects of stretch goals for a few high performers, the salience of the survival reference point for low performers (Boyle and Shapira 2012; March and Shapira 1987, 1992), and downward aspiration adjustments for the majority of organizations that achieve performance safely above survival but significantly below the stretch goals (Lant 1992; Mezias et al. 2002). These mechanisms are not new in the literature. However, their combined implication that stretch goals generate a right skewed performance distribution is novel.

The high performers in the stretch goal condition identify and successfully execute profitable growth strategies. These strategies are hard to discover in dynamic environments characterized by time delays, feedback effects, nonlinearities, and combinatorial complexity (Gary and Wood 2011; Rivkin 2000; Sterman 2006). Only the top 20% in the stretch goal condition of Study 2 achieve or nearly achieve the stretch goals.

Since there are no random events in the simulation, poor performers either have poor mental models, adopting strategies that threaten survival, or discover a reasonable strategy but fail to implement it successfully. Faced with a large attainment gap and the threat of bankruptcy, goal commitment for these managers falls, and they abandon the stretch goal in favor of the goal of surviving (March and Shapira 1987, 1992). Shifting to a survival goal curtails risk taking and increases the likelihood of remaining near the survival point (Boyle and Shapira 2012). The results show how the survival reference point affects the performance distribution, truncating the number of failures or bankruptcies. In this way, the survival mechanism plays an important role in determining the shape of the performance distribution. If managers did not care about organizational survival, the large and persistent attainment discrepancies created by stretch goals would lead to greater risk taking and more bankruptcies. Performance variance would still increase, but the distribution would be

symmetric. However, when managers care about organizational survival, risk taking is restricted when survival is threatened, yielding a right-skewed performance distribution.

Fourth, the findings show that stretch compared with moderate goals lead to higher perceived risk taking and lower goal commitment. Stretch goals generate larger attainment discrepancies than moderate goals. Larger attainment gaps stimulate more extensive search, one of the mechanisms advocates argue enable stretch goals to improve performance (Greve 2003; Lant and Montgomery 1987). However, the results show that persistently large attainment discrepancies increase perceived risk taking and undermine commitment to the goals. These two mechanisms help explain how stretch goals lead to high variance and a right skewed performance distribution.

Persistently large attainment discrepancies eventually decrease people's commitment to their goals (Klein and Kim 1998; Klein et al. 2001). Supporting this argument, Study 2 shows that stretch goals lead to lower goal commitment than moderate goals. Reduced commitment to the stretch goals enables managers performing poorly to enhance their self-image by assessing current performance as satisfactory (Jordan and Audia 2012) and adjusting their aspirations downward (Lant 1992; Mezias et al. 2002). The results extend existing theory by showing that stretch goals lead to high goal commitment for the few high performers and low commitment to the stretch goals for the many. Lower goal commitment and downward aspiration adjustment removes the motivating effect of stretch goals, limits search and subsequent risk taking, and explains why many organizations perform significantly below the stretch goal but safely above the survival point.

Our findings also contribute to research in organizational psychology on goal setting in two ways. First, in that literature, scholars have reported that more difficult compared to easier goals lead to higher performance variance (Erez and Zidon 1984; Locke 1982). However, examining goal effects on performance variance has not been the subject of any theoretical analysis in the literature. Instead, these findings have been attributed to floor and ceiling effects, and differences in individual abilities (Locke and Latham 1990). In contrast, our findings show that performance variance is an outcome of goal difficulty. Therefore, the performance effects of goals should be examined after controlling for the increase in performance variance (e.g., by adjusting performance for risk).

Second, the goal setting literature often implicitly assumes that goal effects are independent of the magnitude of the attainment discrepancy. The results reported here show that more difficult goals lead to higher attainment discrepancies, and that managerial responses vary depending on the size and persistence of those gaps. Goal effects for complex tasks are not independent of the attainment discrepancy. Instead, the discrepancy between actual performance and goals affects subsequent performance through risk taking, goal commitment, and, potentially, other behavioral responses.

Finally, our findings complement and extend the system dynamics literature investigating goal dynamics in organizations using causal diagrams and simulation modeling (Barlas and Yasarcan 2006, 2008; Forrester 1975; Morecroft 1985; Sterman 2000). Causal diagramming provides a precise format for articulating process theories and has been applied extensively in organization theory research (Black, Carlile and Repenning 2005; Martinez-Moyano et al. *Forthcoming;* Repenning and Sterman 2002; Repenning 2002). Figure 6 illustrates the feedback loops that capture the mechanisms through which goals affect the distribution of performance. Our findings extend research in that literature in three ways (highlighted in bold in Figure 6). We discuss these three extensions below and a more detailed description of the complete causal diagram is provided in an online supplement.

First, the Commitment to Goal(s) feedback (labeled R1 in Figure 6) captures the evolution of decision makers' determination to reach the goal. As perceived likelihood of success decreases (increases), decision makers may judge the feasibility of the goal to be low (high), causing commitment to the goal to erode (strengthen), undermining (enhancing) motivation and effort (Barlas and Yasarcan 2008; Morecroft 1985; Repenning 2002). Our results highlight the mediating role of goal commitment in this process, which has been absent from this literature.

[Insert Figure 6 here]

Second, the Strategy Churn feedback (labeled R2 in Figure 6) captures the effect of goals on willingness to take risks and the search for better strategies. High attainment discrepancies and low perceived likelihood of success induce risk taking and strategy search, which increases the probability of selecting an ineffective strategy in rugged performance landscapes (i.e., complex environments). Selecting an ineffective strategy reduces the efficacy of the current strategy, reducing performance, and motivating further risk taking and search for other strategies (Rahmandad 2008). Our results

highlight the mediating role of willingness to take more risk in this process, which has been absent from this literature.

Third, the Survival Mechanism feedback (labeled B3) captures the effects of the survival reference point on managers' willingness to take risks and to engage in extensive strategy search. When performance is near the survival point (e.g., bankruptcy), decision makers focus on survival instead of the aspiration level and minimize risk taking and search. While this process has been well documented in organization theory (March and Shapira 1987, 1992), this feedback has been absent from the system dynamics literature investigating goal dynamics.

The dynamics contingent on the interdependent feedback loops in Figure 6 are complex. The impact of stretch goals on the distribution of performance depends on which feedback loops dominate the system. When a stretch goal is adopted, it is by definition above current performance. If it is perceived to be feasible, the attainment discrepancy should increase motivation and effort without eroding goal commitment, boosting performance until the goal is achieved through the balancing *Motivation Effect* feedback B1. The larger the attainment discrepancy, the lower the perceived likelihood of success, leading to greater willingness to take risk and search for new, better strategies. If that search is effective, the efficacy of the new strategy will rise, boosting performance until the goal is achieved through the balancing *Strategy Improvement* feedback B2.

However, if the stretch goal is set too high, the large attainment discrepancy can lower the actors' judgment about the likelihood of success and goal commitment falls, eroding motivation, lowering effort and performance. The attainment discrepancy does not fall, further eroding beliefs that the goal is feasible and also eroding goal commitment in a reinforcing feedback operating as a vicious cycle (the *Commitment to Goals* loop R1). Similarly, if the complexity of the environment makes the search for better strategies difficult, or the actors' search heuristics and organizational learning capabilities are poor, search may lower the efficacy of the organization's strategy, reducing performance and increasing the attainment discrepancy in another vicious cycle, the reinforcing *Strategy Churn* loop R2. The declining performance may lead to downward aspiration adjustment, reducing motivation and search (the reinforcing *Aspiration Adjustment* loop R3).

If performance falls so low as to threaten survival, then risk taking falls, choking off search, which prevents strategy churn but also lowers the chance of finding a superior strategy (the *Survival Mechanism* feedback B3). The reinforcing feedbacks will tend to amplify differences in initial conditions including the skills, risk attitudes and other characteristics of individual managers, increasing the variance and skewness in outcomes. Future research should examine the dynamics of the feedbacks in Figure 6 using simulation modeling to analyze the conditions under which different paths are dominant.

6.3 Implications for Practice

Boards and CEOs of publicly listed companies are increasingly announcing stretch financial performance goals (Fuller and Jensen 2010), seeking to emulate well known examples used to illustrate the benefits of stretch goals (See, for example, Collins and Porras 2002; Kerr and Landauer 2004; Peters and Waterman 1982; Slater 1999; Thompson et al. 1997). Our findings suggest a very different interpretation of those cases. Instead of being evidence that all organizations should adopt stretch goals, the small number of successful cases held up as exemplars for the benefits of stretch goals are evidence that stretch goals create "riches for the few." The argument that the successful cases are evidence for the success of stretch goals is subject to a major validity threat from sampling on success ex-post and generalizing the benefits of stretch goals for a small, non-random sample to the population of firms. In contrast, our findings show that stretch compared with moderate goals lead to lower risk-adjusted performance.

An example demonstrates how stretch goals can undermine performance even in a firm known for setting and achieving stretch goals. The President of Toyota Motor Corporation recently blamed the firm's expensive and damaging product recalls on their stretch goals for rapid growth and gains in market share, publicly apologizing for problems with Toyota vehicles that led to millions of recalled vehicles and damaged Toyota's brand image and sales (Kubo and Crawley 2010, February 23).

Of course, adopting stretch goals to achieve lower risk adjusted performance is not a choice most managers would make. However, many managers expect to be one of the few high performers. Research shows most people are unrealistically optimistic about their position in a distribution of

peers on almost any positive trait or ability (MacCrimmon and Wehrung 1986). The adoption of an inside view of problem situations, which anchors expectations on plans and scenarios, is one mechanism that results in overly optimistic risk taking (Kahneman and Lovallo 1993). Adopting an outside view, in which the problem at hand is treated as an instance of a broader category, can potentially reduce the optimistic bias (Kahneman and Lovallo 1993). The outside view ignores the details of the case at hand and focuses on the statistics of a class of cases chosen to be similar in relevant respects to the present one. For example, when assessing their organization's capacity to achieve stretch goals, managers should compare their organization to other similar organizations all striving to improve performance as they attempt to assess its position in the distribution of outcomes.

The findings also inform the issue of setting appropriate goals for any particular context. In some situations, stretch goals that lead to only a small number of highly successful organizations may be desirable. For example, in venture capital or private equity the value created by big winners (e.g., Apple computer, Amazon.com, etc.) can more than offset the losses or small returns on the majority of organizations in the portfolio. In other settings, the higher risks associated with stretch goals are not desirable. Moderate goals might be more appropriate in a medium-sized family-owned business that generates the majority of the family's net worth. The choice of more or less aggressive goals in any situation therefore depends on the risk preferences and buffer resources of the individuals and organization. Even if expected performance rises—and our results show this may or may not happen in complex settings—the increase in outcome variance induced by aggressive goals may lead to unacceptable risks in settings where the costs of low performance are large and/or the lack of sufficient buffer resources leads to an increased risk of bankruptcy.

Managers cannot simply assume that stretch goals may boost performance but can't hurt. Future research can build on our findings by exploring in more detail the balance between setting stretch versus moderate goal levels and identifying the conditions under which stretch goals are most appropriate and beneficial.

References

Andriani, P., B. McKelvey. 2009. Perspective—from Gaussian to Paretian thinking: Causes and implications of power laws in organizations. *Organization Science* **20**(6) 1053-1071.

Argote, L., H.R. Greve. 2007. A behavioral theory of the firm—40 years and counting: Introduction and impact. *Organization Science* **18**(3) 337-349.

Audia, P.G., E.A. Locke, K.G. Smith. 2000. The paradox of success: An archival and a laboratory study of strategic persistence following radical environmental change. *Academy of Management Journal* **43**(5) 837-853.

Bakken, B., J. Gould-Kreutzer, D. Kim. 1992. Management flight simulators and organizational learning: some experimental evidence. *European Journal of Operational Research* **59** 167-182.

Barlas, Y., H. Yasarcan. 2006. Goal setting, evaluation, learning and revision: A dynamic modeling approach. *Evaluation and Program Planning* **29**(1) 79-87.

Barlas, Y., H. Yasarcan. 2008. A comprehensive model of goal dynamics in organizations: Setting, evaluation and revision. H. Qudrat-Ullah, J.M. Spector, P. Davidsen, eds. *Complex Decision Making*. Springer, 295-320.

Black, L.J., P.R. Carlile, N.P. Repenning. 2005. A Dynamic Theory of expertise and occupational boundaries in new technology implementation: Building on Barley's study of CT Scanning. *Administrative Science Quarterly* **49** 572-607.

Boyle, E., Z. Shapira. 2012. The Liability of Leading: Battling Aspiration and Survival Goals in the Jeopardy! Tournament of Champions. *Organization Science* **23**(4) 1100-1113.

Bromiley, P. 1991. Testing a causal model of corporate risk taking and performance. *Academy of Management Journal* **34**(1) 37-59.

Bromiley, P., K. Miller, D. Rau. 2001. Risk in strategic management research. M. Hitt, R. Freeman, J. Harrison, eds. *The Blackwell Handbook of Strategic Management*. Blackwell Publishers, Malden, MA, 259-288.

Button, K. 2012. Low-Cost Airlines. *Transportation Journal* **51**(2) 197-219.

Collins, J.C., J.I. Porras. 2002. *Built to last*, 3rd ed. Collins Business, Fulham UK.

Cyert, R., J. March. 1963. *A Behavioral Theory of the Firm*. Blackwell Publishers Inc., Cambridge, MA.

Earley, P.C., T. Connolly, G. Ekegren. 1989. Goals, strategy development, and task performance: Some limits on the efficacy of goal setting. *Journal of Applied Psychology* **74**(1) 24-33.

Erez, M., I. Zidon. 1984. Effect of goal acceptance on the relationship of goal difficulty to performance. *Journal of Applied Psychology* **69**(1) 69-78.

Ethiraj, S., D. Levinthal. 2009. Hoping for A to Z while rewarding only A: Complex organizations and multiple goals. *Organization Science* **20**(1) 4-21.

Fang, C. 2012. Organizational Learning as Credit Assignment: A Model and Two Experiments. *Organization Science* **23**(6) 1717–1732.

Forrester, J.W. 1975. Planning and Goal Creation Ch. 10 *In Collected Papers of Jay W. Forrester*. Wright Allen Press, Cambridge, MA, 167-174.

Fuller, J., M. Jensen. 2010. Just say no to Wall Street: Putting a stop to the earnings game. *Journal of Applied Corporate Finance* **22**(1) 59-63.

Ganzach, Y., S. Ellis, A. Pazy, T. Ricci-Siag. 2008. On the perception and operationalization of risk perception. *Judgment and Decision Making* **3**(4) 317-324.

Gary, M.S., R.E. Wood. 2011. Mental models, decision rules, and performance heterogeneity. *Strategic Management Journal* **32**(6) 569-594

Graham, A., J. Morecroft, P. Senge, J. Sterman. 1992. Model-supported case studies for management education. *European Journal of Operational Research* **59**(1) 151-166.

Greve, H.R. 1998. Performance, Aspirations, and Risky Organizational Change. *Administrative Science Quarterly* **43** 58-86.

Greve, H.R. 2003. Investment and the behavioral theory of the firm: Evidence from shipbuilding. *Industrial and Corporate Change* **12**(5) 1051-1076.

Hollenbeck, J.R., H.J. Klein. 1987. Goal commitment and the goal-setting process: Problems, prospects, and proposals for future research. *Journal of Applied Psychology* **72**(2) 212.

Jordan, A., P. Audia. 2012. Self-enhancement and learning from performance feedback. *Academy of Management Review* **37**(2).

Kahneman, D., D. Lovallo. 1993. Timid Choices and Bold Forecasts: A Cognitive Perspective on Risk Taking. *Management Science* **39**(1) 17-31.

Kerr, S., S. Landauer. 2004. Using stretch goals to promote organizational effectiveness and personal growth: General Electric and Goldman Sachs. *Academy of Management Executive* **18**(4) 134-138.

Klein, H.J., J.S. Kim. 1998. A field study of the influence of situational constraints, leader-member exchange, and goal commitment on performance. *Academy of Management Journal* 88-95.

Klein, H.J., M.J. Wesson, J.R. Hollenbeck, P.M. Wright, R.P. DeShon. 2001. The Assessment of Goal Commitment: A Measurement Model Meta-Analysis. *Organizational Behavior and Human Decision Processes* **85**(1) 32-55.

Knight, D., C.C. Durham, E.A. Locke. 2001. The Relationship of Team Goals, Incentives, and Efficacy to Strategic Risk, Tactical Implementation, and Performance. *Academy of Management Journal* **44**(2) 326-338.

Kubo, N., J. Crawley. 2010, February 23. Toyota says growth trumped safety, vows changes. Reuters.

Lant, T., Z. Shapira. 2008. Managerial reasoning about aspirations and expectations. *Journal of Economic Behavior & Organization* **66**(1) 60-73.

Lant, T.K. 1992. Aspiration level adaptation: an empirical exploration. *Management Science* **38** 623-644.

Lant, T.K., D.B. Montgomery. 1987. Learning from strategic success and failure. *Journal of Business Research* **15**(6) 503-517.

Larrick, R., C. Heath, G. Wu. 2009. Goal-induced risk taking in negotiation and decision making. *Social Cognition* **27**(3) 342-364.

Latham, G., G. Seijts. 1999. The effects of proximal and distal goals on performance on a moderately complex task. *Journal of Organizational Behavior* **20**(4) 421-429.

Locke, E.A. 1982. Relation of goal level to performance with a short work period and multiple goal levels. *Journal of Applied Psychology* **67**(4) 512-514.

Locke, E.A., G.P. Latham. 1990. *A theory of goal setting and task performance*. Prentice-Hall, Englewood Cliffs, NJ.

Locke, E.A., G.P. Latham. 2002. Building a practically useful theory of goal setting and task motivation: A 35-year odyssey. *American Psychologist* **57**(9) 705-717.

Locke, E.A., G.P. Latham. 2013. *New developments in goal setting and task performance*. Routledge Academic.

MacCrimmon, K., D. Wehrung. 1986. *Taking Risks*. Free Press, New York.

March, J., Z. Shapira. 1987. Managerial Perspectives on Risk and Risk Taking. *Management Science* **33**(11) 1404-1418.

March, J., Z. Shapira. 1992. Variable risk preferences and the focus of attention. *Psychological Review* **99**(1) 172-183.

March, J.G. 1991. Exploration and exploitation in organizational learning. *Organization Science* 71-87.

Martinez-Moyano, I.J., D.P. McCaffrey, R. Oliva. *Forthcoming*. Drift and adjustment in organizational rule compliance: Explaining the 'Regulatory Pendulum' in Financial Markets. *Organization Science*.

Mezias, S.J., Y.R. Chen, P.R. Murphy. 2002. Aspiration-level adaptation in an American financial services organization: A field study. *Management Science* 1285-1300.

Morecroft, J.D.W. 1985. Rationality in the Analysis of Behavioral Simulation Models. *Management Science* **31**(7) 900-916.

Mosakowski, E. 1998. Managerial prescriptions under the resource-based view of strategy: The example of motivational techniques. *Strategic Management Journal* **19**(12) 1169-1182.

Ordóñez, L.D., M.E. Schweitzer, A.D. Galinsky, M.H. Bazerman. 2009. Goals gone wild: The systematic side effects of overprescribing goal setting. *Academy of Management Perspectives* **23**(1) 6-16.

Peters, T., R. Waterman. 1982. *In Search of Excellence: Lessons from America's Best-Run Corporations*. Harper and Row, New York.

Rahmandad, H. 2008. Effect of delays on complexity of organizational learning. *Management Science* **54**(7) 1297-1312.

Repenning, N., J. Sterman. 2002. Capability traps and self-confirming attribution errors in the dynamics of process improvement. *Administrative Science Quarterly* **46**(2) 265-295.

Repenning, N.P. 2002. A Simulation-Based Approach to Understanding the Dynamics of Innovation Implementation. *Organization Science* **13**(2) 109-127.

Rivkin, J.W. 2000. Imitation of Complex Strategies. *Management Science* **46** 824-844.

Rousseau, D.M. 1997. Organizational behavior in the new organizational era. *Annual Review of Psychology* **48** 515-546.

Sastry, M.A. 1997. Problems and Paradoxes in a Model of Punctuated Organizational Change. *Administrative Science Quarterly* **42** 237-275.

Sharpe, W.F. 1994. The sharpe ratio. *Journal of portfolio management* **21** 49-49.

Shinkle, G.A. 2011. Organizational Aspirations, Reference Points, and Goals: Building on the Past and Aiming for the Future. *Journal of Management* 415-455.

Short, J., T. Palmer. 2003. Organizational performance referents: An empirical examination of their content and influences. *Organizational Behavior and Human Decision Processes* **90**(2) 209-224.

Siggelkow, N., J.W. Rivkin. 2006. When exploration backfires: Unintended consequences of multilevel organizational search. *Academy of Management Journal* **49**(4) 779-795.

Simon, H. 1964. On the concept of organizational goal. *Administrative Science Quarterly* **9**(1) 1-22.

Sitkin, S.B., K.E. See, C.C. Miller, M. Lawless, A. Carton. 2011. The Paradox of Stretch Goals: Organizations in Pursuit of the Seemingly Impossible. *Academy of Management Review* **36**(3) 544-566.

Sitkin, S.B., L.R. Weingart. 1995. Determinants of Risky Decision-Making Behavior: A Test of the Mediating Role of Risk Perceptions and Propensity. *The Academy of Management Journal* **38**(6) 1573-1592.

Slater, R. 1999. *Jack Welch and the GE way: Management insights and leadership secrets of the legendary CEO*. McGraw-Hill Companies, New York.

Sterman, J.D. 2000. *Business Dynamics: Systems Thinking and Modeling for a Complex World*. Irwin/McGraw-Hill, New York.

Sterman, J.D. 2006. Learning from Evidence in a Complex World. *American Journal of Public Health* **96**(3) 505-514.

Thompson, K.R., W.A. Hochwarter, N.J. Mathys. 1997. Stretch targets: What makes them effective? *Academy of Management Executive* **11**(3) 48-60.

Weber, E.U., A.R. Blais, N.E. Betz. 2002. A domain-specific risk-attitude scale: measuring risk perceptions and risk behaviors. *Journal of Behavioral Decision Making* **15**(4) 263-290.

Winter, S.G., G. Cattani, A. Dorsch. 2007. The value of moderate obsession: Insights from a new model of organizational search. *Organization Science* **18**(3) 403-419.

Wood, R., A. Mento, E. Locke. 1987. Task complexity as a moderator of goal effects: A meta-analysis. *Journal of Applied Psychology* **72**(3) 416-425.

Wood, R.E., E.A. Locke. 1990. Goal setting and strategy effects on complex tasks. B. Staw, L.L. Cummings, eds. *Research in Organizational Behavior*, 73-109.
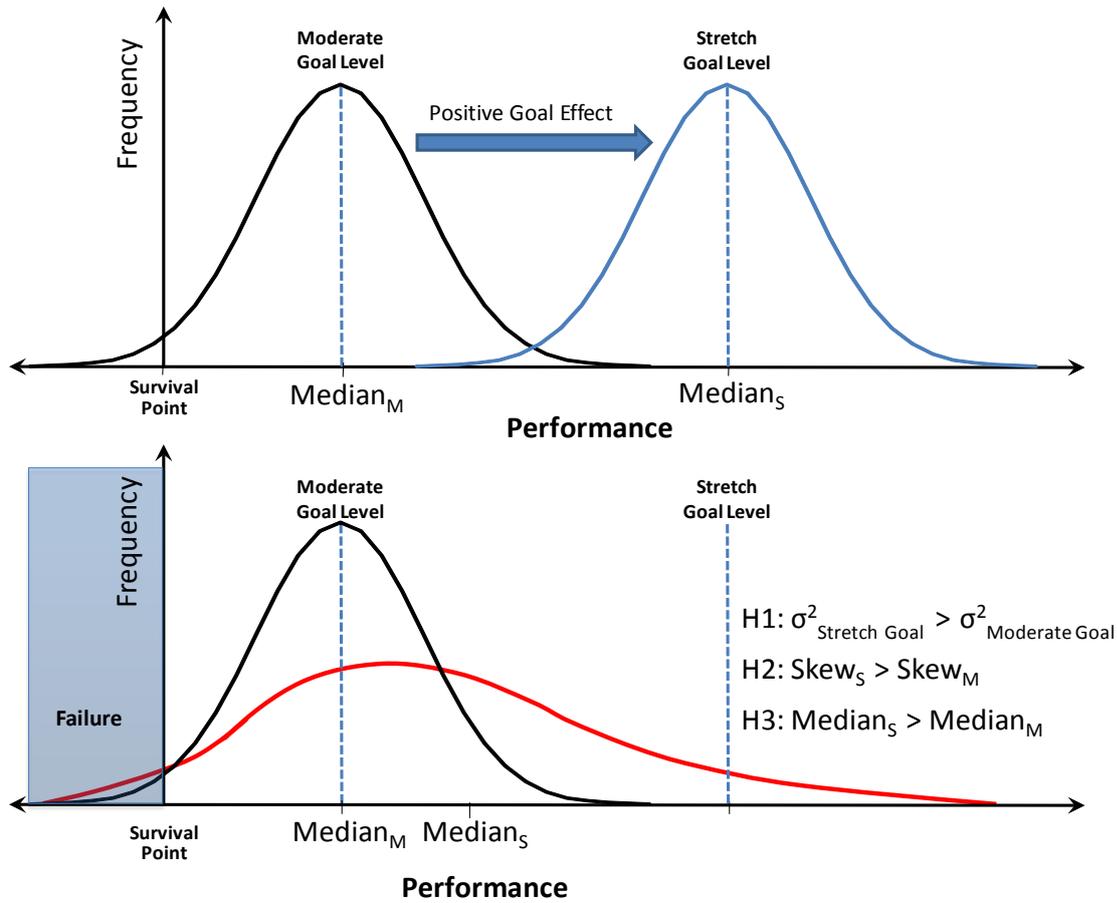
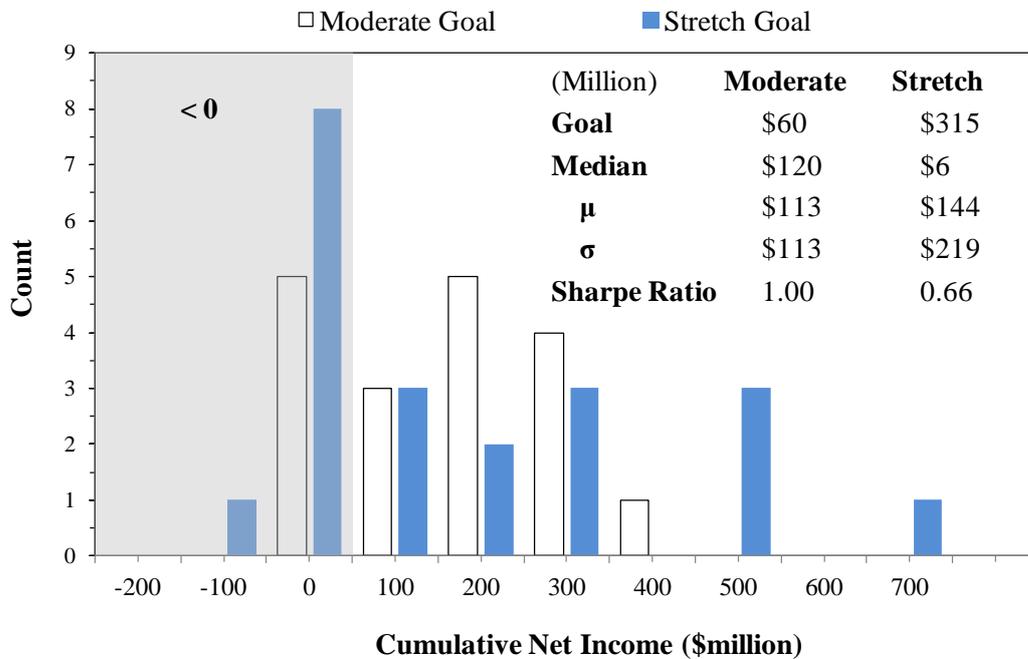**Figure 1 Illustration of hypothesized effects of stretch goals on performance level, variance, and skewness.**

H1: $\sigma^2_{Stretch\ Goal} > \sigma^2_{Moderate\ Goal}$

H2: $Skew_S > Skew_M$

H3: $Median_S > Median_M$

(Million)	**Moderate**	**Stretch**
Goal	$60	$315
Median	$120	$6
μ	$113	$144
σ	$113	$219
Sharpe Ratio	1.00	0.66

Figure 2 Study 1 performance distribution at the end of Year 10 for Stretch and Moderate Goal Conditions
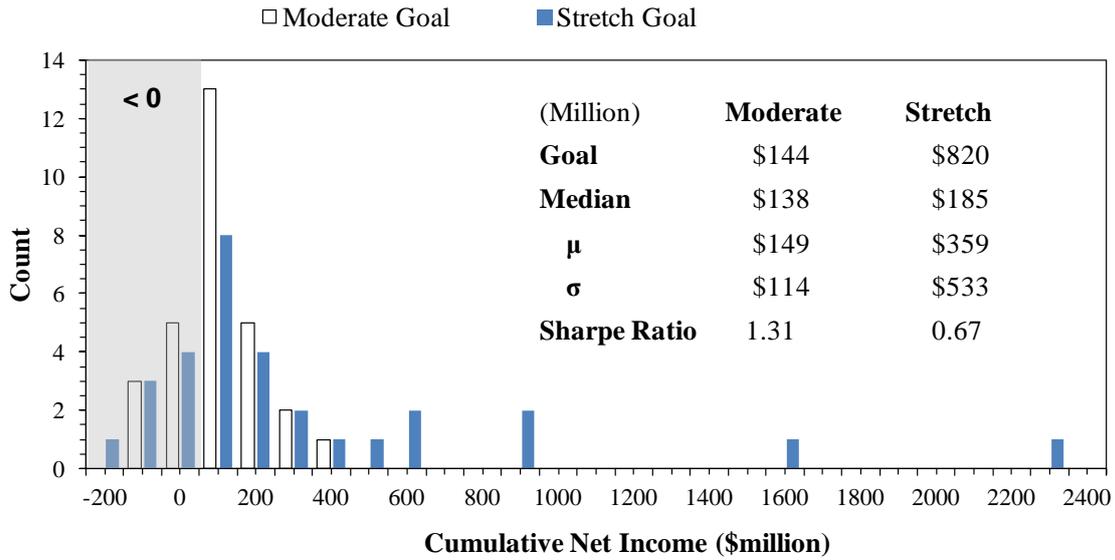
Figure 3 Study 2 performance distribution at the end of Year 10 for Stretch and Moderate Goal Conditions
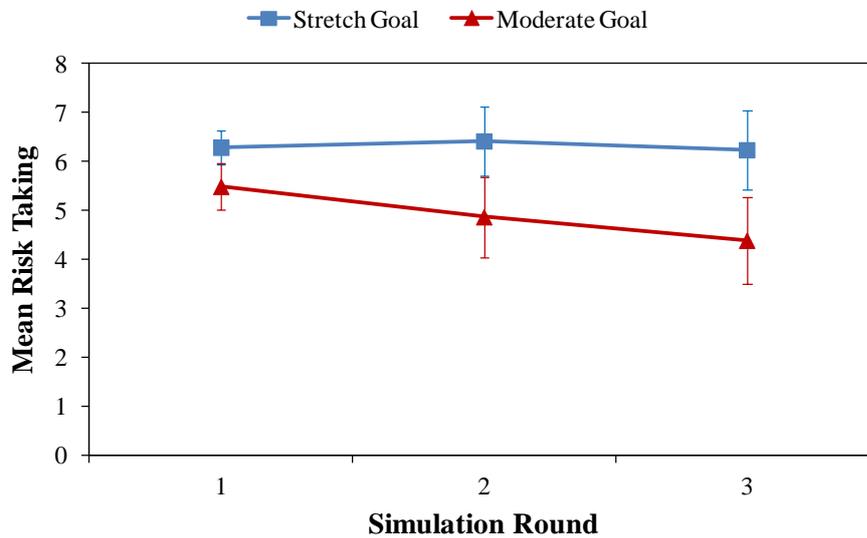

Figure 4 Mean Perceived Risk Taking (with error bars of +/- two standard errors) across the three simulation rounds
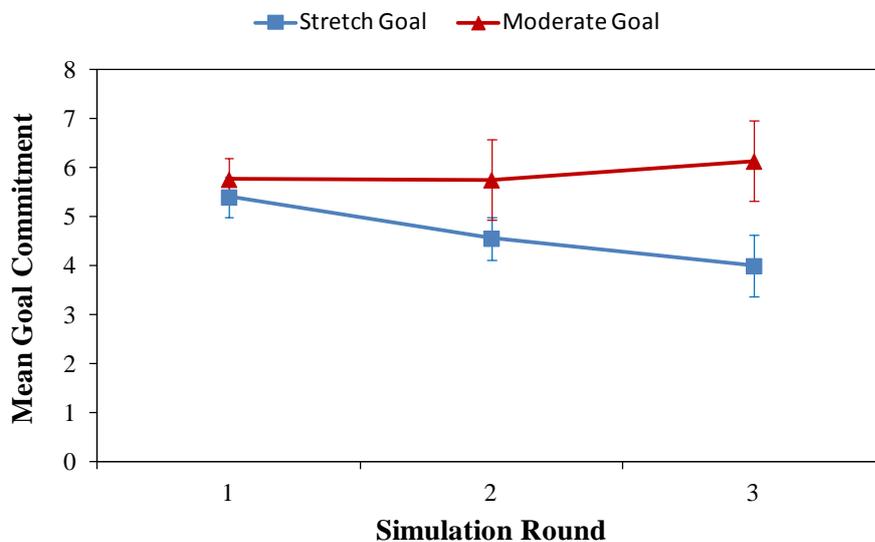

Figure 5 Mean Goal Commitment (with error bars of +/- two standard errors) across the three simulation rounds
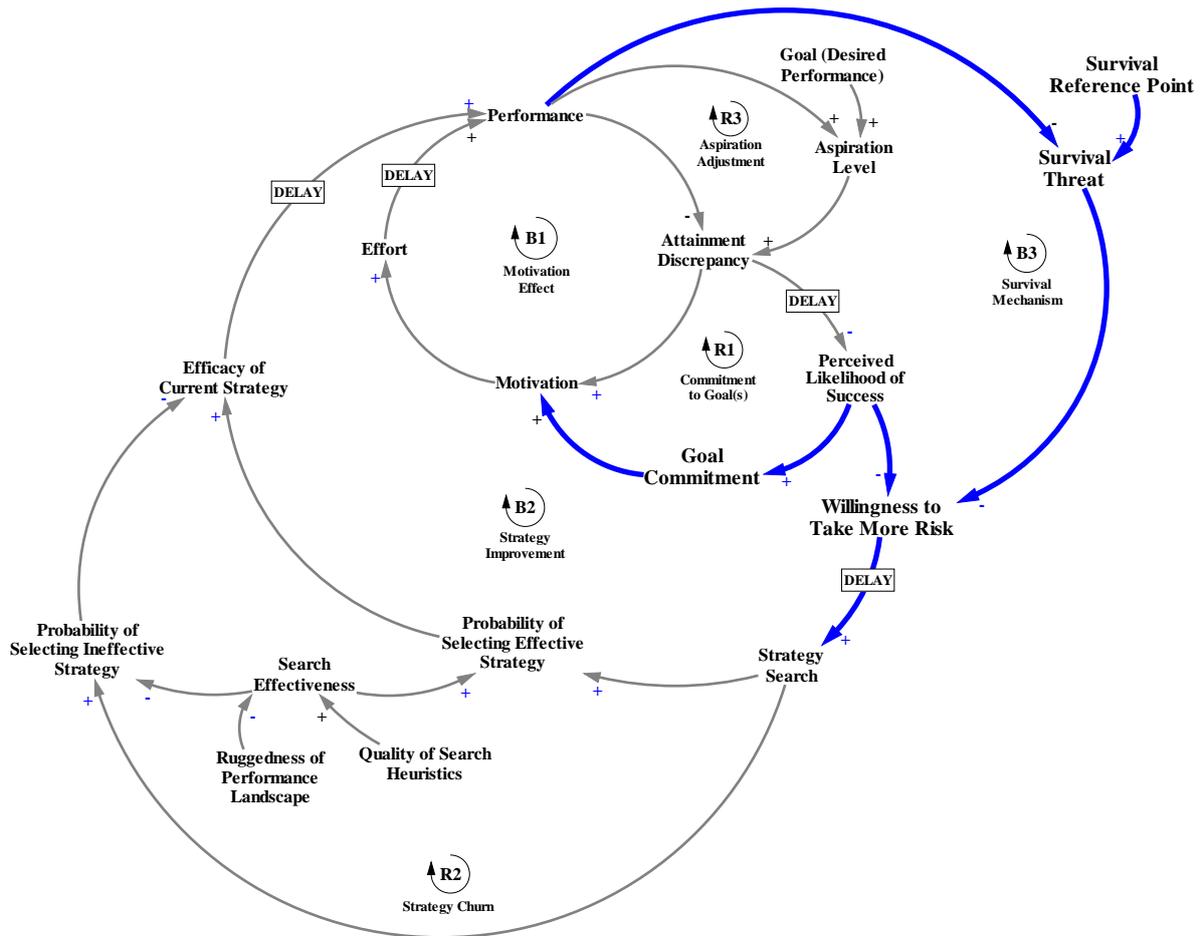
Figure 6 Causal loop diagram showing feedback effects of behavioral responses to stretch goals[5]

Table 1 Payoffs for assigned stretch (moderate) goal levels over the 10 year simulation

By the end of	Cumulative Net Income Goal ($ million)	Your Actual Cumulative Net Income ($ million)	Payment for achieving target
Year 1 Qtr 4	No annual goal		
Year 2 Qtr 4	No Payment		
Year 3 Qtr 4	31.5 (18.8)[6]		$2.00
Year 4 Qtr 4	56.6 (27.7)		$2.00
Year 5 Qtr 4	99.2 (39.2)		$2.00
Year 6 Qtr 4	171.6 (54.4)		$2.00
Year 7 Qtr 4	269.3 (72.0)		$2.00
Year 8 Qtr 4	401.3 (92.4)		$2.00
Year 9 Qtr 4	579.5 (116.0)		$2.00
Year 10 Qtr 4	820.0 (143.5)		$6.00

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[5] Arrows indicate the direction of causality. A plus or minus sign at the arrow head denotes the polarity of the causal relationship. A plus sign indicates that an increase in the independent variable causes the dependent variable to increase, ceteris paribus, and a decrease causes a decrease: $X \rightarrow^+ Y \Leftrightarrow \partial Y/\partial X > 0$. Similarly, a minus sign indicates that an increase in the independent variable causes the dependent variable to decrease, and a decrease causes an increase: $X \rightarrow^- Y \Leftrightarrow \partial Y/\partial X < 0$. The loop identifier B1 indicates a balancing (negative) feedback loop and R1 indicates a reinforcing (positive) feedback loop (Sterman 2000).

[6] The assigned stretch goals are the first number in this column and the moderate goals are in parentheses.

Appendix A: Perceived Risk Taking Measure

People often see some risk in situations that contain uncertainty about what the outcome or consequences will be and for which there is the possibility of 'bad' consequences. However, riskiness is a very personal notion, and we are interested in your assessment of how much risk you plan to take in making decisions in the simulation.

For your upcoming simulation round, think about how much risk you will take in your decisions (0 = No Risk, 10 = Extreme Risk).

| 0 | 2 | 4 | 6 | 8 | 10 |

No Risk   Moderate Risk   Extreme Risk

1. How much risk will you take in your aircraft purchasing decisions?
2. How much risk will you take in your fare decisions?
3. How much risk will you take in your decisions about the fraction of revenue to spend on marketing?
4. How much risk will you take in your decisions about hiring employees?
5. How much risk will you take in your decisions about target service scope?
6. How much risk will you take overall across the complete set of decisions?

Appendix B: Goal Commitment Measure

This set of questions focuses on the performance goals outlined in your objective memo you have been given. Note that there are no right or wrong answers; a quick response is generally the most useful.

For each of the following statements, please adjust the slider bar to the position that best reflects your opinion (0 = Strongly Disagree, 10 = Strongly Agree).

| 0 | 2 | 4 | 6 | 8 | 10 |

Strongly   Neither Agree   Strongly

Disagree   or Disagree   Agree

1. It is hard to take the set of annual goals outlined in the memo from the Board of Directors seriously.
2. It is unrealistic for me to expect to reach all of the annual goals.
3. It is quite likely that the annual goals may need to be revised, depending on how things go.
4. Quite frankly, I don't care if I achieve the annual goals or not.
5. I am strongly committed to pursuing all of the annual goals.