THE EFFECTS OF FIRM SIZE ON THE
ENTREPRENEURIAL ORIENTATION DIMENSIONS OF
INNOVATIVENESS, PROACTIVENESS, AND RISK-TAKING

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Introduction

Recently, entrepreneurship has emerged as a popular area of academic interest and research. This is because entrepreneurial activity represents one of the major engines of economic growth and today accounts for the majority of new business development and job creation in the world. Consequently, writers in both the scholarly literature and popular press have argued that entrepreneurship is an essential feature of high performance. However, there still remains a great deal of information that is yet to be discovered regarding the characteristics surrounding the entrepreneurial concept. This article intends to contribute another small piece to the entrepreneurial literature in hopes to better understand and implement entrepreneurial endeavors.

A link between entrepreneurial orientation and firm size will be presented in this study. Entrepreneurial orientation refers to the strategy-making processes that provide organizations with a basis for entrepreneurial decisions and actions. It has become a central concept in the domain of entrepreneurship which has received a substantial amount of theoretical and empirical attention. The second variable, organizational size, has long been considered one of the most significant contingency variables in macroorganizational studies, and its relationship with other important constructs, such as structure, has been widely examined. Specifically, firm size is commonly used as a variable when examining how a firm’s performance relates to risk-taking. This study intends to further the exploration of a firm’s size although rather than looking at it as a variable accompanying performance; it examines a direct link with entrepreneurial posture.
Specifically, three hypotheses will be tested. They examine the relationship between the size of the firm and the three entrepreneurial dimensions of innovativeness, risk-taking and proactiveness. The three relationships will be evaluated separately rather than as a summed, unidimensional construct. Additionally, the risk-taking dimension will be further examined by analyzing the effect of environmental hostility on the relationship between firm size and risk-taking. Although there have been many studies looking at entrepreneurial dimensions, this is the first known to study the direct link with firm size and also the effect of environmental hostility on the risk-taking dimension.

The results of this study will help clear up the debate as to whether entrepreneurial orientation should be looked at from a unidimensional or multidimensional perspective. Furthermore, if size is found to be a significant predictor of the various dimensions, future studies can use this knowledge to either control for firm size or use it as a moderator. Managers could also potentially use this information to make more informed decisions when implementing entrepreneurial orientation into their strategies. If we as a society can gain a greater understanding of firm characteristics, we will be able to operate more efficiently and make more informed decisions leading to an improved environment for us all.

**Literature Review**

This study examining the effects of firm size on entrepreneurial orientation (EO) will contribute to the growing body of entrepreneurship literature as well as the
strategic management realm. The intersection of strategic management and entrepreneurship has been the topic of scholarly debate concerning the domain of the literary fields. Although some scholars argue that entrepreneurship should be examined through the strategic management canopy, others argue that it is its own distinct field of study. We however argue that this study falls in the realm of a combination of the two known as Strategic Entrepreneurship. Consistent with other authors, we recognize that the two fields are unique, although they are complimentary. Meyer and Hepperd state that the two fields must be viewed together, and that the results from one should be congruently examined with results from the other (Meyer & Heppard, 2000). Regardless of the similarities, there are some distinct differences that exist to create a separation and need for both bodies of literature. The specific characteristics of each are explored below, followed by an overview of strategic entrepreneurship which draws from each respectively.

**Strategic Management**

Strategic Management focuses on how firms establish sustained competitive advantages and earn above average returns. In order to structure much of the strategic management research, a common framework has been utilized. This framework suggests that firms can gain competitive advantage by positioning themselves strategically to “exploit their internal strengths, through responding to environmental opportunities, while neutralizing external threats and avoiding internal weaknesses” (Barney, 1991:99). Generally, the focus of literature is either on a firm’s internal strengths and weaknesses (Hofer & Schendel, 1978; Penrose, 1958; Stinchcombe,
1965), or the externally focused research of opportunities and threats (Porter, 1980; Porter, 1985). Although both internal and external views have been examined in the field, the external focus on the competitive environment dominated most of the earlier research (Duschek, 2004). This external focus is evidenced by Porter’s five-forces model which describes the characteristics of an environment that fosters strong firm performance (Porter, 1980). Porter argued that a firm should first analyze its competitive industry and establish a strategy that would allow for optimal firm performance based on these environmental factors. The resources necessary to implement the strategy were to be acquired based upon the external analysis. It is assumed that all firms have equal access to the necessary resources to implement a given strategy (Porter, 1981; Rumelt, 1984; Scherer, 1980). However, if for some reason one firm did have access to specific resources that others did not, it would only occur for a short period, as the resource could be acquired easily in the factor market (Barney, 1986; Hirshliefer, 1980). Therefore, the overriding idea based on this theory was that the environmental conditions determined probable success for a firm rather than the possession of unique resources necessary to implement the strategy.

Although the external view has yielded many valuable results concerning sustained competitive advantages, the early 1990s brought a change to the strategic management literature (Duschek, 2004). Rather than focusing on the external environmental factors, scholars began to look internally at firm resources and how they could be used to create sustained competitive advantages. This new concept of the resource based view (RBV) of the firm dominates much of the more recent
strategic management literature (Duschek, 2004). One of the main differences from the external focus lies in the assumption of mobile resources. The RBV assumes that resources are heterogeneous to the firm which allows different firms to have access to different resources. Furthermore, these resources are not perfectly mobile and advantages gained from strategic resources can be sustained for long periods of time (Barney, 1991; Dierickx & Cool, 1989; Prahalad & Hamel, 1990; Teece, Pisano, & Shuen, 1997; Wernerfelt, 1984).

According to Barney (1991: 101), strategic resources can be “all assets, capabilities, organizational processes, firm attributes, information, knowledge, etc. controlled by a firm that enable the firm to conceive of and implement strategies that improve its efficiency and effectiveness” (Daft, 1983). They are classified into three general groups: physical capital resources, human capital resources, and organizational capital resources. Examples of physical capital resources include physical technology, plant and equipment, geographic location and access to raw materials (Williamson, 1975). Human capital concerns training, experience, judgment, intelligence, relationships, and insight of individual managers or workers within a firm (Becker, 1964). Finally, organizational capital includes the firm’s structure, and its planning, coordinating, and controlling systems (Tomer, 1987). While all of these resources have the potential to help a firm conceive of and implement valuable strategies, they certainly do not always contribute to the search for competitive advantage. Only those resources that are strategically relevant contribute to a firm’s ability to develop a competitive advantage.
For a resource, or more commonly a bundle of resources, to be considered a source for sustained competitive advantage, there are a few conditions which must be met. First, the resources must be valuable. Valuable resources are those which enable a firm to conceive of or implement effective strategies. However, valuable resources that are possessed by everyone would not lead to a competitive advantage; therefore they must also be rare. Even if a resource is valuable and rare, it still does not lead to a competitive advantage because other firms could potentially acquire these resources. This leads to imperfect imitability being the third contingency for a resource to be a source of sustained competitive advantage. Finally, the resource must not be substitutable. Substitutability can come in the form of a competing firm using similar or very different resources, although each being implemented differently, to achieve the same strategies. Conclusively all four characteristics; valuable, rare, imperfectly imitable, and the lack of substitute resources; are necessary for a resource to be a source of sustained competitive advantage. (Barney, 1991)

Since size is a primary indicator of tangible resources (Bruderl & Schussler, 1990; Dobrev, 2001; Levinthal & March, 1991; Mitchell, 1994), it can be a representation of the depth of the resource pool from which competitive advantages are created. Additionally, strategic management concerns the health and survival of firms, and the pressure on chances for survival in an industry is certainly greater for smaller firms than for their larger rivals (Aldrich & Auster, 1986; MacMillan, 1980). Therefore, understanding how competitive behavior, such as the degree of a firm’s
EO, is influenced by organizational size is of paramount importance to strategic management scholars.

**Entrepreneurship**

This study will also contribute to the base of entrepreneurship literature. Although similar to strategic management literature, the focus of entrepreneurship differs slightly and has emerged as its own field of research. The overall field of entrepreneurship as a cumulative body of knowledge has been slow to develop due to discrepancies in opinions about key issues regarding what constitutes entrepreneurship (Shane & Venkataraman, 2000). Despite the fact that the field of entrepreneurship has been slow to develop, the importance of entrepreneurship has been understood for a much longer period of time. Schumpeter recognized that entrepreneurially driven innovation in products and processes is the crucial engine driving the change process in the capitalist society (Schumpeter, 1934). Early entrepreneurship literature equated the idea of entrepreneurship as working for oneself (Cantillon, 1734; Shane, 1994). Although some of these original views may have changed, many of the basic premises on which the idea was built, remain.

The overall field of entrepreneurship research encompasses a broad realm of academic literature (Shane & Venkataraman, 2000). This is due to the inability of scholars to collectively define the key issues constituting entrepreneurship (Shane & Venkataraman, 2000), the lack of building off of others’ research (Davidsson, 2001), and the weak measurements of key variables (Rauch, Wiklund, Lumpkin, & Frese, 2009). Regardless of a slow start, over the last decade the number and sophistication
of studies exploring entrepreneurship has exploded (Kreiser, Marino, & Weaver, 2002). Furthermore, these studies are beginning to look across cultural boundaries to establish a solid foundation of research on a global basis (McDougall, 2000). In general, research remains to focus on the existence, discovery, and exploitation of entrepreneurial opportunities and particularly the performance implications resulting from entrepreneurial endeavors.

Entrepreneurship has been defined as the scholarly examination of how, by whom, and with what effects, opportunities to create future goods and services are discovered, evaluated, and exploited (Venkataraman, 1997). As a result, entrepreneurship concerns the source of opportunities; the processes of discovery, evaluation, and exploitation of opportunities; and answers who carries out these processes of discovery, evaluation, and exploitation (Shane & Venkataraman, 2000). Other scholars have defined the essential act of entrepreneurship as “new entry” (Lumpkin & Dess, 1996: 136). New entry can be accomplished by a new firm or by an existing firm. Also, new entry refers to entering new or existing markets with new or existing goods. A large portion of research has examined entrepreneurship as this concept of new entry (Lumpkin & Dess, 1996). Although the exact definition of entrepreneurship may be debatable, there seems to exist an opportunity-seeking aspect involved in the descriptions. This is consistent with Shane and Venkataraman’s description that discovering and exploiting profitable opportunities is the foundation for wealth creation through entrepreneurship. Therefore, for the purpose of this paper entrepreneurship will be defined using Hitt, Ireland, and Camp’s definition stating that
entrepreneurship is the identification and exploitation of previously unexploited opportunities (Hitt, 2002). These opportunities could have previously existed or they could be completely new concepts. However, in order for an act to be entrepreneurial, the opportunity must be newly exploited.

Entrepreneurship literature has examined various aspects of identifying and exploiting opportunities. The first aspect looks at the origins of entrepreneurial opportunities. For example, researchers attempt to answer why, when, and how these opportunities were developed. Also, research has looked at why, when, and how some people discover these opportunities and not others. Finally, literature has examined why, when, and how different means of exploitation are used in these opportunities (Shane & Venkataraman, 2000). Therefore, entrepreneurship involves bundling resources to create new organizational and industry configurations. Consistent with the RBV, these bundles of resources can be sources of sustained competitive advantages. Entrepreneurship contributes the opportunity-seeking behavior that results in sustained competitive advantage. Consequently, this paper argues that entrepreneurship is a subset of strategic management, even though it has gained its own realm of literature with specific journals and conferences. The connection between strategic management and entrepreneurship is often recognized as strategic entrepreneurship.

**Strategic Entrepreneurship**

Strategic entrepreneurship has emerged as a combination of strategic management literature and entrepreneurship literature. It incorporates aspects from both fields to involve taking entrepreneurial actions with strategic perspectives. It has
emerged in the last ten years as its own domain and since then has been the topic for international conferences and a new academic journal (Schindehutte & Morris, 2009). Regardless, conceptualizing strategic entrepreneurship continues to be difficult. Scholars have debated whether strategic entrepreneurship is a framework, model, theory, paradigm, concept, or a simple point of reference (Schindehutte & Morris, 2009). This article supports the view that it is its own separate domain of literature, although it falls under the strategy canvas. Strategic management is overarching and strategic entrepreneurship is the field where entrepreneurship falls into the strategy research. Entrepreneurship is its own subset and strategic entrepreneurship looks at this subset through the strategy lens.

Firms must be able to identify and continue to seek opportunities, which is consistent with entrepreneurship. At the same time, opportunity-seeking behavior is only worthwhile if it is also advantage-seeking which corresponds to the strategic management literature. Therefore, strategic entrepreneurship involves seeking opportunities that also contribute to competitive advantage. This combination then leads to growth and wealth creation.

It is difficult to look at advantage-seeking behavior without looking at opportunity-seeking behavior. For instance, prior strategic management literature has focused on competitive positioning of firms. A well-established, mature firm may be able to operate profitably without acting in ways that would be considered entrepreneurial. It can implement competitive strategies such as making production more efficient or increasing product quality. This non-entrepreneurial strategy could
very likely contribute to a competitive advantage, and likely for a long period of time. However, as Mauborgne and Kim suggest, the industry will eventually become saturated with competition. Firms can only increase efficiency up to a certain amount, and then margins begin deteriorating. Eventually the firm that was once dominating the field is barely profitable. If the firm had ventured into uncharted territory with new products or processes, it may have been able to continue its reign at the top (Mauborgne & Kim, 2004). Change is the key and it can only be accomplished by looking toward the entrepreneurship realm. Although strategic management focuses on how firms can maintain competitive advantages, eventually firms must rely on entrepreneurial behavior to stay successful.

Conversely, entrepreneurship also must rely on strategic management. For example, much of the entrepreneurship field has focused on how to find opportunities to exploit. A car manufacturer might be interested in implementing a state of the art computer system into some of its premium models. The manufacturer knows the opportunity that it wants to exploit, although in order to accomplish this task it must partner with technology firms that have the resources necessary to create the computer system. The strategic alliance that is formed between the two companies allows each to benefit from the resources of the other in order to accomplish the production of the new system. In other words, although entrepreneurship specifically looks at new opportunities, strategic management and its offspring, the RBV, are necessary for successful exploitation that leads to a sustained competitive advantage. Similarly, according to the Boston Consulting Strategy School, pursuing growth opportunities
when the opportunity does not exist will likely not lead to profitability (Steffens, Davidsson, & Fitzsimmons, 2009). A firm cannot expect to be profitable by pursuing any entrepreneurial opportunity that presents itself. Both opportunity and advantage-seeking behavior are necessary for profitability.

**Entrepreneurial Orientation**

As mentioned previously, the overall field of entrepreneurship as a cumulative body of knowledge has been slow to develop due to discrepancies in opinions about key issues regarding what constitutes entrepreneurship (Shane & Venkataraman, 2000). Nevertheless, the EO corollary of entrepreneurship has received a large amount of attention and has developed into a promising field of research (Covin, Green, & Slevin, 2006). EO emphasizes the processes used to act entrepreneurially rather than the general entrepreneurial problem of “which business do we enter” (Lumpkin & Dess, 1996: 136). It has received a substantial amount of theoretical and empirical attention (Rauch et al., 2009). More than 100 studies of EO have been conducted which has led to a wide acceptance of the conceptual meaning and relevance of the concept (Rauch et al., 2009). Furthermore, the number of studies has increased over time (Rauch et al., 2009). This evidences the fact that EO is a growing concept and one that is becoming more relevant. This research will contribute to the EO body of research by examining how firm size affects the specific dimensions of the EO construct.

EO refers to the strategy-making processes that provide organizations with a basis for entrepreneurial decisions and actions (Lumpkin & Dess, 1996; Wiklund &
Shepherd, 2003). EO began in the strategy-making process literature (Mintzberg, 1973). Strategy making is an “organization-wide phenomenon that incorporates planning, analysis, decision-making, and many aspects of an organization’s culture, value system, and mission” (Rauch et al., 2009: 763). It has also been noted that strategy-making is “important, in terms of the actions taken, the resources committed, or the precedents set” (Mintzberg, Raisinghani, & Theoret, 1976: 246). EO represents the policies and practices that provide a basis for entrepreneurial decisions and actions (Hart, 1992). Thus, EO refers to how a firm’s decision-makers use entrepreneurship in their strategy-making processes to set the firm’s vision, enact organizational purpose, and gain competitive advantage (Rauch et al., 2009).

One of the many interpretation differences that exists in entrepreneurship literature is the level at which entrepreneurship occurs. For instance, entrepreneurship has been applied to individuals, groups, business segments, or entire businesses. Also, entrepreneurship has been studied in the context of corporate venturing which is when an individual within an organization acts entrepreneurially on behalf of the firm (Guth & Ginsberg, 1990). Because all of these levels can display entrepreneurial characteristics, it is important to determine at what level EO is being studied. EO deals with the direction of the firm, even though individual managers may direct the firm a certain direction. For this reason, EO takes a firm-level approach to entrepreneurship. In other words, it looks at the entrepreneurial orientation of the firm, and not the individuals within it.
Linking Entrepreneurial Orientation to Strategic Entrepreneurship

Although EO has obvious connections to the entrepreneurship domain, it is more specifically situated in the strategic entrepreneurship realm. EO refers to the strength in which a firm’s strategy is entrepreneurial. Intuitively, a strategy is adopted in pursuit of competitive advantage. As such, adopting an entrepreneurial strategy can help a firm stay ahead of competitors and it has even been shown that firms with a strong EO generally have higher performance (Rauch et al., 2009). Therefore, rather than a firm being entrepreneurial, which happens in almost all organizations at times, EO refers to the intent to incorporate entrepreneurship into strategy. It is the recognition that entrepreneurship is vital for a successful strategy and its cognitive inclusion into the direction of the organization. Thus, EO is central to the idea of strategic entrepreneurship and serves as a measurement of how strongly firms implement entrepreneurship into strategy.

EO Dimensions

Research has identified several dimensions of EO. Miller suggested that an entrepreneurial firm is one that “engages in product market innovation, undertakes somewhat risky ventures, and is the first to come up with ‘proactive’ innovations, beating competitors to the punch” (1983: 771). This identifies innovativeness, risk-taking, and proactiveness as key dimensions to an entrepreneurial orientation. This conceptualization has been adopted by numerous scholars to characterize an entrepreneurial strategic posture (Covin & Slevin, 1989b; Ginsberg, 1985; Miller, 1983; Morris & Paul, 1987; Naman & Slevin, 1993; Schafer, 1990). However, other
scholars have suggested that five dimensions have been useful for characterizing EO; the additional two dimensions being autonomy and competitive aggressiveness (Lumpkin & Dess, 1996). Although compelling arguments exist for both lines of thinking, the most widely utilized operationalization of EO in entrepreneurship and strategic management literature is based on the three dimension model (Kreiser et al., 2002). Therefore, this study will follow suit and utilize the three dimension model of EO: innovativeness, risk-taking, and proactiveness.

The different dimensions may all be present in the strategy-making processes that provide firms with a basis for entrepreneurial decisions and actions. However, this does not mean that they all must be present for successful entrepreneurial actions. The extent to which each dimension predicts the nature and success of an undertaking is contingent on external factors such as the organizational structure (Lumpkin & Dess, 1996). As a result, a firm’s EO is comprised of the three dimensions in varying degrees.

**Innovativeness**

Innovativeness has been considered a component of the entrepreneurial process since Schumpeter recognized it as the fundamental undertaking of the entrepreneurial organization. Lumpkin and Dess define innovativeness as the tendency for a firm to “engage in new ideas, novelty, experimentation, and creative processes that may result in new products, services, or technological processes” (Lumpkin & Dess, 1996: 142). Innovativeness may occur in a range from trying a new advertising venue to passionately pursuing a new technology (Hage, 1980). Regardless of the extent of
innovativeness, it represents a basic willingness to depart from existing technologies or practices and venture beyond the state of the art (Kimberly, 1981).

Risk-Taking

Risk-taking has been recognized as an element of entrepreneurship since the early literature. Cantillon, who was the first to formally use the term entrepreneurship, distinguished entrepreneurs from regular employees by arguing that they faced the uncertainty and risk associated with self-employment (Cantillon, 1734). Also, in the 1800s, John Stuart Mill stated that risk-taking was the dominant characteristic involved with entrepreneurship (McClelland, 1960). There are various definitions of risk-taking, although one that most closely relates to entrepreneurship is Miller and Friesen’s definition which defines it as the degree to which managers are willing to make large and risky resource commitments that have a reasonable chance of costly failures (Miller & Friesen, 1978). The notion that risk is innately built into entrepreneurship has continued to gain acceptance in the literature as the years have gone by (Kreiser et al., 2002).

Proactiveness

Proactiveness has received the least attention of the three dimensions from entrepreneurship scholars. It is defined by Lumpkin and Dess as an opportunity-seeking, forward-looking perspective involving introducing new products or services ahead of the competition and acting in anticipation of future demand to create change and shape the environment (Lumpkin & Dess, 2001). This does not necessarily mean that a firm has to be the first to introduce new products or services, rather a firm can
be just as proactive by being the fastest-follower (Miller & Camp, 1985). In fact, Miller and Camp found that a second-mover was just as pioneering and achieved just as much success as a first-mover.

**Summed Dimensions vs. Multidimensional**

There has also been debate within the literature as to whether the various dimensions should be summed together for a one-dimensional EO characterization, or analyzed separate for a multidimensional EO description. Some authors have suggested that the three dimensions covary and a description of firm EO can be derived from combining the three dimensions (Covin & Slevin, 1989a). On the other hand, more recent research has suggested that the dimensions vary independently and occur in different combinations (Covin et al., 2006; Lumpkin & Dess, 2001). The multidimensional approach provides a more comprehensive analysis of EO and for the sake of this study would provide greater insight into the effects firm size has on each aspect of EO.

There are two main arguments for using a multidimensional approach. First, “it gives the most detailed level of analysis…in that statistical properties are evaluated for each individual item” (Bagozzi & Edwards, 1998: 51). The second argument is that it provides “the ability to specify and test the distinctiveness of components” (Bagozzi & Edwards, 1998: 51). Having greater detail allows the researcher to examine what specific parts of EO are causing the resulting effects.

Because we are looking at the effects of firm size on entrepreneurial orientation, it is important to understand how EO is affected, not just what the effect
is. The results present a clearer picture and provide greater implications when the dimensions are viewed separately. For example, if one of the dimensions such as innovativeness is shown to be lacking in smaller organizations, managers can focus their attention to counter this discrepancy. The manager could make an effort to use resources more efficiently in innovative ventures to ensure that a competitive advantage will not be lost due to lack of innovation. If using a summed measure of EO, a manager of a small firm might understand that its firm is less entrepreneurial, yet be unable to distinguish which dimensions were lacking. A multidimensional approach provides the solution to this problem.

**Firm Size**

Firm size is an indicator of tangible resources (Bruderl & Schussler, 1990) and also is an indicator of a firm’s resource endowment (Audia & Greve, 2006). There are a couple of ways that the size of a firm can be studied. (Ming-Jer & Hambrick, 1995). First, size can relate to sheer organizational size. Organizational size can be represented by the number of employees or by the accounting value of assets; intuitively they are highly correlated (Audia & Greve, 2006). The second way to determine firm size is to use a firm’s market-share. Although size and market share are conceptually different, they are empirically correlated (Ming-Jer & Hambrick, 1995). Consistent with prior research, this study will use the number of employees as the variable representing firm size.

Firm size has been used extensively in past research as either a contingency variable (Kimberly, 1976) or moderator (Rauch et al., 2009). Furthermore, there is
considerable research describing characteristics of large or small firms. For example, small firms have an increased probability of failure (Bruderl & Schussler, 1990; Dobrev, 2001; Mitchell, 1994). Also, smallness has been credited with increasing flexibility in production (Fiegenbaum & Karnani, 1991) and price (MacMillan, 1982; Tellis, 1989) and with enhancing speed (Katz, 1970) and risk-seeking behavior (Hitt, Hoskisson, & Harrison, 1991; Woo, 1987). Similarly, the theory of structural inertia holds that large firms are encumbered by structural constraints such as slow communication channels, the need for multiple approvals, and norms and procedures that limit decision makers' ability to make organizational changes (Hannan & Freeman, 1984). On the other hand, large size has been seen as giving a firm such advantages as economies of scale, experience, brand name recognition, and market power (Hambrick, MacMillan, & Day, 1982; Woo & Cooper, 1981; Woo & Cooper, 1982). Although a large number of studies have been conducted that incorporate size, behavioral differences and the means by which firms build advantages has been left unexplored for the most part (Ming-Jer & Hambrick, 1995). This study hopes to contribute to the research surrounding firm size by examining how it contributes to behavioral differences, specifically its effect on EO.

**Theoretical Perspectives**

There are a few different theoretical frameworks that will be used to establish the hypotheses in this paper. The perspectives include the behavioral theory of the firm, prospect theory, and the threat rigidity thesis. This section will explore each
perspective independent of one another beginning with the behavioral theory of the firm, followed by prospect theory and the threat rigidity thesis. They will then be incorporated together in the hypotheses section to ground the theories presented in this paper.

**Behavioral Theory of the Firm**

Behavioral theory of the firm has been used extensively in management research which focus includes organizational change (Greve, 1998; Lant, Milliken, & Batra, 1992) and organizational learning (Levinthal & March, 1993). The theory is based on psychological processes of risk perception and preference (Kahneman & Tversky, 1979). The central theme of behavioral theory is that decision-makers use an aspiration level to evaluate performance and that the performance relative to the aspiration level influences the likelihood that risks will be taken (Cyert & March, 1963; March & Shapira, 1987; March & Shapira, 1992; Shapira, 1986). Behavioral theory states that (1) a firm is made up of people, including managers, workers, and shareholders, (2) when performance is below the aspiration level, the organization initiates problem search, (3) organizations avoid uncertainty, and thus (4) organizational decision-making is often associated with an incremental solution and follows past experience and rules (Rieger & Wang, 2006; Tversky & Kahneman, 1992; Wakker, 2003).

The theory posits that when performance is above an aspiration level, which is determined by social or historical comparison, (Audia & Greve, 2006) managers continue with current behavior and elect not to make risky changes. On the other hand,
when performance falls below the aspiration level, managers will adopt new activities in an attempt to reduce the discrepancy between actual performance and the aspiration level. Old strategies will be reexamined and either altered or changed completely. Because adopting new strategies has inevitably more risk than sticking with the status quo, performance above the aspiration level will likely lead to managers taking less risk, and performance below the aspiration level will encourage managers to take additional risk.

**Prospect Theory**

In regard to decision-making, prospect theory was proposed as an alternative to the accepted utility theory. Expected utility theory posited that an individual will make a decision based on a rational evaluation of risk and return and the calculated expected utility from decision alternatives. However, evidence has suggested that decision-makers do not always make the rational choice. This is supported by prospect theory which is based on four premises. These are the notions that (1) alternatives are categorized as gains or losses depending on their relation to a reference point, which is the status quo, (2) the utility function is an s-shaped graph, concave for gains and convex for losses, which indicates that losses loom larger than corresponding gains, (3) individuals tend to be risk-averse toward gains and take more risk when facing losses, which suggests individuals prefer probable losses to sure losses, and (4) lower probabilities are over-weighted and higher probabilities are underweighted (Rieger & Wang, 2006; Tversky & Kahneman, 1992; Wakker, 2003). Based on these premises, prospect theory suggests that individuals in favorable positions are risk-averse because
they feel they have more to lose than to gain. On the other hand, when individuals are in less favorable positions they tend to take more risks because they have less to lose and more to gain.

**Threat Rigidity Thesis**

The threat rigidity thesis examines how organizations adapt in the face of adversity. This is done by looking at all the levels of the organization, i.e. individual, group, and organizational. The thesis suggests that there may be a tendency to act rigidly in threatening situations. This can be exemplified by two effects. (1) Information processing may be restricted and the field of attention may be narrowed, and (2) threats can cause a restriction of control, resulting in power being concentrated at the upper-levels of the organization. Therefore, threats influence the information and control processes of a firm resulting in rigidity.

On an individual level, the threat rigidity thesis argues that when managers perceive threats, they experience psychological stress and anxiety that have cognitive and motivational effects. Specifically, these threats lead to a constriction in the attention range and lower peripheral cues, complicating the ability to process new or complex information. This reduces the number of alternatives to be considered down to those which are consistent with well-learned interpretive frames (Zajonc, 1965). In other words, when managers are faced with threats, they tend to rely on well-understood, previously implemented activities (Ketchen & Palmer, 1999).

From a group perspective, responses to threats depend on whether the threat is attributable to internal or external sources. If it is an internal source, then the group is
likely to respond by becoming less cohesive, unstable in regard to leadership, and dissenting. On the other hand, if the threat is attributable to an external source, the group will respond by becoming closer, more supportive of leadership, and more uniform. However, reaching consensus often results in the “restriction of information, ignoring divergent solutions and downplaying the role of deviant positions” (Staw, Sandelands, & Dutton, 1981: 510). Also if the group reaches a consensus, this will likely result in a constriction of control.

From an organizational level, threats may cause an overload of communication channels, reliance on prior knowledge, and a reduction in communication complexity. This in turn leads to a restriction in information processing. Another result from threats is a constriction of control which is caused by a centralization of authority and increased formalization. Finally, threats tend to cause organizations to increase efficiency which leads to a conservation of resources (Staw et al., 1981).

Thus, the threat rigidity thesis can be applied at multiple levels of analysis. Information processing restriction can cause firms to miss potential entrepreneurial opportunities. Also, a restriction of control and power could similarly prevent managers from venturing into the unknown for fear they will give up additional control. Therefore, the threat rigidity hypothesis supports the assumption that firms will become risk-averse as they perceive greater threats to their vital interests (Audia & Greve, 2006).
Hypotheses

This paper proposes three separate hypotheses followed by a post-hoc analysis. The three hypotheses relate to the link between firm size and the entrepreneurial orientation dimensions of innovativeness, risk-taking, and proactiveness, respectively. Each dimension is examined independently due to the expectation that the dimensions do not covary. The post-hoc analysis takes the risk-taking hypothesis a little further by introducing environmental hostility as a factor that could affect the relationship between firm size and risk-taking. By splitting the sample into hostile and non-hostile environments, the results can be compared to determine if there are differences between the two groups. This will demonstrate how environmental hostility affects the relationship.

Firm Size and Innovativeness

Innovativeness is the first dimension of EO that is explored. It can occur along a continuum of radicalness and can range from finding a new use for an existing product to a full-scale product development project. Regardless of the type of innovation or the extent to which it ventures into an unknown territory of innovative terrain, there are certain resources that must be devoted to the cause. For example, if a firm is attempting to implement a new innovative advertising campaign, it would rely on resources such as the experience, intellect, and insight of individual managers and workers in the marketing department. Since firm size is an indicator of a firm’s current resource endowment (Audia & Greve, 2006) it can be assumed that larger firms with greater resource endowments will also have a greater amount of resources from which
to draw that could be used to develop the marketing campaign. On the other hand, smaller firms may also intend to develop a marketing plan, although with a much smaller resource endowment. If the smaller firm lacks the experience, intellect, and insight of individual managers and workers, then it will be less likely to develop a marketing plan.

The same can hold true for larger innovative endeavors. For example, two firms, one small and one large, may both have the intention of producing a new product. Implementing a new product requires a large amount of research and development, testing, and distribution. All of these aspects take considerable amounts of resources. Therefore, the larger firm with a greater resource endowment will be able to contribute more resources to the project and ultimately have greater chances for completion.

It should be noted that just because a firm has a larger stock of resources, it does not necessarily have a higher probability of developing new advertising campaigns or products. Rather, as the RBV states, it is those resources that are valuable, rare, inimitable, and unsubstitutable that provide a competitive advantage. In other words, if a firm hires the leading engineer in the field to develop a product, and that engineer meets the four requirements necessary for a strategic resource to be a source of competitive advantage, then that firm is more likely to achieve product development innovations above its competitors regardless of size. Consequently, that firm would also be considered to be more innovative. However, we can assume that on average, a larger stock of resources will result in more strategic resources that are
sources for competitive advantage because there is a larger resource pool from which to bundle resources. Thus, larger firms will have higher levels of innovativeness. This leads to hypothesis 1 which is demonstrated in figure 1.

\[ H1: \text{Firm size will be positively related to innovative firm behaviors. As firm size increases, the level of innovativeness will increase.} \]

Figure 1.

\begin{figure}[h]
\centering
\includegraphics[width=0.5\textwidth]{figure1.png}
\caption{Firm Size and Risk-Taking}
\end{figure}

**Firm Size and Risk-Taking**

Risk-taking has also long been associated with entrepreneurship. It has even been called the paramount attribute of entrepreneurs. However, the relationship with firm size seems to be a little less straight-forward. There are three theories that are implemented to predict results concerning risk-taking and firm size. The three theories are the threat rigidity thesis, prospect theory, and the behavioral theory of the firm. The three will be combined to predict a curvilinear relationship between the size of the firm and the amount of risk that firms take.
Threat Rigidity Thesis

First, threat rigidity states that there is a tendency for individuals, groups, or organizations to behave rigidly in threatening situations. A threat is considered to be an environmental event that has impending negative or harmful consequences for the entity. If a firm is smaller with fewer resources, it is riskier to engage in entrepreneurial endeavors. Furthermore, a failed entrepreneurial activity could result in severe consequences for the firm. Research has shown that small firm size increases the probability of firm failure and makes the firm more vulnerable (Bruderl & Schussler, 1990; Dobrev, 2001; Mitchell, 1994). Therefore the fewer resources a firm has, the more rigid the firm will be due to the increased threat of failure. Because entrepreneurial activities require flexibility and change, rigidity could restrict entrepreneurial activity due to the risk that must be taken. Therefore threat rigidity would imply that firms with fewer employees will take fewer risks than firms with a greater number of employees.

Prospect Theory

The second theory, prospect theory, posits that firms in favorable positions are risk-averse because they have more to lose. In regard to the loss, the variable that is being considered is firm resources. If a firm decides to take on a risky project and it fails, then all the invested resources will be lost. The larger firm already has a larger resource endowment; therefore the gains would be less impactful than to a smaller firm. On the other hand, a smaller firm may be more likely to take on the project because they have the probability to gain a lot more than the larger firms. When a firm
is facing favorable conditions or opportunities, decision-makers would elect to take less risk because they feel they have more to lose than to gain. On the other hand, a firm facing unfavorable conditions or threats may be more risk-seeking because they would prefer to have a probable loss with the chance to gain, rather than a guarantee to stay in the unfavorable condition. Because firms with smaller stocks of resources have been empirically shown to be more vulnerable and more likely to fail, (Bruderl & Schussler, 1990; Dobrev, 2001; Mitchell, 1994) it can be assumed that smaller firms will be in less favorable conditions and face greater threats. Conversely, larger firms that have a larger stock of resources are less vulnerable and less likely to fail. Larger firms have also been shown to have greater access to financial and managerial resources to help overcome problems that threaten survival (Mitchell, 1994). They also have an increased potential to attract additional resources such as raising capital. Furthermore, larger firms face better tax conditions, and government regulations, and can compete better for qualified labor (Bruderl & Schussler, 1990). Therefore larger firms are in more favorable conditions and encounter more opportunities. Based on these assumptions, larger firms will be risk-averse because they have more to lose; whereas smaller firms will be risk-seeking because they have more to gain.

Behavioral Theory of the Firm

Finally, the behavioral theory of the firm states that decision-makers use an aspiration level to evaluate performance and that performance relative to the aspiration level influences the likelihood that risks will be taken. The aspiration level is determined from social or historical comparison. In general, firms aspire to grow;
therefore behavioral theory would suggest that firms have a certain aspiration point where growth is perceived to be greater than competitors (social comparison) or prior amounts of growth (historical comparison). Once a firm grows to a size greater than this aspiration point, it will be content with its current size and not pursue additional risky growth opportunities. Therefore, smaller firms will take more risk than larger firms in hopes to accomplish growth and market-share in relation to competitors. Similar to prospect theory, this theory would suggest that firms which have a smaller number of employees will take greater risks, and firms with a greater number of employees will take fewer risks.

*Integrating the Three Theories*

Because threat rigidity concerns situations that have impending negative or harmful consequences for the firm, it is assumed that this theory will have the most influence over smaller firms where the threat of failure is greater. Larger firms with a greater stock of resources are less likely to become rigid in threatening situations because they know they can ride out the storm better than competitors. As firms increase in size, the threat rigidity thesis will explain less of the results. Therefore, the threat rigidity thesis will describe the risk-averse behaviors of the smallest firms and will gradually be less relevant in predicting firm behavior as size increases.

Prospect theory likely describes the behaviors of larger firms. The largest firms operate in favorable environments and are, therefore unlikely to take risks or make changes to the current strategy because they are content with their current positions. However, as firm size decreases, the favorability of the environment also begins to
decrease. Firms will gradually begin taking additional risk in hopes to achieve market-share and operate in a more favorable environment. This trend will continue until the size of the firm is small enough that risks would threaten the survival of the firm. In other words, the threat rigidity would once again start predicting the firm behavior. Therefore, a positive relationship will exist between firm size and risk-taking for the smallest of firms, yet this relationship will become negative as the size of the firm increases past the size where entrepreneurial activity poses a significant threat to firm survival. This results in a concave downward curvilinear relationship. Figure 2 demonstrates this relationship and hypothesis 2 is drawn from these assumptions.

\[H2: \text{Risk-taking will display a predominantly positive concave downward curvilinear relationship with firm-size. Firms that are moderate-to-large in size will tend to display higher levels of risk-taking than small or very large firms.}\]

Figure 2.
Firm Size and Proactiveness

Proactiveness is the third dimension of entrepreneurship. It has to do with the speed which firms are able to implement new ideas. Proactiveness is often associated with first-movers, although proactive characteristics are not limited to first-movers. Since proactiveness is associated with initiating actions before competitors, firm size should relate to the proactiveness of firms. The theory of structural inertia holds that there are a variety of constraints on structural change in organizations. Some of these factors are internal and include sunk costs in plant and equipment, personnel, the dynamics of political coalitions, and the tendency for precedents to become normative standards. Larger firms tend to face more of these internal constraints and are more ponderous than smaller competitors (Hannan & Freeman, 1984). This concludes that smaller organizations are more likely to implement change quicker than their larger rivals.

Along with the arguments that size may breed complacency and inertia (Halberstam, 1986), size has also been hypothesized to contribute to insularity (March, 1981) and resistance to adaptation. (Aldrich & Auster, 1986). Since proactive behavior requires that firms make quick changes that often contribute to industry exposure, it would seem that larger firms will be less proactive than their smaller, more open rivals. Consequently, smaller firms are able to initiate actions quicker and therefore be more proactive.

From a practical perspective, it make intuitive sense that in order to act quickly a firm would prefer to have as few barriers as possible. Since many proactive actions
require the entire firm to implement, it can be assumed that the larger the firm, the more barriers there are to overcome. For example, a new hypothetical medical device is invented that can deliver field testing for a specific disease to a previously untapped market of individuals likely to have the disease. If we assume that the device is available to multiple medical testing firms, the firm that is most proactive in reaching out to those individuals will likely experience the greatest gains. Larger firms’ strategies are generally developed by top-managers. Therefore the initiative to pursue this new market would have to travel down multiple tiers of management before getting to the actual testers. Furthermore, the testers might have to get approval from the finance department to spend additional funds necessary to travel to this new market. These factors would presumably slow the process and make the firm less proactive in initiating the strategy. On the other hand, smaller firms have fewer levels of management through which the strategy must pass. Also, additional funds could quickly be approved if the smaller firms have less bureaucracy and controls. Therefore, the smaller firms will be more proactive in reaching out to this new market. Ming-Jer and Hambrick supported this argument with their finding that smaller firms tend to be more active in initiating competitive moves and also faster implementers in the competitive actions they initiate (Ming-Jer & Hambrick, 1995). Thus, larger firms will be less proactive than smaller firms. This relationship is displayed in figure 3. Hypothesis 3 is built upon these assumptions.

**H3: Firm size will be negatively related to proactive firm behaviors. As firm size increases, the level of proactiveness will decrease.**
Methods

The data used in this study was obtained from secondary survey data; specifically the Strategic Alliance Research Group dataset. The survey was originally developed as a pilot study of small and medium-sized enterprise (SME) alliance use, attitudes, and opinions. This study was expanded in 1995 as it was conducted in Norway. The following countries were added between the years of 1996-1998. Surveys were sent to the owner or general manager of firms in nine countries. The countries include Australia, Greece, Indonesia, Costa Rica, Mexico, the Netherlands, Norway, Finland, and Sweden. There were a total of 6378 firms that were sent surveys; 973 to Australia; 400 to Finland; 400 to Greece; 890 to Indonesia, 650 to Mexico, 2465 to Norway, 435 to Costa Rica, 300 to the Netherlands, and 600 to Sweden. Responses were received from 206 Australian, 121 Finnish, 255 Grecian, 285 Indonesian, 433 Norwegian, 87 Costa Rican, 131 Dutch, 180 Swedish, and 366 Mexican firms. Surveys were then sent to firms that failed to respond and the general
reasons for not responding included that they were too busy, the questionnaire is too long, or that the questionnaire was not relevant to the firm. The surveys were sent via mail in all countries except Indonesia and Mexico, where on-site interviews or delivery via private courier were needed to ensure the surveys reached their destination.

The firms were randomly selected from trade association membership lists, national databases, and business directories. They were selected from ten different industry groups representing major industrial classifications in the GDP of each country. The size of the firms ranged from 6-500 employees. This range was selected based on the classification of SMEs by the US Government printing office. SMEs are thought to be more entrepreneurial than large organizations, therefore even though size is the dependent variable, only SMEs were used in the study. This is the general trend in entrepreneurial studies.

Because the surveys were mailed to countries that speak different languages, they were subjected to double-back translation. This is where the survey was created in English, translated to the language of the country where the firm is located, translated back to English, and finally back and forth once again. This method was developed by Brislin (Brislin, 1980) for the purpose of translating international surveys while containing consistency across the data. The translations were then tested for reliability by researchers and professional organizations in each of the countries. The sample ended up consisting of 1,793 firms.
In order to determine a firm’s entrepreneurial orientation, the nine-item Likert scale created by Covin and Slevin was used in the survey. The questions, which are shown in Appendix A, address the three dimensions of entrepreneurial orientation separately. However, after the initial data gathering had begun, pre-testing revealed cross-loading between the questions asking whether the organization adopts a bold or aggressive posture and another question which asked whether the firm was willing to engage in bold or wide-ranging acts. Because of this, the question regarding bold posture was dropped. This left the EO scale with eight total questions, the first three addressing innovativeness, the next three for proactiveness, and the final two for risk-taking. The act of dropping one of the scale items is not uncommon when it is deemed necessary (Barringer & Bluedorn, 1999; Becherer & Maurer, 1997; Dickson & Weaver, 1997).

Environmental hostility data for each firm was also collected from the survey. It was measured using a four-item, five-point scale. The measure is a scale developed by Schultz, Slevin, and Covin (Kreiser et al., 2002). The survey questions regarding environmental hostility are shown in Appendix B.

In general, size is determined using one of two methods; number of employees or market share. For this study, the number of employees was used as a determinant of size. It is a representation of the amount of resources that a firm may have and is used as the independent variable in this study.

It has been shown that age and gender may influence risk-taking, therefore controls were used for the age and gender of the individual respondent of the survey (Steensma, Marino, & Weaver, 2000). The industry in which the firm belongs was
also used as a control. This is because many industries will have generally higher or lower levels of proactiveness, innovativeness, and risk-taking.

**Data Analysis**

In order to test the hypotheses, regression analysis was used. This was done using SPSS. Cronbach’s alpha scores and an F-test were used to verify the integrity of the survey questions and the significance of the overall model. Linear regression was then conducted to determine the r-squared values and regression coefficients for four models. The four models were three linear models testing innovativeness, risk-taking, and proactiveness and a curvilinear model for risk-taking. The linear model for risk-taking was included for the sole purpose of verifying that it was less predictive and significant than the curvilinear model. The results verify that the curvilinear model is a better predictor of risk-taking. For the curvilinear model, linear regression was used although another variable was added called “size squared” which is the number of employees squared. This allows the model to be tested as a curvilinear relationship. Table 1 displays the descriptive characteristics and the correlation output for the variables.

For each dimension, there are multiple questions that sum to create a composite measure. Because of this, it is important to test the reliability of each variable. Cronbach’s alpha is used to test that the questions addressing each dimension are correlated. In general, the alpha score will increase as the inter-correlations of the
questions increase, therefore testing the internal consistency of the results. In general, an alpha of 0.6 or greater is accepted in academic work.

Table 2 summarizes the alpha scores for the three entrepreneurial dimensions. Alpha scores of 0.642, 0.679, and 0.742 for innovativeness, proactiveness, and risk-taking respectively are all above the 0.6 generally accepted cutoff for reliable intercorrelations. Therefore, the integrity of the survey questions is upheld and the questions can be summed as originally intended.

It is also important to test the overall significance of the regression models. This is accomplished using the F-Test. The F-values for the three models are reported in Table 3. The results show that the F-values for all models are significant, verifying the overall significance of the models.
# Table 1. Descriptive Characteristics and Correlation Output

| Variables | Mean | SD  | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    | 11    | 12    | 13    | 14    | 15    | 16    | 17    | 18    | 19    | 20    |
|-----------|------|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| **Controls** |      |     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| 1. Food   | .11  | .31 | 1.00  |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| 2. Wood   | .05  | .22 | -.08**| 1.00  |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| 3. Print  | .08  | .26 | -.10**| -.07**| 1.00  |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| 4. Rubber | .05  | .22 | -.08**| -.05* | -.07**| 1.00  |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| 5. Chemi  | .04  | .20 | -.07**| -.05* | -.06* | -.05*| 1.00  |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| 6. Trans  | .03  | .16 | -.06* | -.04  | -.05  | -.04  | -.03  | 1.00  |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| 7. Machine | .08  | .28 | -.11**| -.09**| -.07**| -.06**| -.05* | 1.00  |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| 8. Electro| .09  | .28 | -.11**| -.09**| -.07**| -.06**| -.05* | -.09**| 1.00  |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| 9. Program| .10  | .29 | -.11**| -.09**| -.08**| -.07**| -.05* | -.10**| -.10**| 1.00  |       |       |       |       |       |       |       |       |       |       |       |       |       |
| 10. Textile| .03  | .18 | -.06**| -.04  | -.05* | -.04  | -.03  | -.05* | -.06* | -.06* | 1.00  |       |       |       |       |       |       |       |       |       |       |       |       |
| 11. Service| .09  | .29 | -.11**| -.09**| -.07**| -.05* | -.10**| -.10**| -.6*  | 1.00  |       |       |       |       |       |       |       |       |       |       |       |       |       |
| 12. Constr| .01  | .10 | -.04  | -.02  | -.03  | -.02  | -.02  | -.01  | -.01  | -.03  | -.02  | -.03  | 1.00  |       |       |       |       |       |       |       |       |       |       |       |
| 13. Other | .24  | .43 | -.20**| -.13**| -.16**| -.13**| -.09**| -.17**| -.17**| -.18**| -.18**| -.06* | -.02  | 1.00  |       |       |       |       |       |       |       |       |       |       |
| 14. Age   | 43.91| 10.52| -.05* | .01   | -.01  | -.01  | -.01  | -.01  | -.01  | -.01  | -.01  | 1.00  |       |       |       |       |       |       |       |       |       |       |       |       |
| 15. Sex   | 1.35 | 7.74| -.02  | -.01  | -.02  | -.10**| -.01  | -.02  | -.02  | -.02  | 0.00  | 0.05* | 0.00  | -.03  | 0.07**| 1.00  |       |       |       |       |       |       |       |
| **Independent Variable** |      |     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| 17. Size  | 53.34| 81.06| -.06* | -.07**| -.05* | -.00  | -.01  | -.00  | -.04  | -.03  | -.02  | -.01  | -.01  | 0.00  | -.02  | 1.00  |       |       |       |       |       |       |       |
| **Dependent Variable** |      |     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| 18. Innov | 8.84 | 2.99 | -.09**| -.07**| -.07**| .00   | .03   | -.03  | .04   | .01   | .11** | .01   | .06*  | .04   | -.04  | -.02  | -.05  | -.03  | .07** | 1.00  |       |       |       |       |
| 19. Proact| 9.72 | 2.90 | -.08**| -.07**| -.05* | -.02  | .05*  | .06*  | .04   | .01   | .12** | -.09**| .08** | -.08**| -.05* | -.02  | -.02  | .03   | .10** | .46** | 1.00  |       |       |       |
| 20. Risk  | 5.36 | 4.05 | -.08**| -.05  | -.01  | .01   | .00   | -.01  | .04   | .02   | .10** | -.10**| .05*  | -.05* | -.02  | .00   | -.02  | -.02  | .11** | .37** | .49** | 1.00  |       |       |       |

**Correlation is significant at the 0.01 level
* Correlation is significant at the 0.05 level
Table 2. Alpha Values

<table>
<thead>
<tr>
<th>Entrepreneurial Dimension</th>
<th>Cronbach's Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Innovativeness</td>
<td>0.642</td>
</tr>
<tr>
<td>Proactiveness</td>
<td>0.679</td>
</tr>
<tr>
<td>Risk-Taking</td>
<td>0.742</td>
</tr>
</tbody>
</table>

Table 3. F-Values

<table>
<thead>
<tr>
<th>Entrepreneurial Dimension</th>
<th>Control F-Value</th>
<th>Linear F-Value</th>
<th>Curvilinear F-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Innovativeness</td>
<td>4.579**</td>
<td>4.870**</td>
<td></td>
</tr>
<tr>
<td>Proactiveness</td>
<td>6.457**</td>
<td>7.415**</td>
<td></td>
</tr>
<tr>
<td>Risk-Taking</td>
<td>4.003**</td>
<td>4.993**</td>
<td>5.292**</td>
</tr>
</tbody>
</table>

*Significant at the 0.05 level.
**Significant at the 0.01 level.

Results

The results can be interpreted using the coefficient of determination, also known as the r-squared. This variable represents how well the model approximates the real data. It is often referred to as measuring the goodness of fit for a model. Linear regression coefficients are also used to determine how each of the control variables and firm size independently affect each entrepreneurial dimension. The beta represents the magnitude and direction of the change in the dependent variable (entrepreneurial dimension) for each unit change in the independent variable (firm size). Table 4 displays the r-squared results for the different models tested and table 5 shows the regression coefficients for each independent variable. Because we used industry, age, and gender of the respondents as controls, the r-squared for the model containing only
controls must be compared to the r-squared for the controls and size model. The change in r-squared from the control model to the hypothesized model will tell us how much additional variation in each entrepreneurial dimension is explained by firm size, beyond what is explained solely by the controls.

Table 4. R-Squared Values

<table>
<thead>
<tr>
<th>Entrepreneurial Dimension</th>
<th>Control R-Squared</th>
<th>Linear R-Squared</th>
<th>Curvilinear R-Squared</th>
<th>Change in R-Squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Innovativeness</td>
<td>0.04</td>
<td>0.05</td>
<td></td>
<td>0.01**</td>
</tr>
<tr>
<td>Proactiveness</td>
<td>0.06</td>
<td>0.07</td>
<td></td>
<td>0.01**</td>
</tr>
<tr>
<td>Risk-Taking</td>
<td>0.04</td>
<td>0.05</td>
<td>0.05</td>
<td>0.02**</td>
</tr>
</tbody>
</table>

* *p < 0.05.
** *p < 0.01.

The r-squared results for the innovativeness, proactiveness, and risk-taking models are 0.05, 0.07, and 0.05, respectively. Therefore, 5 percent of the variation in innovativeness, 7 percent of the variation in proactiveness, and 5 percent of the variation in risk-taking is explained by the independent variables. The change in r-squared from the control model is 0.01, 0.01, and 0.02 for innovativeness, proactiveness, and risk-taking, respectively. Therefore, 1 percent of the variation in innovativeness, 1 percent of the variation in proactiveness, and 2 percent of the variation in risk-taking is explained by the size of the firm in addition to that which is explained solely by the control variables. The change in r-squared is significant in all models, concluding that some of the variation in all of the entrepreneurial dimensions
is predicted by size and this prediction is beyond that which is predicted by only the controls.

**Innovativeness**

The regression coefficients for the innovativeness model show that none of the industries were significant in predicting a firm’s level of innovativeness. However, there is a significantly negative relationship between the age of the respondent and innovativeness. The model shows that as the respondent’s age increases, innovativeness will be predicted to decrease. In regard to the innovativeness hypothesis, there is a significantly positive correlation between firm size and innovativeness. As firm size increases, the level of innovation also increases. This finding is consistent with the hypothesis.

**Proactiveness**

The regression coefficients of the proactiveness model show that several industries are significant predictors of a firm’s level of proactiveness. The gender of the respondent is also a significant predictor. The model predicts that if a female responds to the survey, the firm will be more proactive. Inconsistent with the hypothesis that as firm size increases proactiveness decreases, the model actually shows a significantly positive relationship between size and proactiveness. As firm size increases, the model predicts that a firm will be more proactive.

**Risk-Taking**

For risk-taking, the results show that only one industry, programming, was significant in predicting the amount of risk-taking portrayed by a firm. The age and
gender of the respondent was not significant in this model. The beta for size is significantly positive. This means the linear trend is predominantly positive. Size squared has a beta which is significantly negative, meaning the curve is concave downward. The maximum point for the regression equation occurs at the firm size of 267 employees. The model predicts that firms with this number of employees will take the most risk, and as the size of the firm varies from this maximum in either direction, the amount of risk-taking gradually decreases. This is consistent with the original hypothesis that as firm size increases, the amount of risk-taking will increase and then decline.

**Post-Hoc Data Analysis**

The results show that a curvilinear relationship exists between firm size and risk-taking, although it is difficult to determine what causes this result. The original hypothesis used threat rigidity, prospect theory, and behavioral theory to explain how the level of risk-taking is determined among various firm sizes. One of the assumptions involving the threat rigidity thesis was that smaller firms experience more risk. This assumption could very well be true, although it is difficult to prove even though smaller firms have a greater probability of failure. In order to distinguish between when a firm experiences threats, post-hoc analysis was conducted to provide a clearer explanation of the curvilinear results.
Table 5. Regression Coefficients

<table>
<thead>
<tr>
<th></th>
<th>Innovation</th>
<th></th>
<th>Proactiveness</th>
<th></th>
<th>Risk-Taking Linear</th>
<th></th>
<th>Risk-Taking Curvilinear</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Beta</td>
<td>Std. Error</td>
<td>Beta</td>
<td>Std. Error</td>
<td>Beta</td>
<td>Std. Error</td>
<td>Beta</td>
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<td>constant</td>
<td>9.389**</td>
<td>0.897</td>
<td>10.985**</td>
<td>0.861</td>
<td>4.946**</td>
<td>0.617</td>
<td>4.855**</td>
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<td>0.884</td>
<td>-1.739*</td>
<td>0.849</td>
<td>0.149</td>
<td>0.609</td>
<td>0.081</td>
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<td>wood</td>
<td>-0.824</td>
<td>0.912</td>
<td>-1.849*</td>
<td>0.876</td>
<td>0.297</td>
<td>0.626</td>
<td>0.257</td>
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<td>printing</td>
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<td>0.894</td>
<td>-1.435</td>
<td>0.859</td>
<td>0.623</td>
<td>0.616</td>
<td>0.588</td>
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<td>0.914</td>
<td>-1.368</td>
<td>0.875</td>
<td>0.677</td>
<td>0.629</td>
<td>0.631</td>
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<td>0.928</td>
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<td>0.891</td>
<td>0.742</td>
<td>0.639</td>
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<td>transportation</td>
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<td>0.969</td>
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<td>0.926</td>
<td>0.504</td>
<td>0.662</td>
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<td>machinery</td>
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<td>0.882</td>
<td>-0.578</td>
<td>0.846</td>
<td>0.934</td>
<td>0.607</td>
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<td>electronics</td>
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<td>0.84</td>
<td>0.768</td>
<td>0.602</td>
<td>0.768</td>
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<td>program</td>
<td>1.089</td>
<td>0.888</td>
<td>0.076</td>
<td>0.852</td>
<td>1.329*</td>
<td>0.611</td>
<td>1.292*</td>
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<td>textile</td>
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<td>construction</td>
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<td>1.03</td>
<td>-2.874**</td>
<td>0.99</td>
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<td>0.709</td>
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<td>Oil &amp; Gas</td>
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<td>2.239</td>
<td>-5.271*</td>
<td>2.152</td>
<td>-0.731</td>
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<td>-0.765</td>
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<td>-0.009</td>
<td>0.005</td>
<td>-0.009</td>
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<td>0.021</td>
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<td>0.003</td>
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<td># of Employees</td>
<td>0.003**</td>
<td>0.001</td>
<td>0.004**</td>
<td>0.001</td>
<td>0.003**</td>
<td>0.001</td>
<td>0.007**</td>
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<tr>
<td>Size Squared</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-1.31E-05**</td>
</tr>
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</table>

*p < 0.05.

**p < 0.05.
The post-hoc analysis split the sample into firms that operate in a threatened environment and firms that do not. Because threats are innately external to the firm, small firm size in itself did not appear to be a good indicator of threats. Therefore, another external variable was used to determine if the firm really does operate in a threatening environment. In order to do this, data concerning the hostility of each firm’s environment was used to show if the firm experiences threats.

The external hostility variable was determined using four survey questions which are displayed in Appendix B. The results from the four questions were summed for each company to provide a single hostility score. The sample was split between those firms with a summed hostility value above and below the mean. In this way the sample was split into two equal groups: firms operating in a hostile environment, and firms operating in a non-hostile environment. Regression analysis was then used for the split samples and the results were compared to the original full sample.

Figure 4 shows the line of best fit for the three models: total sample, hostile sample, and the non-hostile sample. Figure 5 zooms in on the same graph for the smallest of firms. The zooming is necessary to show that the total sample actually predicts an amount of risk-taking between the hostile and non-hostile models for firms with less than 40 employees. Therefore, even though it appears that the total model predicts less risk-taking than the two split samples overall, the mean amount of risk-taking for the total sample falls between the two split samples as expected. The mean number of employees for the entire sample was only 56, which gives the models a
higher weight for small firms. This also helps to explain why the chart appears to predict risk-taking for the total sample to be less than the two split samples.

Figure 6 shows which environment’s model predicts the most amount of risk-taking for different sizes of firms. For firms with less than 40 employees, the non-hostile model predicts the most amount of risk-taking while the hostile environment predicts the least. However, the models predict that for all firms with more than 235 employees, the non-hostile model no longer predicts the most risk-taking. Rather, the hostile model begins to predict the greatest amount. Furthermore, the models show that for the largest of firms, the non-hostile model predicts the least amount of risk-taking while the hostile model predicts the greatest. This is flipped from the models’ predictions for the smallest of firms.
Figure 4.

![Graph showing the relationship between risk-taking and the number of employees, categorized by hostile and non-hostile environments.](image)
Figure 5.
Discussion

The results show that the size of the firm is a significant predictor of the three entrepreneurial dimensions. Although a significant relationship exists for all three dimensions, only two of the three hypotheses were supported. Even though the third was not supported, there are still some interesting conclusions that can be drawn from the study. The result of each dimension’s hypothesis is discussed below.

**Innovativeness**

Consistent with the initial hypothesis that as firm size increases, innovativeness also increases. The results support this prediction. Larger firms are assumed to have larger stocks of resources which are used for innovative endeavors. Therefore, smaller firms might have the intention to be innovative, although the larger firms are actually the ones with more resources to bring the intention to fruition. Because the survey
questions relate to innovative actions and not the intention to innovate, the data supported the hypothesis.

*Risk-Taking*

The risk-taking hypothesis was also supported by the data. A predominantly positive, concave downward relationship was found between firm size and risk-taking. As the size of the firm increases, the firm will take on more risk up to a certain point. Thereafter the firm will take less risk as the size of the firm continues to increase. The smallest firms were the most risk-averse. This may be due to the effect that would result from a risky action failing. The smaller firms would likely fail from a failed endeavor. Larger firms, on the other hand, could withstand taking risks because there are more resources to sustain the firm if a negative result occurs.

The model predicts that as the number of employees for a firm increases past 267, the firm will take relatively less risk. Behavioral theory of the firm and prospect theory both support this result. The theories suggest that once a firm reaches an aspiration point, it will be less likely to take risks to continue past that aspiration. If we assume that firms aspire to grow, then firms will take risks that could result in growth until they are content with the size of the firm. At that point, the firm will be less likely to take risks because the aspiration of firm growth has been achieved. The model predicts that the aspiration point occurs when a firm has grown to the size of 267 employees. Additional growth does not have the same positive effect on the firm because the goal has been reached. Therefore risk-taking that could result in the aspired growth will decline.
The post-hoc analysis provided a little more insight into the risk-taking results. After the sample was split into hostile and non-hostile environments, the models predict different amounts of risk-taking at various firm sizes. A firm is affected by the external environmental threats and also the internal impact of resource availability. Therefore, rather than interpreting a single model using internal and external factors, multiple models should be used for a more precise interpretation. For the smallest of firms, the non-hostile model predicts the most amount of risk-taking and the hostile model predicts the least. This is consistent with the threat rigidity thesis. The thesis states that when a firm experiences threats, it will become rigid and take less risk. We can assume that the threats associated with environmental hostility are causing the firms to take less risk. However, the models show that for large firms, the most amount of risk-taking occurs for firms operating in the hostile environment. This may seem as if it contradicts the threat rigidity thesis, although when coupled with the information of firm size, some interesting conclusions can be drawn. The threat rigidity thesis holds true for the smallest of firms, but not for medium or large firms. This shows that a threatening external environment will cause a firm to become rigid just as the threat rigidity thesis predicts; but if a firm has enough resources to counter the threat, firms will take more risk. This could be due to the firm’s necessity to take risk in a hostile environment because complacency would potentially lead to failure. A firm in a munificent environment would be less likely to take risks because it is content with its current market position.
Behavioral theory is also supported by the results of the split sample. Regardless of whether the firm operated in a hostile environment, the models predict a concave downward curvilinear relationship. This means that firms larger than a certain number of employees will gradually take less risk just as the theory predicts. One interesting result however is that the inflection point is greater for the hostile model and less for the non-hostile model when compared with the total sample. In other words, the hostile model presents a more predominantly positive concave downward relationship than the other models. Since the inflection point represents the aspiration point in regard to behavioral theory of the firm, the hostile model predicts that firms will have a greater aspiration point. This also makes intuitive sense considering that the more resources a firm has, the greater the probability of surviving an environmental threat. These firms will want to grow to a larger size because of the threatening environment in which they operate. However, the firms operating in a non-hostile environment will not have as much need to grow in size. Therefore, they will be more content at smaller sizes because they don’t have to worry about as many external threats. Consequently, the non-hostile model predicts an aspiration point much lower than the other two models.

Proactiveness

The hypothesis concerning proactiveness was not supported by the data. It was hypothesized that smaller firms would be more proactive due to the lack of bureaucracy and size limitations; however the results predicted the opposite. As size increases, proactiveness actually increases as well. This may be due to larger firms
having greater resources to be proactive even though smaller firms intend to act proactive. This is inconsistent with the original hypothesis, although there can be some explanations for this. As stated earlier, the survey questions concern proactive behavior rather than the intent to be proactive. Smaller firms, likely, do have less bureaucracy which could contribute to faster implementation of ideas; however proactive behavior often requires resources. One of the questions asks how fast a firm introduces new products or services. Although a firm might be proactive in initiating a plan to develop new products or services, executing the plan can be difficult with minimal resources. Therefore smaller firms may be more fluid with less bureaucracy, although they are still less proactive than larger firms with greater amounts of resources.

**Unidimensional vs. Multidimensional Approach**

Another interesting finding that can be explored involves the different dimensions covarying with one another. The hypotheses assumed that the dimensions did act independently of one another and they should not be summed as other researchers have done in the past. The results show that all three dimensions, when tested for linear regression, are positively significant. This could support the argument that the three dimensions should be summed as one entrepreneurial variable. On the other hand, the results could be significantly different even though they are all significantly positive. Therefore, the extent to which each is positive could covary.

In order to test whether the different dimensions significantly covary, a correlation analysis must be conducted to determine how greatly the dimensions
correlate with one another. As shown in table 1, the correlation of innovativeness and proactiveness is 0.46, innovativeness and risk-taking is 0.37, and proactiveness and risk-taking is 0.49. Generally, correlations above 0.5 are considered strong and correlations below 0.3 are considered weak. The results of this study show that the correlations fall somewhere in the middle for all the dimensions. There is some covariation between the dimensions; however, there is still a large percentage of variation between the variables that is not shared with each other. Consequently, it appears that there is evidence that the variables covary, although not enough to disprove the argument that they vary independently. Therefore, these results support looking at the dimensions separately due to the dimensions lacking a strong enough correlation with each other.

**Implications**

There are many implications that can be drawn from this research. When studying EO in the past, many different theories have been used to explain relationships having to do with the three dimensions and in particular, the risk-taking dimension. Most often scholars look at the connection with performance and EO. Behavioral theory, prospect theory, and the threat rigidity thesis are commonly referenced when interpreting the results. Although this research did not look at performance as a variable, it still serves as an example of how the different theories interact with one another. For example, the post hoc data analysis showed that the threat rigidity thesis can be used to explain results for the smallest of firms, but
behavioral theory and prospect theory are more explanatory of the results for medium and large firms. Going forward, researchers should recognize that there may be moderating variables such as firm size that should be used to distinguish which theory is applicable to a specific situation. Specifically, it should be recognized that threats can be internal, such as small firm size, or external, such as environmental hostility. Hypotheses of the future should therefore incorporate multiple variables that could affect risk-taking. Furthermore, rather than looking at a single theory, multiple theories should be used to predict different outcomes depending on the environment.

Another implication for academia has to do with the argument concerning whether the dimensions of an EO should be summed or examined independently. The results of this study show that there is some correlation between the different dimensions, although not enough to rule out the idea that they could vary independently. Thus, there is inconclusive evidence that supports the summing of the variables. Additionally, each variable makes its own unique contribution to the overall entrepreneurial orientation of a firm. Looking at the dimensions separately provides a more detailed glimpse into the EO construct and can yield more valuable results. Therefore this study contributes to the research arguing that the dimensions should not be summed.

Some interesting conclusions can be drawn from a practical business perspective as well. Companies understand that it is important to be entrepreneurial and research has shown that an entrepreneurial orientation can contribute to higher performance. By understanding that as firms grow they are more proactive and
innovative, managers can make more informed decisions about how to implement an entrepreneurial orientation. Risk-taking also increases to a point, and then decreases. Therefore assumptions could be made about whether a firm of a certain size would make a risky entrepreneurial venture. Knowing these characteristics would only add to a manager’s knowledge when making key decisions.

There are also some interesting conclusions involving the significance of the control variables. For example, younger respondents said that their firms were significantly more innovative. Assuming that the respondent was either the owner or general manager, the results show that firms with younger owners or general managers are more innovative. Furthermore, women respondents were significantly more proactive. Therefore firms with women as owners or general managers are more proactive. The research wasn’t necessarily looking to study age or gender; however, it is an interesting finding.

**Limitations**

Some limitations exist that could affect the value of the results. First, the data was collected more than ten years ago. There may have been some change in how the size of a firm affects its entrepreneurial posture since that time. Furthermore, the data used was cross-sectional. To obtain results of greater value, EO should have been measured over a period of time. This would provide insight into how the dimensions change over time and if there are any trends in the direction of the changes.
The study also relies on surveys to individuals. The survey results are used to determine firm-level behavior. To be more accurate in measuring a firm’s entrepreneurial orientation, the actual actions of the firm could have been measured. However, even if the actions of firms were measured, subjectivity would still remain when determining what actions constitute the various dimensions of entrepreneurial orientation.

**Conclusion**

This study should add to the growing body of research surrounding strategic entrepreneurship. Firm size has often been looked at as a predictor of firm behavior, and this study provides a new look at how it affects entrepreneurial orientation. Size has been used a moderator, although this research takes a new perspective by using size as the independent variable. It has been shown that for SMEs, innovativeness and proactiveness significantly increase as firm size increases. Also, the results show that firms will take more risk as firm size increases up to a certain point, after which risk-taking declines. Going forward, researchers can build off of this information and determine even more variables that affect entrepreneurial orientation. There are practical applications to the data as well. Managers can use the results to make more informed decisions about how to go about entrepreneurial ventures. The data presents a general idea of how firms act entrepreneurially in regard to size, therefore competitors could be examined in this context. The same assumptions can be made for risk-taking and proactiveness relative to the models’ predictions. Therefore
understanding how firms act can help managers make better decisions concerning future actions. Entrepreneurship is crucial for economic growth, therefore understanding the characteristics of entrepreneurship will only contribute to the growth of our economy and the well-being of our nation.
References


Appendix A. Entrepreneurial Orientation Survey Questions

The survey questions follow:

1.) In general, the top managers of my firm favor . . .
A strong emphasis on the marketing of tried and true products or services 1 to 7 A strong emphasis on R&D, technological leadership, and innovations

2.) How many new lines of products or services has your firm marketed in the past 5 years?
No new lines of products or services 1 to 7 Very many new lines of products or services

3.) Changes in product or service lines have been mostly of a minor nature 1 to 7 Changes in product or service lines have usually been quite dramatic

4.) In dealing with its competitors, my firm . . .
Typically responds to actions which competitors initiate 1 to 7 Typically initiates actions which competitors then respond to

5.) In dealing with its competitors, my firm . . .
Is very seldom the first business to introduce new products/services, administrative techniques, operating technologies, etc. 1 to 7 Is very often the first business to introduce new products/services, administrative techniques, operating technologies, etc.

6.) In dealing with its competitors, my firm . . .
Typically seeks to avoid competitive clashes, preferring a 'live-and-let-live' posture 1 to 7 Typically adopts a very competitive, 'undo-the-competitors' posture

7.) In general, the top managers of my firm have . . .
A strong proclivity for low-risk projects (with normal and certain rates of return) 1 to 7 A strong proclivity for high-risk projects (with chances of very high returns)

8.) In general, the top managers of my firm believe that . . .
Owing to the nature of the environment, it is best to explore it gradually via timid, incremental behavior 1 to 7 Owing to the nature of the environment, bold, wide-ranging acts are necessary to achieve the firm's objectives
## Appendix B. Hostility Survey Questions

How would you characterize the external environment within which your company functions?

<table>
<thead>
<tr>
<th>Option</th>
<th>Score Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very safe, little threat to the survival and well-being of my company</td>
<td>1 2 3 4 5</td>
<td>Very risky, one false step can mean my company’s undoing</td>
</tr>
<tr>
<td>Rich in investment and marketing opportunities</td>
<td>1 2 3 4 5</td>
<td>Very stressful, exacting, hostile; very hard to keep afloat</td>
</tr>
<tr>
<td>An environment that my company can control and manipulate to its own advantage, such as a dominant firm has in an industry with little competition and few hindrances</td>
<td>1 2 3 4 5</td>
<td>A dominating environment in which my company’s initiatives count very little against the tremendous political, technological or competitive forces</td>
</tr>
<tr>
<td>An environment demanding little in the way of technological sophistication</td>
<td>1 2 3 4 5</td>
<td>Technologically, a very sophisticated and complex environment</td>
</tr>
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