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CE, AND CHANGES IN PARTNERING BEHAVIOR: EVIDENCE FROM THE PHARMACE

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Abstract

Building on the prior research on aspiration levels, managerial decision making and partnering routines, we examine the conditions under which pharmaceutical firms change their partnering behavior across time. Using insights drawn from behavioral theory and evolutionary theory of the firm, we suggest that any change in partnering behavior is considered risky, and is triggered by the gap between actual performance (financial and innovative) and aspirational performance (developed on the basis of historical and social comparisons). Testing a sample of 988 pharmaceutical firms from 1990 to 2006, our results suggest that the change partnering behavior depends on the performance type: firms are more likely to change when financial performance equals aspiration, while innovative performance predicts opposite results on the performance discrepancy (both below and above)- change in partnering behavior relationship.

Aspirations, Performance, and Changes in Partnering Behavior:

Evidence from the Pharmaceutical Industry 1990 - 2006

Key Words: Aspiration levels, performance, change, collaborations, alliances

ABSTRACT

Building on the prior research on aspiration levels and managerial decision making, we examine the conditions under which pharmaceutical firms change their partnering behavior across time. Using insights drawn from behavioral theory and evolutionary theory of the firm, we argue that any change in partnering behavior is considered risky, and is triggered by the gap between actual performance and aspirational performance. Testing a sample of 988 pharmaceutical firms from 1990 to 2006, our results confirm the central idea of the paper - that the type of performance (financial or innovative) has a strong influence on the associated feedback loop and subsequent organizational action. When financial performance deviates from aspirations (either above or below), pharmaceutical firms decrease the extent of change in partnering patterns; in contrast, when innovative performance deviates from expectations (either above or below), pharmaceutical firms increase the extent of change in partnering patterns. Our results are stronger for aspiration levels based on historical comparisons than those for social comparisons.

INTRODUCTION

Behavioral theory offers us an important insight - that past performance influences subsequent decision making in organizations (Cyert and March, 1963; Levitt and March, 1988). This observation has led researchers to investigate the relationship between organizational performance and associated change (Miller and Chen, 1994; Ocasio, 1995). An important idea underlying this stream of research is that it is not just absolute levels of performance that matter but rather, the gap between actual performance and desired performance (aspiration levels). The actions of managers differ depending on whether organizational performance is above or below their aspiration levels. These aspiration levels are determined by historical performance (current performance relative to own previous performance) or social performance (performance relative to peers) (Kahneman and Tversky, 1979; March and Shapira, 1992; Greve, 1998). The conceptual reasoning supporting this research stream calls upon behavioral concepts of problemistic search and slack resources (Cyert and March, 1963) and suggests that organizations adjust their risk preferences in actions whenever performance deviates from aspirations.

In a recent special issue of Organization Science, Argote and Greve (2007) describe current research trends in the behavioral tradition and explain how the building blocks developed by Cyert and March (1963) have become the foundation for theoretical and empirical research in a wide range of fields including organizational learning theory and evolutionary economics. Argote and Greve (2007) suggest that the rich contributions in this field have generated theoretical and empirical puzzles in management studies, in particular around concepts related to performance feedback, risk preferences, and organizational change. In modeling the relationship between these concepts, most studies have adopted the theoretical perspective that organizations grow averse to risk when they perform above their aspiration levels (Bromiley et al., 2001; Greve, 1998, 2003a, 2003b; Nickel and Rodriguez, 2002), and this results in lower levels of organizational change. However, when performance is below aspiration levels, there is lack of consensus regarding the organization's appetite for risk. While Cyert and March (1963) and Kahneman and Tversky (1979) suggest that under-performance in organizations will result in greater propensities to take risk and hence change, Staw et. al. (1981) expect greater resultant organizational

rigidity and risk averse behavior. Recent studies (Vissa et al., 2010; Baum and Dahlin, 2007; Haleblian et al., 2006) take a more evolutionary point of view and suggest that organizational change is not only an outcome of performance feedback, but also the result of experience effects, learning mechanisms, and the evolution of routines within the organization.

The extant empirical research on aspiration levels provides two main insights. First, organizational change is better predicted when performance is above aspiration levels rather than below, both in terms of magnitude of the effect and its statistical significance (Greve, 2003a; Audia and Greve, 2006). Studies show mixed results when performance is below aspiration levels as regards an organization's risk preferences and likelihood of change. Second, whenever the type of organizational change is very risky (for example launching innovative products), change is more likely when performance is close to aspiration levels – either above or below (Greve, 1998; Greve, 2003a). In order to explain these mixed empirical findings, organizational scholars have turned their attention to the exploration of boundary conditions that affect the extent of organizational change by looking at organizational characteristics (Audia and Greve, 2006), the type of organizational change and the related nature of risk (Greve, 1998), and different performance measures (Greve, 2008). Given the existing theoretical and empirical puzzles, this paper attempts to draw upon concepts from behavioral theory and evolutionary economics to develop a conceptual framework that complements classical performance feedback models and enrich our understanding of the boundary conditions under which performance predicts risk preferences and organizational change. Specifically, we focus on the how two types of performance - financial and innovative - differentially affect performance feedback and therefore the likelihood of risky change.

Our research studies change in the context of organizational partnering behavior (the choice of alliances and acquisitions). The literature in strategic management has highlighted the risky nature of partnering choices (Dyer et al., 2004; Wang and Zajac, 2007), emphasized that they are associated with routinized organizational decisions (Hayward, 2002) and that they are important, specifically in high-technology industries, to organizational competitiveness (Bierly and Chakrabrati, 1996). This

understanding makes the study of decisions related to partnering patterns an appropriate setting in which to observe the relationship between risky organizational actions and performance. Our study observes partnering behavior of pharmaceutical firms from the year 1990 to 2006. Our results confirm the central idea of the paper - that the type of performance (financial or innovative) has a strong influence on the associated feedback loop and subsequent organizational actions. When financial performance deviates from expectations (either above or below), pharmaceutical firms decrease the extent of change in partnering patterns. In contrast, when innovative performance deviates from expectations, pharmaceutical firms increase the extent of change in partnering patterns. Our results are stronger for aspiration levels based on historical comparisons than those for social comparisons.

Our study builds on rich and diverse prior theoretical and empirical research and seeks to extend it in a few important ways. First, we directly test how performance predicts risk preferences when the organizational change is highly risky in nature. As suggested by evolutionary economics, given that organizations are path dependent and establish routines that heavily influence subsequent action, we argue that risk may not so much refer to the nature of an organizational action, but rather that any organizational action that represents a clear departure from the existing routines will be deemed risky (Nelson and Winter, 1982). Second, we introduce a performance construct not usually associated with this stream of empirical literature, namely innovative performance and contrast it with financial performance. This is important given that most prior studies have only used financial measures of performance, and as Audia and Greve (2006) point out, the results of these studies may well be sensitive to the type of performance being studied and its measurement. Third, we attempt to improve the understanding of the antecedents of risky organizational change. We offer theoretical arguments that combine the behavioral theory of the firm and evolutionary economics to better explain organizational change. Both these frameworks have offered predictions on organizational change, but there is limited research that combines these two perspectives to explain change. Finally, we investigate how performance and aspirations affect organizational change at the corporate level, which is relatively uncommon in previous studies (Greve, 2008). In the next section, we develop our hypotheses regarding the relationship between performance

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and change in partnering. We then discuss the use of data and describe our methodology. The final section presents the findings and discusses the results, limitations, and extensions of this study.

THEORY AND HYPOTHESES

Performance, Aspiration Levels, and Organizational Change: The behavioral theory of the firm has contributed significantly to our understanding of organizational search, the propensity for risk taking, and the likelihood of strategic change (Audia et al., 2000; Bromiley 1991; Greve 1998, 2003b; Miller and Chen, 2004; Park, 2007). According to this theory, organizational search for new solutions is triggered by a problem. When organizational performance falls below the aspiration levels of the firm, a search for solutions occurs and organizational change becomes more likely. Problemistic search implies that organizational aspiration levels (as regards performance) are formed based on the past experience of the focal organization (*historical* aspiration levels) and those of comparable organizations (*social* aspiration levels). The behavioral view of the firm offers similar predictions when organizational performance is above desired aspiration levels. Performance above aspirations levels provides managers not only with access to additional or lower-cost resources (slack) but also instills confidence in their abilities to pursue promising ideas previously deemed too risky. In this frame, the gap between aspiration levels and performance plays a central role, serving as an impetus for the firm to search for new solutions, increasing the salience of risky organizational choices and subsequently encouraging managers to engage in more risk-seeking behavior that results in organizational change. Figure 1a represents the relationship between performance, aspiration levels, and organizational change derived from Cyert and March's (1963) theory of the firm.

Evolutionary economics and organizational learning can be seen to be the most direct descendants of the behavioral theory of the firm (Argote and Grieve, 2007). One of the important concepts arising from evolutionary economics is that of a routine, which Winter (1964, p. 263) defines as a 'pattern of behavior that is followed repeatedly, but is subject to change if conditions change'. Nelson and Winter (1982) view routines as adapting in response to performance feedback. Actions that result in

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successful outcomes are positively reinforced and hence lead to persistence in the use of the existing routines, while actions that lead to performance outcomes that are unsuccessful trigger a search for modifications in the existing routine. Routines thus possess the qualities of both stability and change (Feldman, 2000; Feldman and Pentland, 2003). Such evolutionary predictions on the relationship between performance and organizational change are in line with the functional form presented in Figure 1b.[1] Empirical research largely supports the theoretical predictions indicated above. Bromiley et al. (2001) and Nickel and Rodriguez (2002) offer a comprehensive review of the empirical studies on this topic and find broad support for these predictions. Greve (1998), for example, finds that in the radio broadcasting industry, firms increase the likelihood of format change when station performance is below aspiration levels (both historical and social) and decrease the likelihood when performance is above aspiration levels.

When considering more risky forms of organizational change, however, the empirical findings on the relationship between performance, aspiration levels and organizational change are mixed, particularly when performance falls below aspirations. Greve (1998) studying change in format in the radio broadcasting industry finds that, in general, performance below aspiration levels does not have any effect in predicting change. However, by isolating various levels of risky change (in this study, different types of format), he finds for the most risky types of change, there is a decrease in the likelihood of change for performance below aspiration levels. Greve (2003a) finds similar results when studying the relationship between performance and the launch of innovations in the shipbuilding industry. The author shows that while performance above aspirations has an expected negative relationship to the launch of innovations, performance below aspirations has a positive but insignificant effect. These findings suggest that, when

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[1] The literature on individual risk-taking (Kahneman and Tversky, 1979) and organizational risk-taking (Bowman, 1982; March and Shapira, 1987) also suggests risk aversion when performance is above aspirations and risk taking when it is below aspiration levels.

organizational change is risky, performance below aspirations generates inertial forces (Hannan and Freeman, 1977) and risk aversion (Staw et al., 1981), which in turn decreases the likelihood of organizational change. Figure 1c shows the expected relationship between performance and risky organizational change.

FIGURE 1

The results of these studies are related, in part, to the nature of the performance measures (usually financial) employed. As suggested previously by Nickel and Rodriguez (2002), the organizational feedback observed may depend on the type of performance measure. Diversity in performance type can affect the feedback mechanisms that lead to decision-making and, thus, the likelihood of risky change. In this paper, we therefore contrast the patterns of organizational change arising from feedback models related to innovative performance and financial performance for a set of pharmaceutical firms. We focus on change related to partnering behavior (the firms' alliance and acquisition portfolios).

Organizational Change: Partnering Behavior

Performance feedback models have been applied in the study of several types of organizational change including changes in strategy, markets, products launches, levels of R&D, practices and processes (Lant et al., 1992; Nohria and Gulati, 1996; Greve, 1998, 2003a, 2003b; Audia et al., 2000; Mezias et al., 2002; Fleming and Bromiley, 2003). Even though a critical aspect of organizational growth and success is related to partnering behavior (in the form of alliances and acquisitions), and there are several studies that relate the formation of alliances to subsequent performance, there has been less attention paid to explaining how performance changes affect the change in the formation of alliances and acquisitions. Exceptions to this include Anand and Singh (1997) who study when low-performing organizations make acquisitions, Iyer and Miller (2008) who suggest how firm performance feedback matters to the timing of an acquisition, and Baum et al. (2005) who explain how Canadian investment banks accept the risk and

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uncertainty of non-local inter-organizational partnerships. However, these studies do not look at the portfolio of alliances and acquisitions, or explain specifically how such a portfolio would change given performance feedback. We suggest that behavioral and evolutionary theories of the firm provide an appropriate framework to study this change. First, given the evidence that most acquisitions and alliances fail in generating value and wealth for shareholders (Dyer et al., 2004, Seth, 1990; Doz, 1996), the expansion (and contraction) of organizational boundaries through alliances and acquisitions can be seen as being risky in nature and a viable organizational phenomenon for research purposes. Second, in order to explain the rationale behind strategic choices involving partnering, management scholars have often employed several theoretical perspectives related to rational decision making (for a review see Villalonga and McGahan, 2005). However, Dyer et al. (2004), find that managers seem to have a very limited rationale and basis from which to make choices between the formation of an alliance or an acquisition and suggest that these choices are often reflective of past experiences and path dependent behaviors. We therefore apply insights drawn for behavioral and evolutionary theories to the strategic choices made by firms regarding the choice of partnering behavior. While previous research has focused on the choice between alliances and acquisitions as opposing options, and has explained under which conditions organizations move from one collaborative mode to another, we are interested in looking at the change in the composition of the entire portfolio of alliances and acquisitions, which represents and defines the overall pattern of organizational partnering behavior.

Hypotheses Development: Previous research on partnering in strategic management literature, for example Villalonga and McGahan (2005), appropriately view different modes of collaboration as embodying varying levels of risk. Often certain forms of alliances, such as licensing, are deemed to be less risky, while acquisitions are seen as more risky. An important insight that may be derived from the behavioral theory of the firm is that the perception of risk in the mind of a manager may not coincide with actual risk. After all, individual managers are boundedly rational (March and Simon, 1958). In the face of uncertainty and complexity, they do not consider, or rationally evaluate, the complete spectrum of choices

before them. Rather, when deciding on future approaches and actions, they are heavily influenced by current areas of practice and by historical actions. The resulting individual actions and decisions tend to be in the neighborhood of current practice (since they are seen to be less risky) and are pursued even if they may not be the most attractive in terms of future success. Hence, when faced with a decision about partnering choices, managers are likely to associate current partnering patterns with minimal risk, regardless of whether this is actually the case. In the following paragraphs, building on behavioral theory and evolutionary economics, we suggest that any change in the overall partnering behavior of the organization represents risky action.

Nelson and Winter (1982) point out that organizations, like individuals, are bounded in their rationality and decision processes. Using this lens to explain the evolution of organizations, Nelson and Winter (1982) suggest that firms are path dependent – actions tend to be along well-established and familiar paths. They ascribe this to the formation of routines (organizational skills or habits) within the organization. These routines favor local search processes and make it difficult for the firm to adapt to any changes that are a departure from past practices and trajectories. Hence at the organizational level too, firms are likely to view a continuation of current practice (existing patterns of partnering behavior) as being less risky, and only depart from current practice reluctantly.

Recent studies on alliances and acquisitions (Zollo, 2009; Zollo and Singh, 2004) suggest that, although knowledge about the management of acquisitions and alliances can accumulate in individual managers as well as in groups throughout the organization, it is at the corporate level where organizational routines related to these processes are most likely to form and develop. Hayward (2002) proposes that managers develop standardized and specialized routines to form acquisitions while Zollo et al. (2002) introduce the concept of inter-organizational routines, defined 'as stable patterns of interaction among two firms developed and refined in the course of repeated collaborations'. Routinized actions embody the relationship between two firms and are important since they build across time and, with experience, allow growth in partner specific knowledge and hence contribute to alliance success. An evolutionary perspective (Nelson and Winter, 1982, Feldman, 2000) suggests that behaviors that result in

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outcomes that are viewed as a success are positively reinforced, making the change in organizational routines less likely. On the other hand, behaviors that lead to outcomes that are considered unsuccessful trigger the search for modifications in the existing routines, making the organizational change more likely. Therefore, while partnering actions are significantly affected by experience and routinization generating stability and path-dependency in behavior, the interpretation of an organization's performance (successful or unsuccessful) could stimulate possible modifications of existing partnering routines.

As explained earlier in our paper, when risky change is involved, an advanced interpretation of behavioral theory (Greve 1998) suggests that organizational change is most likely when performance is at expected levels. In general, for performance below expectations, evolutionary theory would appear to predict an increased likelihood of change – this is not in line with behavioral expectations for risky change. However, we argue below, that when considering financial performance specifically and the nature of routines linked with partnering behavior, evolutionary theories too would suggest that a decrease in financial performance below expectations would result in maintenance of existing routines and a decreased likelihood of change. First, according to threat-rigidity theory (Staw et al., 1981) organizations respond to financial distress by emphasizing cost reduction, limiting new strategic initiatives and reducing risk taking, and this results in conservative behavior (for a review see Miller and Chen, 2004; Chen and Miller, 2007). Poor performance could bring an organization close to the survival point (March and Shapira, 1987, 1992) where any further failure could threaten the organization's existence. Since establishing (or even dissolving) partnerships or undertaking acquisitions are resource intensive activities, these will not be undertaken lightly in an environment of financial distress. Maintaining existing routines could be seen as more cost effective compared to establishing new ones. Second, since financial performance is a broad measure of organizational performance, the set of factors that influence the performance may be hard to identify or pinpoint, and hence the precise nature or location for any underlying problem and the associated solution may not be obvious. Similarly, partnerships are complex and the relationship between a particular partnership, or a portfolio of partnerships, and the overall financial performance of the organization is often ambiguous (Haleblian et

al., 2006). Behavioral researchers have suggested that under conditions of ambiguity, decision makers depend heavily upon the most recent information to reduce their cognitive burdens and simplify information processing (Hogarth & Einhorn, 1992). When we bring together the conditions of financial distress, causal ambiguity and risky change (partnering patterns) the power of the feedback mechanism is likely to be reduced, and the organization incentives and ability to change routines is likely to diminish. Hence managers can be expected to fall back on reliance of familiar and existing routines, rather than try new approaches. Therefore, we expect that a change in the composition of the portfolio of alliances and acquisitions is most likely when an organization faces financial performance that equals aspirations. In view of these arguments, we propose the following hypotheses:

Hypothesis 1a: For firms performing below their aspiration levels for financial performance, decreases in financial performance are negatively related to the extent of change in organizational partnering behavior.

Hypothesis 1b: For firms performing above their aspiration levels for financial performance, increases in financial performance are negatively related to the extent of change in organizational partnering behavior.

Innovative Performance: Previous literature suggests a positive relationship between alliances and acquisitions and organizational innovative performance (Cloodt et al., 2006). An alliance can contribute to an organization's innovativeness by facilitating access to a partner's knowledge as well by providing opportunities for joint knowledge creation (Grant and Baden-Fuller, 2004) thereby establishing a positive link between strategic alliances and innovative performance (Ahuja, 2000; Stuart, 2000). Acquisitions can be a means to absorb the complete knowledge base of another firm permitting the generation of economies of scale and scope in the use of knowledge (Ahuja and Katila, 2001). Research also suggests that alliances and acquisitions may have a dark side - partners may have conflicting interests and moral hazard behaviors may decrease inter-organizational knowledge transfers (Khanna et al., 1998). In acquisitions, the aggressive pace of integration may disrupt innovative routines of the acquired

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organization generating a loss in competence or expert manpower and a delay in innovative activities (Puranam et al., 2006; Paruchuri et al., 2006). Most prior studies have sought to examine the effects of collaborative mechanisms on innovation. In this paper, our emphasis is on how deviations in innovative performance from aspiration levels affect subsequent partnering actions. We do not seek to study whether levels of innovative performance result in a decrease or increase of alliances and acquisitions, but rather whether innovative performance above and below aspiration levels results in a change in the approach to partnering as captured by the change in the portfolio of partnering choices (alliances and acquisitions). Scholars interested in how performance affects organizational decision making have called for measures of performance beyond financial performance (Audia and Greve, 2006; Greve, 2008) to predict organizational change. Innovation performance is a strong candidate for study given its importance in high technology industries where it is often closely related to organizational success.

Innovation and financial performance differ in important ways with respect to the feedback mechanisms they generate. They differ in terms of the breadth of organizational entities that influence them and in the extent of causal ambiguity related to performance levels. As argued previously, financial performance is a broad measure of a firm's overall financial health. It results from the combination of several interrelated activities within the organization including incoming and outgoing logistics, operations, sales, marketing, and manufacturing. All these activities individually and interactively influence financial performance and this makes it hard to identify and isolate the effects of any given activity on financial performance. Hence, causal ambiguity of financial performance (above or below expectations) is significant and the appropriate strength and direction of any resultant managerial action is less clear. Innovative performance, on the other hand, reflects the results of an organization's effort to generate innovation, and is heavily dependent on, and identified with, the Research and Development (R&D) function of an organization (Hagedoorn and Cloodt, 2003). The focus on the R&D function suggests a more direct managerial interpretation of cause and effect. The decreased causal ambiguity for innovative performance suggests a decrease in uncertainty and perception of risk for the decision maker and a corresponding decrease in inertia in organizational action.

The contrast between financial and innovative performance is even more evident when we specifically consider situations where performance is below or above aspiration levels. March and Shapira (1992) show that when financial performance is below the desired level, the decision maker's attention moves from one considering aspirations to that of the survival point (the performance level below which the organization may not be able to survive). Innovative performance below expectations, on the other hand, is less affected by survival considerations. A drop in the number of patents in a particular year may have long-term survival considerations but is unlikely to impinge on the short term viability of the organization (given the time lags involved in product design, development, manufacturing and sales) and hence the decision making associated with poor performance is not likely to be influenced by survival considerations, and hence may be less risk averse. Financial performance is also observed by, and impacts, a large number of stakeholders inside and outside the organization. The broad set of stakeholders may be affected by poor performance and may therefore want to influence the subsequent decisions about the way forward. Multiple interests and inputs into the decision making process, increase the likelihood of decisions made will reflect a compromise amongst stakeholders ensuring solutions that are relatively risk averse and close to current practice (Coff, 1999). For innovative performance, the stakeholders are more local to the R&D department and, perhaps, the top management of the organization. The fewer and less diverse set of stakeholders will permit corrective decisions and actions that are more risky than would be prudent when considering financial performance.

When performance is above aspiration levels, innovative performance also differs from financial performance. Financial resources in excess of expected ones, generates competition among stakeholders for rent appropriation. Organizational units compete with each other to increase their budgets and investors exercise pressure to transform slack resources to dividends. The competition for resources creates internal pressure resulting in conflicts and can produce inertia in decision making and an aversion to external investment, especially if risky. Innovation above expected levels does not result in a similar competition for additional innovations generated since this does not necessarily result in excess resources – especially in the short run.

We have argued that given important differences between innovative and financial performance, there will be less organizational inertia associated with innovative performance. So how do changes in innovative performance (above or below aspirations) affect choices in partnering behavior? Since in high technology industries, innovative performance is linked to partnering behavior, altering partnering behavior (to acquire external knowledge) can be seen as an approach to adjust this outcome. A fall in innovative performance below aspiration levels would generate an increase in internal R&D investments and external knowledge sourcing (alliances and acquisitions) based on the problemistic search argumentation (Cyert and March, 1963). From an evolutionary perspective, partnering routines generating outcomes that are seen as unsuccessful would activate a search for modification of (Nelson and Winter, 1982; Gavetti et al, 2007), or repairing of (Feldman, 2000) existing routines, leading to organizational change. As regards external knowledge sources, innovative performance below aspirations suggests that current partnering behavior may not be satisfying expectations in knowledge sourcing, and such a discrepancy is likely to generate a change in the alliance and acquisition portfolio. One possibility is that organizations might reduce partnering activities since they perceive them as not contributing overall innovative performance. Another possibility is that organizations might increase partnering activities in order to increase the external knowledge needed to reach expected innovation levels. Finally, organizations may change the relative weightage of alliances and acquisitions in the portfolio (from more acquisitive to more collaborative, or vice versa) to search for an optimal set of knowledge inputs. In every case, innovative performance below aspiration levels stimulates a search for external knowledge through collaborative activities that complements internal knowledge, through the modification of the existing alliance and acquisition portfolio.

Hypothesis 2a: For firms performing below their aspiration levels for innovative performance, decreases in innovative performance are positively related to the extent of change in organizational partnering behavior.

Kogut and Zander (1992) suggest that knowledge is both an input and output of innovation. Therefore innovation performance above aspirations would result in an increase in knowledge available for subsequent innovation. This is in line with Penrose (1959) who suggests that excess resources explain organizational growth and innovation. Pitelis (2007), while examining the similarities between Penrose's and Cyert and March's views of organizations, suggests that these theories are largely in alignment when it comes to the effects of slack or excess resources on growth and innovation. Both theories support the idea that excess (or slack resources) would lead to organizational search and hence serve to further increase innovation. Innovative performance, often measured in terms of weighted patent counts, affects a firm's ability to both exchange and absorb knowledge (Cohen and Levinthal, 1990) and therefore relates to the ability to conduct collaborative (Lane and Lubatkin, 1998) and acquisitive activities (Ahuja and Katila, 2001). A firm with strong innovative performance can be seen as a repository of new and useful knowledge, and can therefore be viewed as an attractive potential partner or, perhaps, as having a greater capacity to acquire new knowledge through acquisition. Innovating beyond expectations can lead to a new set of opportunities for alliances and acquisitions for a firm, presenting the firm with additional choices and therefore increasing the chance that the firm will alter its partnering portfolio. Hence, we predict that:

Hypothesis 2b: For firm above their aspiration levels for innovative performance, increases in innovative performance are positively related to the extent of change in organizational partnering behavior.

DATA AND METHODOLOGY

Our sample consists of 988 publicly traded U.S. firms that had a total of 2,380 acquisitions and 2,864 alliances between 1990 and 2006. Our analysis is confined to the pharmaceutical industry identified by the SIC codes 2833, 2834, 2835 and 2836. We also examined the NAICS codes relevant to the pharmaceutical industry (325 and 5417) to ensure that our sample did not include standalone biotechnology and chemical firms. Given the importance of innovation (OECD, 1997; Cloodt et al.,

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2006), and the prevalence of alliances and acquisitions, the pharmaceutical industry is a good empirical setting to study performance feedback models and change in partnering behavior.

Our data on acquisitions and alliances are drawn from the SDC Platinum database recognized as one of the most comprehensive databases of its kind (Schilling, 2009). Patent data are obtained from the United States Patent and Trademark Office (USPTO). For this database we use the most updated version available on the National Bureau of Economic Research (NBER) website, which contains information for patents up to 2006. Firm-level data are obtained from the Compustat Global Fundamental Annual dataset (Standard & Poor's), which provides data for publicly traded companies and their subsidiaries. These three databases have been commonly used in previous studies of firm partnering choices (Villalonga and McGahan, 2005; Iyer and Miller, 2008; Wang and Zajac, 2007) and in performance feedback studies (Chen and Miller, 2007).[2]

Dependent variable: The dependent variable measures the change in partnering behavior between year *t* and year *t-1*. For each firm-year, we generate a column vector with two components (i) a = the number of alliances and (ii) b = the number of acquisitions formed by the organization in the given year. This vector represents the partnering profile of the organization in a particular year. In order to compute the change in partnering patterns between year *t* and *t-1*, we measure the Euclidian distance between the two vectors.

$$PBC_{it} = \sqrt{\left(a_{i,t} - a_{i,t-1}\right)^2 + \left(b_{i,t} - b_{i,t-1}\right)^2} ,$$

where PBC (Partnering Behavior Change) is the extent of change in the pattern of partnering behavior of organization *i* from year *t-1* to year *t*. Our formulation of the dependent variable is similar to studies that capture technological distance across firms (Ahuja, 2000; Rosenkopf and Almeida, 2003). This operationalization of the dependent variable captures both quantitative and qualitative changes in partnering behavior across time. Quantitative changes, such as an increase or decrease in alliances and/or

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[2] For the creation of our final database, the matching of the three databases is a critical issue. In order to match USPTO data with COMPUSTAT data we followed the procedure suggested by NBER (Bessen, 2009). After this first match, we matched this resulting database with the SDC database using CUSIP numbers as the identifier of each firm. The resultant final sample has 9,950 firm-year combinations

acquisitions will increase the magnitude of the dependent variable and qualitative changes, such as a shift in the partnering emphasis from alliances to acquisitions and vice versa will also increase the magnitude of the dependent variable.

Independent variables: In our study we examine two types of performance, financial and innovative. Following previous studies on performance feedback models and organizational change (Greve, 2003a, Greve 2003b), financial performance is measured using the traditional accounting measure of return on assets (ROA)[3]. Recent studies of firm boundary choice under behavioral assumptions have identified ROA as a good measure of firm performance (Iyer and Miller, 2008). For innovative performance (IP) we use the count of granted patents for the firm. Patents are an appropriate indicator of innovative performance in high-technology sectors (Hagedoorn and Cloodt, 2003), and are an important source of technological advantage in the pharmaceutical industry (Levin et al., 1987). Previous studies of partnering choices have widely used patent counts as a measure of innovative performance (Cloodt et al., 2006).

For both the performance measures, we follow Greve (1998, 2003a, 2003b) in generating the measures for historical and social aspiration level variables. We generate historical aspiration levels by taking an exponentially weighted average of past values on the performance variable (Levinthal and March 1981). The formula for historical aspiration levels is:

$$A_{i,t} = \alpha * A_{i,t-1} + (1 - \alpha) * P_{i,t-1}$$

In this specification of historical performance aspiration level, $A_{i,t}$ is the aspiration level for firm *i* in time *t*. $P_{i,\ t-1}$ is the actual performance of firm *i* in time *t-1*. *Alpha* is the weight given to the most recent aspiration level. In order to assess the appropriate value of *alpha,* we estimate models with different values of alpha varying from 0.1 to 0.9 with increments of 0.1 (Greve, 2003a) and identify the value of *alpha* corresponding to the best log-likelihood value. Following this procedure we find that Financial Performance (ROA) had an *alpha* of 0.5 and Innovative Performance (IP) had an *alpha* of 0.2. For social aspiration levels, we attempted to identify the appropriate reference group for a particular firm. We

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[3] Studies have also used return of equity (ROE) as a measure for financial performance (Audia and Greve, 2006). Our findings for ROE resemble those for ROA but with slightly weaker effects.

assume (as did Greve 2008) that firms will identify with, and compare themselves to, other firms of a similar size. We hence divided our sample firms into two groups by size (measured as log of employees) depending on whether they were below or above the median in terms of size in that year. We then computed the difference between the firm's performance in period t and the median performance of the appropriate reference group (bigger firms or smaller firms) in the industry in period $t-1$.

$$Social_{i,t} = P_{i,t} - P_{j,t-1,s}$$

where $Social_{it}$ for firm i in time t is the difference between the performance of firm i in year t and the performance of the firm j in year $t-1$, where j is the median industry performer in the same size category. In our model, s is 1 when the firm is large, 0 otherwise.

As in previous similar studies, (Audia and Greve, 2006; Greve, 2003a), to estimate whether the effect of performance on change in partnering activity differs according to whether the performance is above or below the aspiration level, we specify performance as a spline function (Greene, 1993). Therefore, for each performance type (ROA and IP) we create two variables for both historical and social aspiration levels. First we compute the difference between performance and aspiration, as:

$$D_{i,t,a,p} = P_{i,t,p} - A_{i,t,a,p}$$

where $D_{i,t,a,p}$ is the discrepancy for the firm i in time t relative to aspiration a (historical or social) between the $P_{i,t,p}$, which is the performance p (financial or innovative) of the firm i in time t, and $A_{i,t,a,p}$, which is the aspiration a (historical or social) for the performance p (financial or innovative) for the firm i in time t. From D we generate two variables called $Above_{i,t,a,p}$ and $Below_{i,t,a,p}$ formalized as:

$$Above_{i,t,a,p} = \begin{cases} D_{i,t,a,p} \\ 0 \end{cases}$$

where $Above_{i,t,a,p}$ equals $D_{i,t,a,p}$ when $D_{i,t,a,p}$ is positive, and 0 otherwise.

$$Below_{i,t,a,p} = \begin{cases} D_{i,t,a,p} \\ 0 \end{cases}$$

where $Below_{i,t,a,p}$ equals $D_{i,t,a,p}$ when $D_{i,t,a,p}$ is negative, and 0 otherwise.

Therefore, for each performance type we have 2 independent variables for historical aspiration levels (above and below) and two independent variables for social aspiration levels (above and below). In general, we use aspirations in t to generate discrepancy in $t+1$, which in turn predicts partnering behavior change in $t+2$. Therefore, we allow for a one year lag between the generation of the performance feedback and the subsequent organizational change.

Control variables: In order to take into account alternative explanations for explaining partnering behavior, we introduce control variables into our model. The resource based view of the firm highlights the role of firm's technological and marketing resources (especially in high-technology sectors) in making partnering choices to build complementarities and synergies. We therefore introduce *R&D Intensity* (the ratio of R&D expenditures to sales), and *Marketing Intensity* (the ratio of the sum of marketing, selling, general, administrative expenses to sales) to the model. The variable *Resources* is the sum of the two resource variables[4]. From an organizational learning perspective, the value generated by an acquisition or an alliance depends on the capabilities which the firm develops through repeated experience with these governance forms (Hayward, 2002). Thus, we use *Alliance Experience* and *Acquisitions Experience,* as the average number of alliances (or acquisitions) in the previous 3 years as controls. To control for *Size*, we use the log of the number of employees. Size has, after all, been confirmed as an important organizational characteristic in firm risk taking studies (Audia and Greve, 2006) and in partnering choice studies (Villalonga and McGahan, 2005). Finally, we control for growth opportunities that encourage partnering behavior by incorporating *Net Income* and *Intangible Assets* (trademarks, patents, and property rights) (Iyer and Miller, 2008).

Model: In this study, the dependent variable Partnering Behavior Change (PBC) captures the difference between the organization's portfolio of alliances and acquisitions in t and $t-1$ as explained previously. The independent variable is the difference between performance and its aspirations in t, where the aspiration in t is a linear combination of aspiration and the performance in $t-1$, either historical or social (as

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[4] We use the Resource variable in our regressions, though the results are the same if we use the variables R&D Intensity and Marketing Intensity separately

explained earlier). By definition our dependent and independent variables are differences across time, so we specify our estimation model as pooled ordinary least squares (POLS) using the first-difference method (Wooldridge, 2002). As in a fixed-effect model the first-differencing transformation eliminates unobserved effects and holds the same assumptions of consistency as in the fixed-effects method. Unlike in fixed-effects, the first-difference estimator does not assume homoskedasticity and no serial correlations in the error term, which implies that all the reported statistics from the POLS are asymptotically valid (Wooldridge, 2002). Therefore:

$$\Delta Y_{i,t} = \Delta X_{i,t}\beta + \Delta C_{i,t} + \Delta U_{i,t}$$

where $\Delta Y_{i,t}$ is the change in organizational partnering behavior by firm i in year t ($\Delta Y_{i,t}=Y_{i,t}-Y_{i,t-1}$), ΔX_{it} is the difference between performance and aspiration levels ($\Delta X_{i,t}=X_{i,t}-X_{i,t-1}$), $\Delta C_{i,t}$ is the vector of control variables affecting $Y_{i,t}$ and $\Delta U_{i,t}$ is the error term. Intuitively, the FD specification implies that we focus on the effect of any variation in performance on the variation in the change in partnering behavior, rather than the level of the dependent and independent variables. The interpretation of the estimates is exactly the same as FE model (Wooldridge, 2002). In addition, we adjust the standard errors for intra-group correlation and control for robustness of the estimator. We analyze the data using STATA SE 11.0.

RESULTS

Table 1 presents the correlation matrix and table 2 presents the results of the regressions. Model 1 includes the control variables, model 2 adds the variables based on financial performance, and model 3 includes variables based on innovative performance. Models 4 to 8 show the results of the sensitivity analyses (a) by adjusting the time lag used (model 4 and 5), (b) combining both independent variables (model 6) and (c) using alternative estimation models (model 7 and 8).

TABLE 1

Hypotheses 1a and 1b suggest that any increase in the discrepancy between financial performance and the aspiration levels results in a decrease in the extent of change in partnering behavior. In model 2, the regression coefficient associated with performance above historical aspirations is negative and statistically significant (-.475, p<0.001), while the coefficient for performance below historical aspirations is positive and significant (.448, p<0.001). Therefore Hypotheses 1a and 1b are supported suggesting that organizations are most likely to change their partnering behavior when their financial performance equals the expectations based on historical performance patterns (Figure 2a). Following previous studies (Greve 2003a, 2003b) we perform the Wald test of the difference of coefficients to explore whether the magnitude of partnering behavior change is different for above and below aspirations. The results of the Wald test (F=0.81) suggest that there is no statistically significant difference between the magnitudes of the two effects. Our results for social aspiration levels variables (associated with financial performance) show that while performance below expectations based on social aspirations is positive and significant (.230, p<0.001), performance above social aspirations has a negative coefficient but is not statistically significant. Overall our findings for financial performance, above and below aspirations, are as expected and reinforce past findings of empirical research on performance and risky organizational change.

Hypotheses 2a and 2b suggest that the increase in the discrepancy between actual innovative performance and aspirations results in an increase in the extent of change in partnering behavior. The coefficient for performance above historical aspirations is positive and statistically significant (.033, p<0.001), while coefficient for performance below historical aspirations is negative and significant (-.028, p<0.001). Our findings support Hypotheses 2a and 2b and suggest that the greater the difference between innovative performance and the organizations aspirations (either below or above), the greater the change in partnering behavior (Figure 2b). Results of the Wald test of the difference of coefficients (F=0.54) suggest there is no difference in the magnitudes of the coefficients when Pharmaceutical firms' innovative performance is above or below historical aspiration levels. The results for the variables considering social aspirations resemble those for historical aspiration levels; while performance below social aspirations supports hypothesis 2b (-.019, p<0.001), performance above social aspirations has a positive coefficient,

as predicted, but is not statistically significant. Overall our findings for innovative performance suggest that any deviation from aspirational performance activates problemistic or slack search, which results in greater risk taking and change. This finding is in line with Cyert and March's (1963) original ideas on performance feedback and organizational change. Overall, the fit of our models improved significantly (model 2 adjusted r^2 =.105 and model 3 adjusted r^2 =.128) with the addition of our independent variables.

TABLE 2

In table 2 we report results also for three different sensitivity analyses. In our initial models (2 and 3), we use the difference between performance in time t and aspiration levels in time t as the predictor for change in period $t+1$. The assumption here is that a change in partnering behavior takes one year to get reflected in the performance feedback mechanism and the associated change adopted by the organization. We also allow for an additional time between performance and change by observing the change in period $t+2$. Model 4 shows how the discrepancy between actual financial performance and its aspiration in time period t predicts change in partnering behavior in $t+2$. Our results do not change and the coefficients maintain their direction and statistical significance. The results also hold for both historical and social aspiration levels. In model 5, we apply the time lag $t + 2$ to the model using innovative performance. As was the case for financial performance, our results do not change in any significant manner. Model 6 shows the regression results after combining the independent variables from models 2 and 3. By combining the independent variables, we are taking into consideration the effect of both types of performance together in explaining the variation in the phenomenon of interest. Model 6 shows a better fit to data in comparison to model 2 (LR=47.01) and model 3 (LR=19.82) and confirms our initial findings supporting our hypotheses. Finally, we consider the likelihood of change instead of the extent of change, as in previous studies on organizational change (Greve, 1998, 2003a), to see whether our results may be affected by the choice of the estimation procedure (model 7 and model 8). In order to do that, we create the variable *Partnering Behavior Change Binary* (*PBCB*) equal to 1 when *Partnering*

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Behavior Change (*P.B.C.*) is greater than 0, and 0 otherwise. Estimating the models for *P.B.C.B.* using a Probit estimator, we observe similar results as with the pooled OLS regressions.

DISCUSSION AND CONCLUSIONS

Our study examines how the gap between aspiration levels and actual performance explains the changes in partnering patterns of pharmaceutical firms for the period 1990 to 2006. Our results confirm the central idea of the paper - that the type of performance (financial or innovative) has a strong influence on the associated feedback and subsequent organizational action. When financial performance deviates from expectations (either above or below), pharmaceutical firms decrease the extent of change in partnering patterns; in contrast, when innovative performance deviates from expectations (either above or below), pharmaceutical firms increase the extent of change in partnering patterns. Our results are stronger for aspiration levels based on historical comparisons than those for social comparisons.

Our study suggests that the type of performance being observed is important. While any deviation of financial performance from its aspirations generates risk adversity, which is reflected in less change, a deviation from expectation of innovative performance increases the extent of change in partnering behavior for the firms being studied. In other words, our results suggest that risk profile in decision-making, as captured by the change in partnering routines, has different patterns depending on the type of performance used to activate the behavioral feedback mechanisms. Hence the relationship between performance, risk and organizational change is explained not only by whether performance is above and below aspirations (as has been the focus of most previous studies), but also by the type of performance that triggers the feedback mechanism and the change. Our results, in fact, suggest that for pharmaceutical firms, performance above or below expectations leads to similar patterns of risk taking (for both innovative and financial performance), but these patterns of decision-making are significantly different when considering different performance types (financial and innovative).

Though our research attempts to extend and incorporate new ideas to the literature on performance aspiration levels and organizational change, it also in many ways reinforces existing

perspectives. Greve (1998, 2003a) has previously shown that financial performance (measured as ROA) does not explain risky organizational change in the manner that problemistic search would suggest. Instead the papers found support for inertial argumentation and risk aversion. Building on this platform, our study provides the conceptual basis for this finding and confirms the empirical findings in a new setting. Our research is also an attempt to directly answer the call for more research that improves our understanding of the role of various types of goals (other than profitability) and related performance measures (other than financial performance) in predicting risky organizational change (Greve, 2008). By using innovative performance as a predictor of organizational change in our performance feedback model, our findings suggest that the decision maker's interpretation of each performance construct has different implications for firm risk-taking behavior. In this vein, we shed light on what can be viewed as the local character of performance and its related feedback mechanisms. In other words, while a goal belongs to the organization as a whole, the related performance feedback mechanisms might reside only in a part of the organization, and more specifically in those parts involved closely to the input-output process that is reflected by the performance. This local nature of goals affects the level of causal ambiguity related to the feedback mechanism and thus the level of uncertainty of the subsequent decision-making process.

This paper attempts, perhaps more fully than before, to incorporate and synthesize insights from evolutionary economics in order to sharpen the perspective on the relationship between performance, risk taking and organizational change. One of the primary insights from evolutionary economics is incorporated into our dependent variable – that any departure from existing practice is viewed as being essentially risky from a managerial decision-making perspective. Borrowing from Nelson and Winter's (1982) concepts as path dependency, routines, stability and change, we attempt to build a more comprehensive approach to behavioral strategic decision-making, presenting risk as any departure from current behavioral practice (specifically applied to the idea of change of partnering routines). Along this theoretical tradition, we view risk as a perception in the mind of the managers, who are considered boundedly rational and path dependent in their decision-making. Where the insights from evolutionary economics play an important role is in highlighting how hard it is for individuals and organizations to

change behavior patterns, regardless of the likelihood of success related to the change. By looking at risky change as a departure from routinized strategic actions related to alliances and acquisitions and by using a performance feedback model perspective, we incorporate behavioral concepts and thinking to both the independent variables and the dependent variable – thus embedding our research more completely in behavioral theory.

From the perspective of the strategic management literature on partnering choices, our findings are in line with previous studies that suggest that partnering decisions are risky in nature (Villalonga and McGahan, 2005; Wang and Zajac, 2007), and also with studies attempting to uncover behavioral explanations behind partnering choices (Iyer and Miller, 2008). At the same time, our study seeks to enrich the understanding of the rationale behind partnering choices and risk taking in strategic decision making by emphasizing the role of bounded rationality and routinization in the associated processes. The literature on alliances and acquisitions has largely relied on rational assumptions related to resource-based, transaction cost-based and agency-based theories in explaining corporate managerial decision making. This study attempts to add to the overall understanding on partnering choices showing how evolutionary and behavioral assumptions can explain variation in risk taking of corporate level decision making. Thus this study helps complete the picture of influences on decisions related to alliances and acquisitions.

Building on the literature on alliances, acquisitions, and innovation we confirm the strength of the relationship between innovative performance and partnering choices that is seen as a key determinant of competitive advantage in high-tech industries (Bierly and Chakrabrati, 1996). We look at how innovative performance affects the extent of change in partnering choices. Here innovative performance is not seen as an outcome of strategic decision making, but rather as a driver for strategic decision making in the minds of managers. Thus, our study presents innovative performance in a different light; not only as an output of the innovation process but also as input for the firm's decision making process.

Our study has some implications for managers. Managers should recognize that decision making in areas of strategic importance could often be influenced by expectations in performance rather than by

other more rational characteristics such as the level of resources, the competitive environment involved, or the strategic probabilities of success associated with these actions. We do not suggest that building on behavioral considerations in decision making is either efficient or inefficient. We merely suggest that managerial awareness of the salience of expectations regarding performance (especially those influenced by historical performance) on subsequent decision making, will enhance the sophistication of the choices they make. Managers should therefore explore the basis of their decision-making processes and be aware of the implications. While we do not have any normative claims to offer, we do believe managers should bear in their mind the performance implications in their strategic decision making, in particular when engaging in partnering choices.

By building on previous research in behavioral theory, we hope to make several contributions. First, we contrast the feedback effects of different types of performance. Second, we attempt to develop and directly test theoretical arguments on how performance feedback models predict risky forms of organizational change. Third, we apply performance feedback models to better understand changes in partnering routines. While collaborations are seen as important strategic tool (Villalonga and McGahan, 2005), there has been relatively little research that explains partnering patterns taking into account behavioral insights. Fourth, we bring into focus an important measure of performance - innovative performance. In high technology industries, innovative performance is central to firm success and therefore it is important to understand how it affects firm decision making. By studying innovative performance, we shed light on how different performance measures affect risk taking behavior in contrasting ways. Finally, we study performance feedback models on partnering behavior change in the pharmaceutical industry, which is a new empirical setting in which to test behavioral assumptions.

Our study has certain limitations which also point to possible avenues for future research. First, our analysis is limited to the global pharmaceutical industry. While the pharmaceutical industry is similar to other high technology industries in terms of the importance of innovation and collaborations, we cannot generalize our findings, and the implications thereof, to other technology and science intensive industries. Future research should examine the relationship between financial and innovative performance

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and changes in partnering behavior in other high-technology industries. Second, we examine only one type of dependent variable to capture the idea of risky change at the organizational level. There is an opportunity to further understand how performance feedback models can provide insight to managerial actions related to other variables of strategic importance. Third, as suggested by previous studies, innovative performance is a multi-indicator construct. While patents are a good measure of innovative performance and have been commonly used to measure innovativeness, future studies using innovative performance in feedback models should consider other measures including R&D expenditure and new product introductions. Fourth, our study only partially addresses the call from management scholars to explore additional performance goals in predicting organizational change. While we have used measures of both financial and innovative performance, we do not explore the relationship between the two. Future studies may explore the interaction between these two performance variables.

MAIN REFERENCES

Ahuja, G. 2000. Collaboration networks, structural holes, and innovation: A longitudinal study. *Administrative Science Quarterly* **45**(3) 425-455.

Ahuja, G., R. Katila. 2001. Technological acquisitions and the innovation performance of acquiring firms: A longitudinal study. *Strategic Management Journal* **22**(3) 197-220.

Anand, J., H. Singh. 1997. Asset redeployment, acquisitions and corporate strategy in declining industries. *Strategic Management Journal* **18**(S1) 99-118.

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

Audia, P.G., H.R. Greve. 2006. Less likely to fail: Low performance, firm size, and factory expansion in the shipbuilding industry. *Management Science* **52**(1) 83.

Baum, J.A.C., T.J. Rowley, A.V. Shipilov, Y.T. Chuang. 2005. Dancing with strangers: Aspiration performance and the search for underwriting syndicate partners. *Administrative Science Quarterly* **50**(4) 536-575.

Bessen, J. 2009. Matching patent data to compustat firms. NBER PDP Project.

Bierly, P., A. Chakrabarti. 1996. Generic knowledge strategies in the US pharmaceutical industry. *Strategic Management Journal* **17**(WINTER) 123-135.

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

Chen, W.R., K.D. Miller. 2007. Situational and institutional determinants of firms' R&D search intensity. *Strategic Management Journal* **28**(4) 369-381.

Cloodt, M., J. Hagedoorn, H. Van Kranenburg. 2006. Mergers and acquisitions: Their effect on the innovative performance of companies in high-tech industries. *Research Policy* **35**(5) 642-654.

Coff, R.W. 1999. When competitive advantage doesn't lead to performance: The resource-based view and stakeholder bargaining power. *Organization Science* 119-133.

Cyert, R.M., G. James. 1963. March, A Behavioral Theory of the Firm. *Englewood Cliffs*.

Dyer, J.H., P. Kale, H. Singh. When to ally and when to acquire. *Harvard Business Review, Jan 2004* **82**(7) 109-115.

Feldman, M.S. 2000. Organizational routines as a source of continuous change. *Organization Science* 611-629.

Greve, H.R. 1998. Performance, aspirations, and risky organizational change. *Administrative Science Quarterly* **43**(1) 58-86.

Greve, H.R. 2003a. A behavioral theory of R&D expenditures and innovations: Evidence from shipbuilding. *Academy of Management Journal* **46**(6) 685-702.

Greve, H.R. 2008. A behavioral theory of firm growth: Sequential attention to size and performance goals. *The Academy of Management Journal (AMJ)* **51**(3) 476-494.

Haleblian, J., J.Y. Kim, N. Rajagopalan. 2006. The influence of acquisition experience and performance on acquisition behavior: Evidence from the US commercial banking industry. *The Academy of Management Journal ARCHIVE* **49**(2) 357-370.

Hayward, M.L.A. 2002. When do firms learn from their acquisition experience? Evidence from 1990 to 1995. *Strategic Management Journal* **23**(1) 21-39.

Iyer, D.N., K.D. Miller. 2008. Performance feedback, slack, and the timing of acquisitions. *The Academy of Management Journal ARCHIVE* **51**(4) 808-822.

Kahneman, D., A. Tversky. 1979. Prospect theory: An analysis of decision under risk. *Econometrica: Journal of the Econometric Society* 263-291.

Khanna, T., R. Gulati, N. Nohria. 1998. The dynamics of learning alliances: competition, cooperation, and relative scope. *Strategic Management Journal* **19**(3) 193-210.

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

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

March, J.G., H.A. Simon. 1958. *Organizations*. John Wiley & Sons Inc.

Miller, K.D., W.R. Chen. 2004. Variable organizational risk preferences: Tests of the March-Shapira model. *The Academy of Management Journal* **47**(1) 105-115.

Nelson, R.R., S.G. Winter. 1982. *An evolutionary theory of economic change*.

Nickel, M.N., M.C. Rodriguez. 2002. A review of research on the negative accounting relationship between risk and return: Bowman's paradox* 1. *Omega* **30**(1) 1-18.

Paruchuri, S., A. Nerkar, D.C. Hambrick. 2006. Acquisition integration and productivity losses in the technical core: Disruption of inventors in acquired companies. *Organization Science* **17**(5) 545.

Penrose, E. 1959. *The theory of the growth of the firm*.

Pitelis, C.N. 2007. A behavioral resource-based view of the firm: The synergy of Cyert and March (1963) and Penrose (1959). *Organization Science* **18**(3) 478-490.

Rosenkopf, L., P. Almeida. 2003. Overcoming local search through alliances and mobility. *Management Science* 751-766.

Schilling, M.A. 2009. Understanding the alliance data. *Strategic Management Journal* **30**(3) 233-260.

Staw, B.M., L.E. Sandelands, J.E. Dutton. 1981. Threat rigidity effects in organizational behavior: A multilevel analysis. *Administrative Science Quarterly* **26**(4) 501-524.

Stuart, T.E. 2000. Interorganizational alliances and the performance of firms: a study of growth and innovation rates in a high technology industry. *Strategic Management Journal* **21**(8) 791-811.

Villalonga, B., A.M. McGahan. 2005. The choice among acquisitions, alliances, and divestitures. *Strategic Management Journal* **26**(13) 1183-1208.

Wang, L., E.J. Zajac. 2007. Alliance or acquisition? A dyadic perspective on interfirm resource combinations. *Strategic Management Journal* **28**(13) 1291-1317.

Zollo, M., J.J. Reuer, H. Singh. 2002. Interorganizational routines and performance in strategic alliances. *Organization Science* 701-713.

Zollo, M., H. Singh. 2004. Deliberate learning in corporate acquisitions: post acquisition strategies and integration capability in US bank mergers. *Strategic Management Journal* **25**(13) 1233-1256.

Table 1

Table 1: Descriptive Statistics

	Obs	Mean	SD	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
(1) Partnering Behavior Change	8,694	0.39	0.69	1.00																
(2) Partnering Behavior Change (1 year lagged)	7,733	0.40	0.70	0.53	1.00															
(3) Partnering Behavior Change Binary	9,950	0.37	0.48	0.89	0.50	1.00														
(4) Above $_{Historical, Financial}$	5,137	0.10	0.19	-0.09	-0.08	-0.11	1.00													
(5) Below $_{Historical, Financial}$	9,870	-0.04	0.15	0.05	0.05	0.06	0.22	1.00												
(6) Above $_{Social, Financial}$	7,792	0.10	0.14	0.03	0.02	0.03	0.09	0.18	1.00											
(7) Below $_{Social, Financial}$	7,792	-0.19	0.32	0.10	0.09	0.07	0.10	0.41	0.45	1.00										
(8) Above $_{Historical, Innovative}$	6,915	0.91	3.17	0.07	0.08	0.08	-0.06	0.03	0.00	0.05	1.00									
(9) Below $_{Historical, Innovative}$	9,902	-0.37	1.63	-0.09	-0.06	-0.06	0.04	0.01	0.00	-0.04	0.08	1.00								
(10) Above $_{Social, Innovative}$	6,946	0.85	3.54	0.06	0.06	0.08	-0.04	0.02	0.00	0.04	0.54	-0.24	1.00							
(11) Below $_{Social, Innovative}$	6,964	-3.90	5.21	-0.12	-0.14	-0.11	0.13	-0.05	0.03	-0.11	0.12	-0.04	0.19	1.00						
(12) Size	7,012	88.93	1,683	0.09	0.06	0.04	-0.02	0.00	0.03	0.03	0.01	-0.03	-0.01	0.01	1.00					
(13) Resources	6,772	-0.20	11.53	-0.02	-0.01	-0.01	-0.09	-0.06	-0.03	-0.02	0.01	-0.01	0.01	0.00	0.00	1.00				
(14) Alliance Experience	8,962	-0.00	0.38	0.12	0.03	0.10	0.00	0.01	0.01	0.00	-0.04	0.03	-0.01	-0.02	-0.01	-0.03	1.00			
(15) Acquisition Experience	8,962	0.01	0.29	0.17	0.05	0.14	0.00	0.02	0.04	0.02	0.01	-0.05	0.06	-0.01	0.01	0.00	0.14	1.00		
(16) Net Income	8,259	9,758	358,424	0.02	0.03	0.02	-0.01	0.02	0.04	0.02	0.07	-0.05	0.00	0.00	-0.14	-0.01	-0.02	-0.03	1.00	
(17) Intangible Assets	5,831	-0.00	0.42	0.05	-0.01	0.03	-0.02	-0.01	0.00	0.02	0.01	-0.01	0.00	-0.02	0.07	0.11	0.01	0.06	-0.05	1.00

Coefficients greater in magnitude than 0.04 are significant at the 0.05 level

Notes: Number of observations per variable is not costant given the missing values. This difference is reflected also in N of the sample for each model. However, our results are not affected by these differences

Table 2

Table 2: Model in first difference for Partnering Behavior Change

	Main Models				Sensitivity Analysis Models			
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
$Above_{Historical, Financial}$		-0.47*** (0.083)		-0.34*** (0.107)		-0.19* (0.084)	-0.94*** (0.209)	
$Below_{Historical, Financial}$		0.44*** (0.096)		0.42*** (0.113)		0.32** (0.105)	1.08*** (0.288)	
$Above_{Social, Financial}$		-0.08 (0.137)		-0.08 (0.138)		-0.02 (0.132)	-0.17 (0.249)	
$Below_{Social, Financial}$		0.23*** (0.070)		0.22** (0.082)		0.10 (0.077)	0.40** (0.150)	
$Above_{Historical, Innovative}$			0.03*** (0.007)		0.02* (0.007)	0.03** (0.009)		0.06*** (0.013)
$Below_{Historical, Innovative}$			-0.02*** (0.007)		-0.02* (0.010)	-0.03** (0.009)		-0.06*** (0.013)
$Above_{Social, Innovative}$			0.02 (0.004)		0.00 (0.006)	0.00 (0.006)		0.01 (0.008)
$Below_{Social, Innovative}$			-0.01*** (0.003)		-0.02*** (0.003)	-0.01*** (0.003)		-0.03*** (0.005)
Size	0.00*** (0.000)	0.00*** (0.000)	-0.00 (0.000)	0.00* (0.000)	0.00* (0.000)	-0.00 (0.000)	0.00** (0.000)	0.00 (0.000)
Resources	-0.00 (0.001)	-0.00 (0.001)	-0.00 (0.001)	0.00 (0.001)	-0.00 (0.001)	-0.00 (0.001)	-0.00 (0.002)	-0.00 (0.002)
Alliance Experience	0.11 (0.073)	0.12⁺ (0.071)	0.30*** (0.067)	-0.05 (0.051)	-0.30 (0.057)	0.31*** (0.067)	0.12* (0.061)	0.34*** (0.097)
Acquisition Experience	0.24** (0.081)	0.24** (0.079)	0.44*** (0.102)	0.05 (0.071)	0.16* (0.102)	0.32*** (0.097)	0.41*** (0.075)	0.68*** (0.118)
Net Income	0.00** (0.000)	0.00* (0.000)	0.00 (0.000)	0.00* (0.000)	0.00 (0.000)	0.00 (0.000)	0.00* (0.000)	0.00 (0.000)
Intangible Assets	0.06⁺ (0.000)	0.06* (0.032)	0.07** (0.030)	-0.04 (0.033)	-0.03 (0.030)	0.00 (0.000)	0.12* (0.060)	0.11⁺ (0.060)
Costant	0.71*** (0.081)	0.80*** (0.081)	0.53*** (0.073)	0.87*** (0.083)	0.59*** (0.073)	0.56*** (0.087)	-0.15 (0.104)	-0.85*** (0.091)
Years Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Likelihood-ratio test vs. model 1		85.78***	105.04***					
Degrees of freedom		4	4					
Likelihood-ratio test vs. model 2						47.01***		
Degrees of freedom						4		
Likelihood-ratio test vs. model 3						19.82***		
Degrees of freedom						4		
Log-Likelihood							-1,829.71	-1,903.19
N	2,627	2,627	2,824	2,343	2,626	1,898	2,894	3,091
Number of Cluster (firm)	413	413	598	394	559	379	425	619
R-squared	0.08	0.10	0.13	0.07	0.09	0.13	0.07	0.08
F (or Wald Chi2 for model 7 and model 8)	5.86***	9.47***	11.53***	5.61***	6.59***	7.98***	190.99***	229.12***

Notes. One-tailed test for hypothesized effects; two-tailed tests otherwise.

⁺p<0.10, *p<0.05, **p<0.01, ***p<0.001
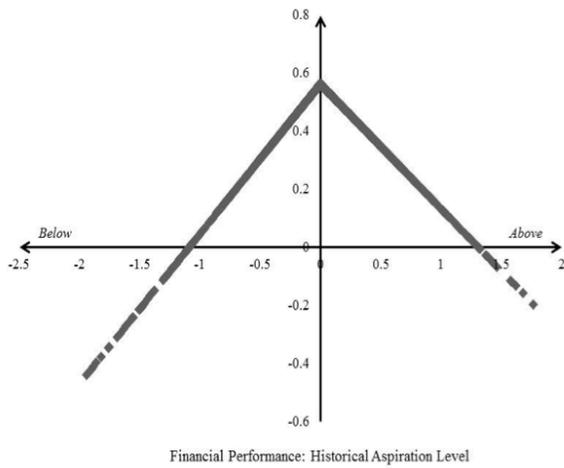
Robust standar errors are in parentheses

Figure 1

Figure 1a
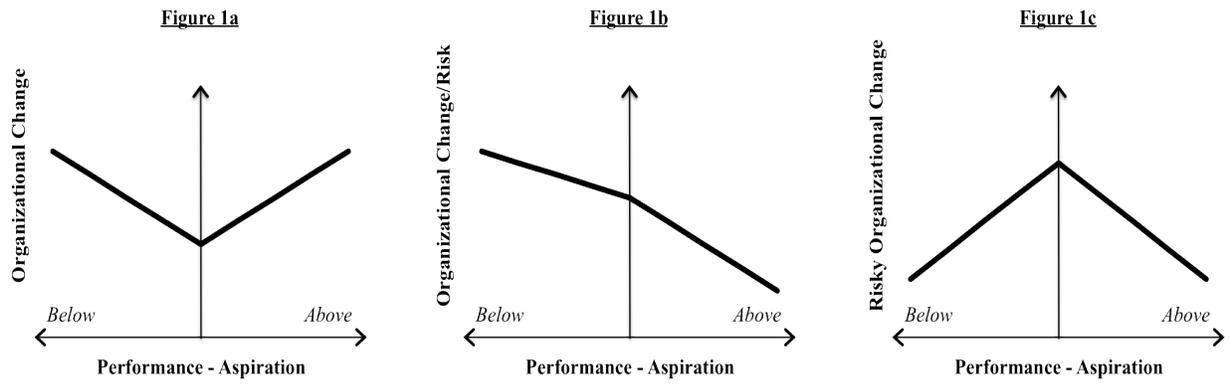
Figure 1b

Figure 1c

Figure 2

Figure 2a: Estimated FINANCIAL Performance on Partnering Behavior Change

Financial Performance: Historical Aspiration Level

Figure 2b: Estimated INNOVATIVE Performance on Partnering Behavior Change

Innovative Performance: Historical Aspiration Level