*Strategic Management Journal*
*Strat. Mgmt. J.*, **32**: 1426–1436 (2011)
Published online EarlyView in Wiley Online Library (wileyonlinelibrary.com) DOI: 10.1002/smj.960
*Received 20 January 2009*; *Final revision received 19 October 2010*

# ADAPTIVE ASPIRATIONS: PERFORMANCE CONSEQUENCES OF RISK PREFERENCES AT EXTREMES AND ALTERNATIVE REFERENCE GROUPS

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*Goals or aspirations and their relationships to risk taking and performance are important issues in both psychology and strategic management. The concept of adaptive aspirations, as discussed in Cyert and March's Behavioral Theory of the Firm, has long been a topic of interest in both fields. Moreover, many studies in strategy have focused on risk and/or extreme performance. In the current paper, we build on earlier models of adaptive aspirations. We introduce into the models a new risk preference function that incorporates changes in risk preference at extremes of performance. Based on empirical studies and the managerial literature, we also introduce alternative strategies for setting reference groups. Simulations of the resulting models suggest important differences in outcomes from earlier studies and this invites further empirical investigation. These simulations also have significant implications for managerial goal setting.*


## INTRODUCTION

Strategic management has long been interested in goals or aspirations (e.g., Ansoff, 1965; Porter, 1980). An early textbook (Andrews, 1971) defined strategy as the pattern of decisions in a company that determines and reveals its objectives, purposes, or goals. Cyert and March's (1963) *A Behavioral Theory of the Firm*, wherein goals or aspirations are seen as adapting to performance as feedback and driving organizational search processes, has had a substantial impact on research in strategic management (Argote and Greve, 2007).

Psychologists have had an even longer interest in goals (Lewin *et al.*, 1944). One of the best-established results in psychology is that goals improve performance (Locke and Latham, 1990). Goals or aspirations can be seen as reference points separating regions of gain from regions of loss. Research indicates that risk taking is responsive to changes in gains and losses. For situations that are not extreme relative to the reference point, individuals tend to be risk averse above the reference point and risk seeking below it (Kahneman and Tversky, 1979).

The current paper is concerned with the development of models and the associated simulations of adaptive aspirations that build on the earlier work of March (1988) and March and Shapira (1987, 1992). Relative to previous work, our research introduces two innovations. First, we introduce into the models a three-reference-point risk preference function that incorporates changes in risk preference at extremes of performance in line with research in strategic management. Our integration of three reference points into a single risk preference function results in the reversal of the effectiveness of adjusting speeds of aspiration levels. This has significant implications for

Keywords: adaptive aspirations; reference group strategies; risk preference function; risk taking at extremes; psychological foundations of strategy
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research and strategic managers. Second, based on empirical studies and the managerial literature, we introduce alternative strategies for setting reference groups (e.g., for 'stretch' goals or subgoals). Comparison of three strategies has important implications for research, existing conventional wisdom, and managerial practice.

## RISK PREFERENCES AT EXTREMES

Models of variable risk preferences have been developed (e.g., Cyert and March, 1963; March, 1988; March and Shapira, 1987, 1992). The idea of a single reference point is central to modern theories of individual and organizational choice (Cyert and March, 1963; Kahneman and Tversky, 1979; March, 1988). Decision makers are risk seeking below their chosen targets, and risk averse above them. However, empirical investigations of choice by organizations indicate organizational risk-taking behavior changes significantly at the extremes of performance.

### Risk taking at very low performance levels

Some research suggests that when decision makers are at a certain distance below their normal reference point, they shift their attention to the survival point (Lopes, 1987; March and Shapira, 1987, 1992). The major framework explaining why firms attend to a survival point is threat-rigidity theory (Staw, Sandelands, and Dutton, 1981). Threat-rigidity theory argues that when close to the survival point, firms become rigid and engage in extreme forms of risk aversion (Staw *et al*., 1981). Specifically, when potential losses are perceived to be very large and threaten the survival of an organization, top management is likely to emphasize cost reductions (Schendel, Patton, and Riggs, 1976) and prefer less risky alternatives (Laughhunn, Payne, and Crum, 1980); e.g., they may be less likely to initiate acquisitions (Iyer and Miller, 2008) and more likely to engage in divestitures (Shimizu, 2007).

Meanwhile, some empirical studies suggest the opposite argument (Audia and Greve, 2006). A few studies suggest that increasing threats to survival stimulates greater and greater risk taking, presumably as an attempt to escape the threats (e.g., Bowman, 1982; Gooding and Goel, 1996; Miller and Chen, 2004). Other scholars (e.g., Bromiley, 1991; Wiseman and Bromiley, 1996) have argued that these mixed results across studies could potentially be attributed to different or inappropriate measures of key variables. While recognizing the mixed nature of the evidence, we believe the weight of the evidence and threat-rigidity theory favor decreased risk taking in the vicinity of the survival point.

### Risk taking at very high performance levels

The evidence for risk-taking behavior at very high levels of performance is also somewhat ambiguous. On the one hand, a positive association between very high levels of performance and increased risk taking has been established (Singh, 1986). Some early studies (e.g., Mansfield, 1961) associated high levels of slack with high levels of innovation. Furthermore, the behavioral theory of the firm (Cyert and March, 1963) suggests that the presence of slack resources enables firms to increase slack search through activities such as innovation (Nohria and Gulati, 1996), organizational change (Kraatz and Zajac, 2001), and expansion through acquisition (Iyer and Miller, 2008). The 'cushion effect' (Jeffrey, Onay, and Larrick, 2010) also supports increased risk taking at high levels of performance.

On the other hand, there are some contradictory findings. The main argument against slack leading to increased risk taking is organizational inertia (e.g., Leonard-Barton, 1992). High slack leads to low exploration, passivity in organizational responses, and increased motivation to capitalize on known competencies through exploitation (Levinthal and March, 1993; Yasai-Ardekani, 1986). Furthermore, Miller and Chen (2004) found no support for the positive relationship between slack and risk taking in spite of using multiple measures for key variables. While acknowledging these arguments, we believe overall relevant research suggests that very high levels of performance relative to the goal or aspiration level encourage increased risk taking.

## STRATEGIES FOR DEFINING REFERENCE GROUPS

In line with Kelley (1952), we see reference groups as standards of comparison for appraising one's own performance. Management researchers



DOI: 10.1002/smj

(DiMaggio and Powell, 1983; Fiegenbaum and Thomas, 1995) have extended the notion of social comparison theory (Festinger, 1954) from individuals to organizations. In contrast with the previous work (e.g., Greve, 2003; Knudsen, 2008) that commonly considered the population performance average as the reference point for organizations,[1] we use three different strategies for setting reference groups.

*Conservative strategy*

Comparison with the average in the industry has been shown to drive risk taking and strategic change (Greve, 1998, 2003; Lant, Milliken, and Batra, 1992). Research on aspiration levels (Lewin *et al*., 1944) and social comparison theory (Festinger, 1954) has also suggested that individuals use a reference group reflecting the average performance of peers rather than high-performing individuals. Therefore, we define the 'conservative strategy' as comparing the focal firm's performance with the industry/population average.

*Ambitious strategy*

A common practice for setting firm and subunit aspiration levels is performance benchmarking, i.e., the performance of best-in-class performers (Frasier-Sleyman, 1992). In many cases it results in seemingly impossible performance goals that are usually referred to as 'stretch' goals or even 'big hairy audacious goals' in one influential management best seller (Collins and Porras, 1994). Advocates of stretch goals have largely focused on their presumed positive effects, with the underlying logic that adoption of ambitious long-term goals can force organizations to search for or experiment with ideas beyond current capabilities and inspire creativity and innovation to achieve outcomes that currently seem impossible (Golovin, 1997; Hamel and Prahalad, 1993). The 'ambitious strategy' is defined as setting the top 10 percent of performers in the population as the reference group. This is consistent with goal-difficulty studies (Locke and Latham, 1990).

[1] Knudsen's (2008) work also defines the reference groups as other populations with different average performances and examines the case of decision makers switching among populations.

*Stepwise strategy*

Some researchers in the goal literature have argued that proximal goals or subgoals inspire higher performance (Heath, Larrick, and Wu, 1999). There are similar voices in the strategy and management literature. Organizations learn best with tentative steps that are traceable and not too great in magnitude, yet involve changes to existing procedures that are large enough to achieve small wins (Sitkin, 1992; Weick, 1984). The 'stepwise strategy' means decision makers choose the reference group that is seen as having satisfactory performance relative to the focal firm, rather than the highest performance. This strategy is consistent with the managerially popular concept of 'strategic intent' (Hamel and Prahalad, 1989), whereby a long-term stretch goal is broken down into a series of shorter-term challenges for the organization.

## MODEL SPECIFICATION AND SIMULATION

### Historical adaptive aspiration model

March's (1988) model is based on a Gaussian random walk with an absorbing barrier at zero accumulated wealth. The standard model employs $N$ decision makers with an initial stake $W_{i,0}$. In each period, each decision maker chooses among a set of alternatives for risk taking on the basis of their individual risk preferences and receives a payoff that will increase, or decrease, her accumulated wealth.[2] If the accumulated wealth of a decision maker declines to the absorbing barrier, that decision maker is replaced by a new decision maker with the initial stake. The size of the population is constant. The payoff is determined by a draw from a normal distribution with the expectation zero and the standard deviation $R_{i,t}$, the risk preference. Decision maker $i$ will adjust the risk preference $R_{i,t}$ over time, according to the following function:

$$R_{i,t} = \beta \frac{A_{i,t}}{W_{i,t}} \tag{1}$$

[2] In line with March and Shapira (1992: 174), we take wealth or resources to include things such as 'capital assets of an entrepreneur or business firm, the political support of a politician or public agency, the reputation of a professional or professional association.'

where $A_{i,t}$ and $W_{i,t}$ are the aspiration level and the accumulated wealth of decision maker $i$ at time $t$. The parameter $\beta$ is a scale factor for risk environment that is set to one in the standard model. Each decision maker, $i$, comes to the simulation with an initial stake $W_{i,0}$, equal to an initial aspiration level $A_{i,0}$, so the initial preference for risk $R_{i,0}$ is one. The decision maker's aspiration level adapts according to the following standard function, making the aspiration level an exponentially weighted moving average of experienced wealth:

$$A_{i,t+1} = \alpha W_{i,t} + (1-\alpha)A_{i,t} \qquad 0 \le \alpha \le 1 \quad (2)$$

Since $\alpha$ determines the speed at which aspiration levels adapt to the accumulated wealth, it is referred to as 'the adjusting speed.' When the adjusting speed is equal to one, the aspiration level adapts instantaneously to experience, $W_{i,t}$. When the adjusting speed is equal to zero, the aspiration level remains the initial value $A_{i,0}$ over time, and preferred risk is fixed at $\beta$. As the adjustment rate declines from one, it is increasingly influenced by the past aspiration levels. A very low value of adjustment means new performance feedback is barely considered.

### Reference group model

Previous studies (Knudsen, 2008; March and Shapira, 1987, 1992) have proposed an extension to March's (1988) model and suggested the aspiration level of the decision maker depend on its previous aspiration level and the accumulated wealth of the relevant reference group, $j$.

$$A_{i,t+1} = \alpha W_{j,t} + (1-\alpha)A_{i,t} \qquad 0 \le \alpha \le 1 \quad (3)$$

where $W_{j,t}$ is the average wealth accumulated by the reference group at time $t$.

$$W_{j,t} = \frac{\Sigma W_{i,t}}{N_j} \quad (4)$$

Here, $\Sigma W_{i,t}$ is the total accumulated wealth in the reference group $j$ at time $t$, and $N_j$ is the number of members in the reference group.

### A three-reference-point risk preference function

The three-reference-point risk preference function integrates a survival point (extremely low performance) and a success point (extremely high performance) in addition to the standard reference point. This risk preference function incorporates the following features: (1) when the performance is in the neighborhood of the aspiration level, decision makers will be risk averse when above the aspiration level, but risk seeking when below the aspiration level; (2) when the performance is approaching the survival point, decision makers will be risk averse; (3) when the performance surpasses the success point, decision makers will be risk seeking; and (4) risk preference shares the principle of diminishing sensitivity (Heath *et al.*, 1999; Tversky and Kahneman, 1992). A conceptual risk preference function for a fixed aspiration level that satisfies these properties is displayed in the dashed curve of Figure 1. The Appendix further describes the three-reference-point risk preference function mathematically. Note that only with small probability can decision makers obtain extreme (either very high or very low) performance.

We examine the three-reference-point risk preference function in the context of both historical and social (reference group) models. We refer to our two major classes of models as the 'three-reference-point historical model' and the 'three-reference-point reference group model.'

### Simulations

The simulations in this paper are similar to the approach used in previous studies (Knudsen, 2008; Levinthal and March, 1981; March, 1988). The initial stake, $W_{i,0}$, and initial aspiration level, $A_{i,0}$, were set to three. The absorbing barrier was set to 0.1 to avoid absurdly high values of risk taking. The simulation in the present paper differs in (1) examining an alternative three-reference-point risk preference function[3]

[3] In the present paper, we report only the simulation results based on one set of mathematical specifications corresponding with Figure 1 and satisfying the requirements listed in the text under 'Model specification and simulation' and the Appendix. However, these results were rather insensitive to both the precise parameter values chosen to characterize the break points for extreme performance regions and the precise risk preference curve used to characterize the risk preference.

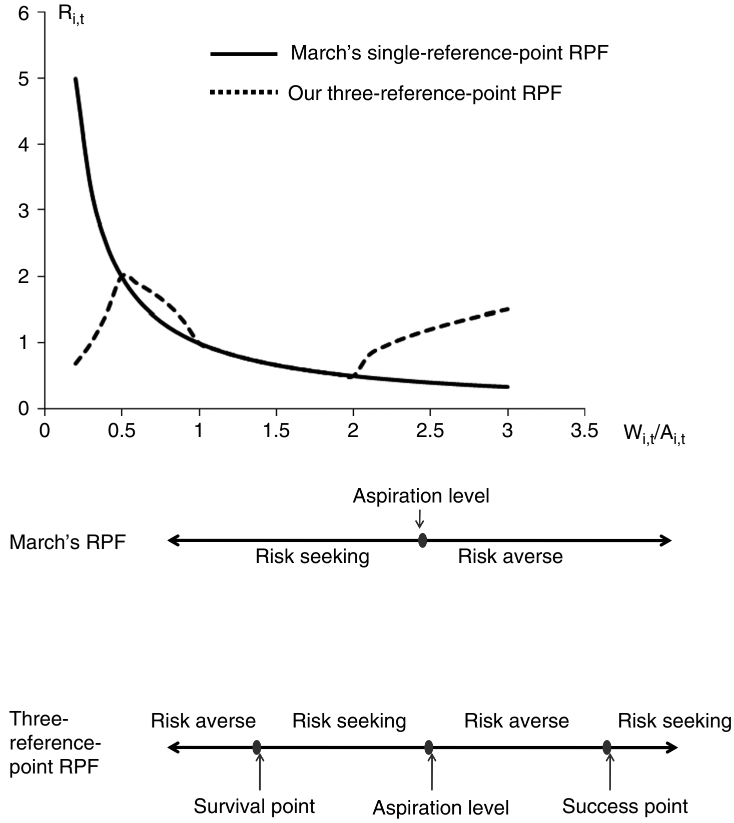



Figure 1. Comparison of the original and the three-reference-point risk preference functions (RPF)

and (2) comparing three strategies for defining reference groups.

Specifically, we examine: (1) the effect of varying aspiration adjusting speeds, $\alpha$, on the average cumulative wealth/ruin rate trade-off in the three-reference-point historical model (and the three-reference-point reference group model); and (2) the comparison of three strategies (conservative, ambitious, stepwise) in the original reference group model and in the three-reference-point reference group model.

For instance, refining the set of breakpoints, such as refining the definition of extremely high performance as the performance three times rather than twice the aspiration level, does not have a significant impact on simulation results. Similarly, decreasing the threshold of extremely low performance from the performance of one half of the aspiration level to one third has a negligible impact on the results. Moreover, given that each of the four piecewise curves satisfies the conditions described in the text under 'Model specification and simulation', the results do not change in any significant way. For instance, using $Y = X^{1/3}$ or $Y = X^{1/2}$ to characterize the diminishing sensitivity property does not have significant differences.

## SIMULATION RESULTS AND ANALYSES

### Simulation #1: comparison of different risk preference functions in the historical model

In this section, we show how the standard and the three-reference-point risk preference functions affect the wealth versus ruin rate trade-off in terms of different adjusting speeds.[4] We begin our analysis by briefly examining the homogeneous populations of *solo* adjusting speed in the historical

[4] To ensure that the results reflect the underlying structure of the model and not merely particular realizations of a highly stochastic process, the results are based on the average behavior of organizations over 1,000 independent runs of the simulation model. We tracked 200 decision makers over 300 periods of time instead of 10,000 decision makers over 10,000 time periods as in March's (1988) original setup or 30 runs of 300 decision makers over 10,000 time periods as in Knudsen's (2008) setup because we wanted to simplify the complexity in computation and make the number of decision makers and time periods more realistic. Our results were completely robust when we ran the simulations using their setups. In all cases, the performances of populations of decision makers with different adjusting speeds or different strategies never converge.



DOI: 10.1002/smj

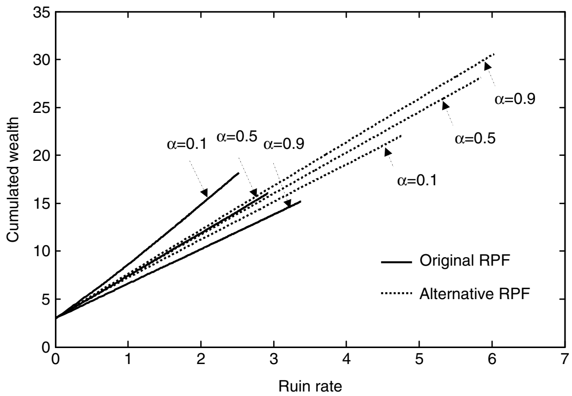



Figure 2. Effectiveness of different adjusting speeds on performance in historical models with the original and the three-reference-point risk preference functions

model with the standard risk preference function. The adjusting speed, $\alpha$, was examined at levels of 0.1, 0.5, and 0.9. The comparison of the three adjusting speeds in this original model is reported in the three solid lines in Figure 2. Decision makers with low adjusting speed ($\alpha = 0.1$) end up with the most wealth (18) and the lowest ruin rate (2.5), whereas decision makers with high adjusting speed ($\alpha = 0.9$) end up with the least wealth (15) and the highest ruin rate (3.3). This result is consistent with previous studies (e.g., March, 1988).

Next, we examine the homogeneous populations of *solo* adjusting speed in the historical model with the three-reference-point risk preference function. The results for the three adjusting speeds in this new model are reported in the three dashed lines in Figure 2.We found that decision makers with high adjusting speed end up with the most wealth (31) and the highest ruin rate (6), whereas decision makers with low adjusting speed end up with the least wealth (22) and the lowest ruin rate (4.7).

There are substantial performance differences between the historical models with the two different risk preference functions. The performance differences suggest that the changes of risk-taking behavior in extreme regions of performance are important to outcomes.[5] The most striking finding is that in the original historical model, the slow adjusters dominate, while in the three-reference-point historical model, the fast adjusters dominate. Put differently, there is a reversal of the effectiveness of adjusting speeds in models with different risk preference functions.

The reason is that, in the original historical model, when the adjusting speed, $\alpha$, approaches zero, the aspiration level, $A_{i,t}$, approaches a fixed value. As the aspiration level approaches a fixed value, the level of preferred risk, $R_{i,t}$, will increase for a decision maker who is close to ruin. Remember that, the losses of highly risk-seeking behavior will be covered naturally, while the gains of high risk-seeking behavior will be distributed in the population. Therefore, the maximal accumulation of wealth for the population will occur for a low value of $\alpha$. As $\alpha$ approaches one, the level of preferred risk will also approach the fixed value of one. In this case, the amount of each uncovered loss will be limited, so the slow adjusters dominate the fast ones. However, in the three-reference-point historical aspiration model, $R_{i,t}$ will decrease for a decision maker who is close to ruin, so the maximal accumulation of wealth for the population will not occur for a low value of $\alpha$ as previous studies predict. By contrast, as $\alpha$ approaches one, $R_{i,t}$ approaches the fixed value of one, which renders each decision maker moderately risk taking in their decision making over time. This explains the reversal effectiveness of adjusting speeds in the simulation results.

We also investigated the effectiveness of adjusting speeds of aspirations in the reference group model with the original and the three-reference-point risk preference functions, respectively. A similar reversal of adjusting speed effectiveness was found.

### Simulation #2: comparison of three strategies for setting reference groups

In this section, we compared the three strategies described earlier for setting reference groups in both the original reference group model and the three-reference-point reference group model. The conservative strategy is defined as using the average performance of the population as the aspiration level, the ambitious strategy using the top 10 percent of performers in the population as the reference group, and the stepwise strategy using the better (but not necessarily best) performers as the reference group. For implementing the

[5] Our robustness tests further show that the performance difference between the original models and three-reference-point models results from the integration of the different risk-taking behavior at extreme performance, but not from the integration of the diminishing sensitivity.



DOI: 10.1002/smj

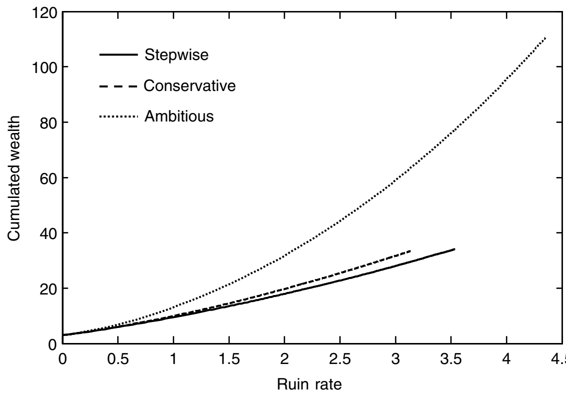



Figure 3. Comparison of three strategies for setting reference groups in the original reference group model

stepwise strategy, we divided the population into quartiles according to their performance. Decision makers in the lowest three quartiles use the average performance of those in the quartile immediately above them as their reference group. The top quartile uses the top 10 percent of performers in the population as their reference group.[6] The adjusting speed $\alpha$ was examined at level of 0.5.[7]

Figure 3 shows the comparison of the three strategies in the original reference group model. We found that the decision makers adopting the ambitious strategy end up with the most wealth and the highest ruin rate, and the decision makers adopting the conservative strategy end up with similar level of wealth and slightly lower ruin rate than those by decision makers with the stepwise strategy. Thinking in terms of *ex post* 'bankruptcy risk' instead of *ex ante* risk preference in terms of variability, we can frame the results differently. That is, the ambitious strategy is a high-bankruptcy-risk and high-return strategy. The conservative and the stepwise strategies are low-bankruptcy-risk and low-return strategies. The reasons for this are: (1) with the ambitious strategy, the decision makers set the top 10 percent of performers as their reference groups. Therefore, most decision makers will be highly risk seeking given that they greatly underperform their reference group. Since the losses of highly risk-seeking behavior will be covered naturally (the decision makers whose accumulated wealth is less than or equal to the absorbing barrier will be replaced by new decision makers with the initial endowment), while the gains of high risk-seeking behavior will be distributed in the population, the accumulated wealth of decision makers with the ambitious strategy will be much higher than that of decision makers with the other two strategies; (2) with the stepwise strategy, most decision makers set the next group up the ladder as their reference group, and the majority of decision makers will always be risk seeking. However, since their performance is only a small amount below their reference groups, they take very limited risk and, thus, take advantage of limited, naturally covered losses. With the conservative strategy, some decision makers whose performance is below their reference groups take high risk, but some others whose performance is above their reference groups take minimal risk; combining these groups, decision makers with the conservative strategy and decision makers pursuing a stepwise strategy ultimately accumulate similar amounts of wealth and ruin rates.

Figure 4 shows the comparison of the three strategies in the three-reference-point reference group model. We found that, contrary to traditional wisdom, the stepwise strategy is a high-bankruptcy-risk and high-return strategy; the conservative and ambitious strategies are low-bankruptcy-risk and low-return strategies. The reasons for this surprising result are: (1) with the

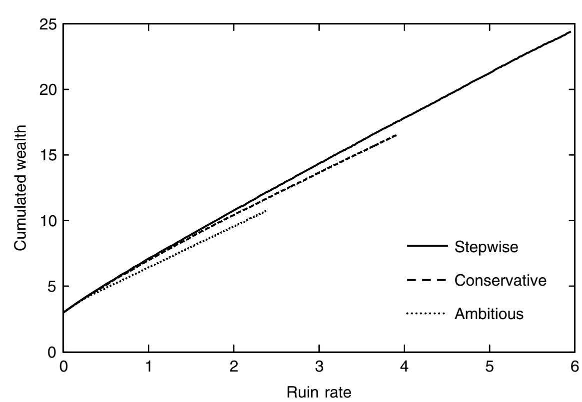



Figure 4. Comparison of three strategies for setting reference groups in the three-reference-point reference group model

[6] The simulation results are highly robust with different specifications of the stepwise strategy.

[7] Since the effect of different adjusting speeds has been examined in Simulation #1, we report only the comparisons of three strategies based on homogeneous population with adjusting speed 0.5 in Figures 3 and 4 for readability and simplicity. We also compare three strategies based on heterogeneous populations with mixed adapters, which insignificantly influences the pattern and effectiveness of three strategies. More simulation results are available upon request.

ambitious strategy, each decision maker sets the top 10 percent of performers as their reference group, so most decision makers greatly underperform their reference group. Their performance may be less than the breakpoint for extremely low performance; thus, they are approaching their survival point based on the three-reference-point risk preference function. Therefore, most decision makers pursuing an ambitious strategy will be very risk averse. This risk aversion, in turn, limits their risk-taking behavior, increasingly leading to the lowest accumulated wealth; (2) with the stepwise strategy, most decision makers set the next group up the ladder as their reference groups. Therefore, their performance is always below their aspiration level by up to an average of a quartile, and they will be risk seeking; (3) with the conservative strategy, the decision makers whose performance is slightly below the aspiration level or significantly above the aspiration level will be risk seeking. Therefore, their risk-seeking behavior is in between the decision makers pursuing the stepwise strategy and the decision makers pursuing the ambitious strategy.

## DISCUSSION

The current research contributes to the strategic management literature within the evolving behavioral theory of the firm (Argote and Greve, 2007) and raises important issues for strategic managers.

Introducing a three-reference-point risk preference function and/or reference groups defining an ambitious strategy (stretch goals or benchmarking) or a stepwise strategy (subgoals) results in substantially different outcomes from previous studies. These are important issues to both managers and scholars and they need further research. Two examples are instructive. First, the stepwise reference group strategy with the alternative risk preference function generated more wealth than any other strategy at the same level of ruin rate. This result resonates with the empirical plausibility of incremental steps in strategic management (Quinn, 1980; Sitkin, 1992; Weick, 1984). This also adds a risk preference-based explanation as to why incremental steps are valuable to organizational effectiveness: a stepwise approach leads to moderate risk taking by decision makers because they consistently slightly underperform the aspiration level. This explanation is different from, but consistent with, psychological research regarding proximal versus distal goals (Heath *et al*., 1999). A second interesting finding is the reversal of adjusting speed effectiveness in the ruin rate versus cumulative wealth trade-off when the three-reference-point risk preference function is used in the historical (and the reference group) model. This strongly suggests that empirical studies of adjusting speeds should be a high priority for research (e.g., Greve, 2002).

More generally, these results and others highlight the importance of determining whether the three-reference-point model fits firm behavior better than the single-reference-point approach that has been used for empirical studies in the past. They also highlight the importance of empirically studying the performance of the ambitious and stepwise strategies, which have become part of both the conventional wisdom and the toolkit of strategic managers.

Our findings suggest strategic management scholarship could substantially benefit from a deeper and more thorough understanding of the behavioral literatures on risk preferences and goals or aspirations. The majority of strategic management is concerned with the sources of performance heterogeneity. The usual methodology is estimation of econometric models of performance, incorporating a variety of primarily economic and financial independent variables (e.g., market structure, market share, financial leverage, size, differentiation, cost, and innovation). These studies have associated performance outcomes with a variety of activities, resources, capabilities, and economic variables that are relevant to the choice of a strategy subject to contingencies such as industry. However, performance outcomes are not the same as the path through which performance is achieved. This is an important distinction for both researchers and strategic managers. Adaptive aspirations, risk preference functions, and reference groups may have a great deal to do with observed performance heterogeneity, but they have largely been absent from empirical strategy research. Hence, *ex ante* risk, as with a risk preference function, is rare or nonexistent in strategic management empirical research. Dependent variables, if adjusted for risk, use an *ex post* measure of variation. This raises important survivor bias issues and the issue of high *ex ante* risk taking, resulting in both high and low performance (e.g., Denrell, 2003). Furthermore, it is *ex ante* risk taking, as opposed to *ex post* variability, which determines outcomes. Incorporating the psychological literature on goals, risks, and adaptive aspirations into strategy research based on the behavioral theory of the firm can substantially increase our understanding of the dynamic causes of performance heterogeneity. This becomes even more important when one considers the importance that strategic managers attach to the proper setting of goals and objectives as part of the strategy process.

From a purely managerial perspective, the study highlights the bundled nature of goal setting and risk taking. Goal setting implies the level of risk taking. As the study shows, conservative, ambitious, and stepwise strategies for goal setting have very different implications for the trade-off between bankruptcy risk and return. An explicit understanding of this trade-off could be important in improving the risk/return performance. This is especially so, since a significant portion of the managerially popular books and business press is based on informal studies of high performers over a few years and ignores both risk taking and survivor bias.

## ACKNOWLEDGEMENTS

The authors thank Special Issue Editor Craig Fox and four anonymous referees for their valuable comments. We thank Thorbjørn Knudsen for helpful suggestions on programming and other constructive comments during a discussion at the 2009 Academy of Management Meeting. We thank the participants at the 2009 AOM Annual Meeting and the 2009 Strategic Management Special Issue Conference for their useful suggestions. We also thank the Kenan-Flagler Business School of the University of North Carolina, the Southern Mississippi University Business School, and Tilburg University for financial support. Finally we wish to thank Daniela's daughters Juliana (three-years-old) and Lucia (born during the review process) for their patience with Mom's research schedule.

## REFERENCES

Andrews KR. 1971. *The Concept of Corporate Strategy*. Irwin:Homewood, IL.

Ansoff HI. 1965. *Corporate Strategy: An Analytical Approach to Business Policy for Growth and Expansion*. McGraw-Hill:New York.

Argote L, Greve HR. 2007. *A Behavioral Theory of the Firm*—40 years and counting: introduction and impact. *Organization Science* **18**(3): 337–349.

Audia PG, Greve HR. 2006. Less likely to fail: low performance, firm size, and factory expansion in the shipbuilding industry. *Management Science* **52**(1): 83–94.

Bowman EH. 1982. Risk seeking by troubled firms. *Sloan Management Review*. Summer: 33–42.

Bromiley P. 1991. Testing a causal model of corporate risk taking and performance. *Academy of Management Journal* **34**: 37–59.

Collins JC, Porras JI. 1994. *Built to Last: Successful Habits of Visionary Companies*. Harper Business:New York.

Cyert RM, March JG. 1963. *A Behavioral Theory of the Firm*. Prentice Hall:Englewood Cliffs, NJ.

Denrell J. 2003. Vicarious learning, undersampling of failure, and the myths of management. *Organization Science* **14**(3): 227–243.

DiMaggio PJ, Powell W. 1983. The iron cage revisited: institutional isomorphism and collective rationality in organizational fields. *American Sociological Review* **48**(2): 147–160.

Festinger L. 1954. A theory of social comparison processes. *Human Relations* **7**(2): 117–140.

Fiegenbaum A, Thomas H. 1995. Strategic groups as reference groups: theory, modeling, and empirical examination of industry and competitive strategy. *Strategic Management Journal* **16**(6): 461–476.

Frasier-Sleyman K. 1992. Benchmark your way to forecasting excellence. *Journal of Business Forecasting* **11**(1): 6–10.

Golovin JJ. 1997. *Achieving Stretch Goals: Best Practices in Manufacturing for the New Millennium*. Prentice Hall:Upper Saddle River, NJ.

Gooding RZ, Goel S. 1996. Fixed versus variable reference points in risk-return relationship. *Journal of Economic Behavior & Organization* **29**(2): 331–351.

Greve HR. 1998. Performance, aspirations, and risky organizational change. *Administrative Science Quarterly* **44**: 58–86.

Greve HR. 2002. Sticky aspirations: organizational time perspective and competitiveness. *Organization Science* **13**(1): 1–17.

Greve HR. 2003. *Organizational Learning from Performance Feedback: A Behavioral Perspective on Innovation and Change*. Cambridge University Press: Cambridge, U.K.

Hamel G, Prahalad CK. 1989. Strategy intent. *Harvard Business Review* **67**: 130–142.

Hamel G, Prahalad CK. 1993. Strategy as stretch and leverage. *Harvard Business Review* **71**: 75–84.

Heath C, Larrick RP, Wu G. 1999. Goals as reference points. *Cognitive Psychology* **38**: 79–109.

Iyer DN, Miller KD. 2008. Performance feedback, slack, and the timing of acquisitions. *Academy of Management Journal* **51**(4): 808–822.

Jeffrey SA, Onay S, Larrick RP. 2010. Goal attainment as a resource: the cushion effect in risky choice above a goal. *Journal of Behavioral Decision Making* **23**: 191–202.

Kahneman D, Tversky A. 1979. Prospect theory: an analysis of decision under risk. *Econometrica* **47**(2): 263–291.

Kelley HH. 1952. Two functions of reference groups. In *Society for the Psychological Study of Social Issues: Readings in Social Psychology,* Swanson G, Newcomb T, Hartley E (eds). Holt: New York; 410–414.

Knudsen T. 2008. Reference group and variable risk strategies. *Journal of Economic Behavior & Organization* **66**(1): 22–36.

Kraatz MS, Zajac EJ. 2001. How organizational resources affect strategic change and performance in turbulent environments: theory and evidence. *Organization Science* **12**(5): 632–658.

Lant TK, Milliken FJ, Batra B. 1992. The role of managerial learning and interpretation in strategic persistence and reorientation: an empirical exploration. *Strategic Management Journal* **13**(8): 585–608.

Laughhunn DJ, Payne JW, Crum R. 1980. Managerial risk preferences for below-target returns. *Management Science* **26**(12): 1238–1249.

Leonard-Barton D. 1992. Core capabilities and core rigidities: a paradox in managing new product development. *Strategic Management Journal*, Summer Special Issue **13**: 111–125.

Levinthal D, March JG. 1981. A model of adaptive organizational search. *Journal of Economic Behavior & Organization* **2**(4): 307–333.

Levinthal DA, March JG. 1993. The myopia of learning. *Strategic Management Journal,* Winter Special Issue **14**: 95–112.

Lewin K, Dembo T, Festinger L, Sears PS. 1944. Level of aspiration. In *Personality and Behavior Disorders*, Hunt JM (ed). Ronald: New York; 333–378.

Locke EA, Latham GP. 1990. *A Theory of Goal Setting and Task Performance*. Prentice Hall: Englewood Cliffs, NJ.

Lopes LL. 1987. Between hope and fear: the psychology of risk. *Advances in Experimental Social Psychology* **20**: 255–295.

Mansfield E. 1961. Technical change and the rate of imitation. *Econometrica* **29**(4): 741–766.

March JG. 1988. Variables risk preferences and adaptive aspirations. *Journal of Economic Behavior & Organization* **9**(1): 5–24.

March JG, Shapira Z. 1987. Managerial perspectives on risk and risk taking. *Management Science* **33**(11): 1404–1418.

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

Miller KD, Chen WR. 2004. Variable organizational risk preferences: tests of the March-Shapira model. *Academy of Management Journal* **47**(1): 105–115.

Nohria N, Gulati R. 1996. Is slack good or bad for innovation? *Academy of Management Journal* **39**(5): 1245–1264.

Porter ME. 1980. *Competitive Strategy: Techniques for Analyzing Industries and Competitors*. Free Press:New York.

Quinn B. 1980. *Strategies for Change: Logical Incrementalism*. Irwin:Homewood, IL.

Schendel DE, Patton GR, Riggs J. 1976. Corporate turnaround strategies: a study of profit decline and recovery. *Journal of General Management* **3**: 3–11.

Shimizu K. 2007. Prospect theory, behavioral theory, and the threat-rigidity thesis: combinative effects on organizational decisions to divest formerly acquired units. *Academy of Management Journal* **50**(6): 1495–1514.

Singh J. 1986. Performance, slack, and risk taking in organizational decision making. *Academy of Management Journal* **29**(3): 562–585.

Sitkin SB. 1992. Learning through failure: a strategy of small losses. *Research in Organizational Behavior* **14**: 231–237.

Staw BM, Sandelands L, Dutton J. 1981. Threat-rigidity effects in organizational behavior: a multi-level analysis. *Administrative Science Quarterly* **26**(4): 501–524.

Tversky A, Kahneman D. 1992. Advances in prospect theory: cumulative representation of uncertainty. *Journal of Risk and Uncertainty* **5**(4): 297–323.

Weick KE. 1984. Small wins: redefining the scale of social problems. *American Psychologist* **39**(1): 40–49.

Wiseman RM, Bromiley P. 1996. Toward a model of risk in declining organizations: an empirical examination of risk, performance, and decline. *Organization Science* **7**: 524–543.

Yasai-Ardekani M. 1986. Structural adaptations to environments. *Academy of Management Review* **11**(1): 9–21.

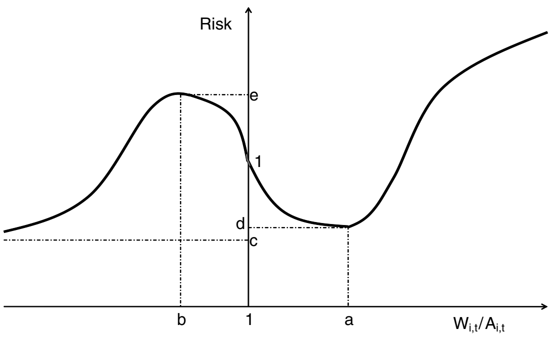



DOI: 10.1002/smj

## APPENDIX

### Mathematical specification of the three-reference-point risk preference function

The conceptual three-reference-point risk preference function we used in our paper is as follows:




Mathematically, the function may be described as follows:

$$R_{i,t} \in \begin{cases} (c, e] \quad for \quad \dfrac{W_{i,t}}{A_{i,t}} \le b, \quad and \\ \quad R'(x) > 0,\ R''(x) > 0 \\ \qquad (Risk\ aversion) \\ [1, e) \quad for\ b < \dfrac{W_{i,t}}{A_{i,t}} \le 1, \quad and \\ \quad R'(x) < 0,\ R''(x) > 0 \\ \qquad (Risk\ seeking) \\ [d, 1) \quad for\ 1 < \dfrac{W_{i,t}}{A_{i,t}} \le a, \quad and \\ \quad R'(x) < 0,\ R''(x) < 0 \\ \qquad (Risk\ aversion) \\ (d, \infty) \quad for\ a < \dfrac{W_{i,t}}{A_{i,t}}, \quad and \\ \quad R'(x) > 0,\ R''(x) < 0 \\ \qquad (Risk\ seeking) \end{cases}$$

In these formulas, $a$ and $b$ are breakpoints for extremely high and extremely low performance respectively. So $a$ is some value larger than one ($a > 1$), $b$ is some value smaller than one ($b < 1$), both $c$ and $d$ take on values smaller than one ($c < d < 1$), and $e$ is some value larger than one ($e > 1$). When $W_{i,t}/A_{i,t} \le b$, performance is approaching the survival point so that decision makers will be risk averse due to fear of ruin. Since, however, it is impossible for decision makers to take zero risk (see arguments in literature section), we set a minimum value $c$ of risk taking. When $b < W_{i,t}/A_{i,t} \le 1$, the performance is just below the aspiration level, the decision makers are risk seeking; when the performance $W_{i,t}/A_{i,t} = b$, the decision makers take risk of value $e$. When $1 < W_{i,t}/A_{i,t} \le a$, performance is just above the aspiration level, the decision makers are risk averse; when the performance $W_{i,t}/A_{i,t} = a$, the decision makers take a very low risk, $d$ ($d$ is larger than the minimum risk-taking value $c$). When the $W_{i,t}/A_{i,t} > a$, the decision makers are approaching 'safe' success, where their performance is significantly above the aspiration level, and the decision makers become risk seeking due to their slack resources, which allow for innovation and risk-taking activities.