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Brandon A. Mueller

Indiana University - East, bamuelle@indiana.edu

Varkey K. Titus Jr.

University of Nebraska-Lincoln, vtitusjr2@unl.edu

Jeffrey G. Covin

Indiana University, covin@indiana.edu

Dennis P. Slevin

University of Pittsburgh, dpslevin@katz.pitt.edu

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Published in *Journal of Management* 38:5 (September 2012), pp. 1517-1549;
doi: 10.1177/0149206310380249

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Pioneering Orientation and Firm Growth: Knowing When and to What Degree Pioneering Makes Sense

Brandon A. Mueller,¹ Varkey K. Titus Jr.,¹
Jeffrey G. Covin,¹ and Dennis P. Slevin²

1. Indiana University

2. University of Pittsburgh

Corresponding author – Brandon A. Mueller, Indiana University, Kelley School of Business,
1309 East Tenth Street, Bloomington, IN 47405, USA; email bamueller@indiana.edu

Abstract

An extensive amount of research has been conducted regarding the various advantages and disadvantages posed by engaging in market pioneering behavior at the product level. However, relatively little research examines factors that facilitate the relationship between a firm's overall pioneering orientation and firm growth. This article investigates pioneering as an orientation that a firm adopts in pursuing a proactive introduction of new products to the market across product lines. In doing so, this study examines organizational and industry factors that impact the relationship between pioneering orientation and firm growth and proposes that this main effect relationship will be curvilinear (inverted U shaped). Further, this study hypothesizes that an organization's ability to strategically learn will positively moderate the relationship between pioneering orientation and firm growth. Additionally, this study hypothesizes that the greater the technological sophistication of the industry, the more positive the relationship between pioneering orientation and firm growth. Hierarchical regression analysis was utilized to examine the hypotheses as observed within a grouping of 101 select firms. Findings indicate that all hypotheses are supported, except for that regarding strategic learning, which is shown to negatively moderate the relationship between pioneering orienta-

tion and firm growth. The authors conclude with a discussion of the findings and the potential implications of the study.

Keywords: pioneering, pioneering orientation, strategic learning, entrepreneurial orientation

Introduction

Entrepreneurial behavior has become increasingly important to organizations as they face dynamic and complex environments (Barlett & Ghoshal, 1990) and seek new ways to increase competitiveness (Covin & Miles, 1999). At the firm level, entrepreneurial behavior is manifested through an organization's commitment to innovation, risk taking, and proactiveness (Miller, 1983). One of the ways in which an organization can engage in entrepreneurial behavior is by becoming a pioneer in its market (Covin & Miles, 1999). An organization that engages in market pioneering is one that brings new products to market before other organizations do. Stated differently, market pioneering is "a particular form or manifestation of entrepreneurial behavior whereby the organization proactively creates or is among the first to enter a new product-market arena that others have not recognized or actively sought to exploit" (Covin, Slevin, & Heeley, 2000: 177). An organization that consistently exhibits such market pioneering behaviors across product lines could be said to have adopted a "pioneering orientation." Firms with a pioneering orientation are able to capitalize on potential first-mover advantages, which may help a firm create and sustain competitive advantage (Garrett, Covin, & Slevin, 2009).

Several advantages to developing a pioneering orientation have been discussed in both the marketing and strategy literatures. For example, Robinson and Min (2002) discuss one of the potential benefits of becoming a market pioneer as being a short-term monopolist. This can allow the firm to create the industry standards by which future competitors are measured by consumers (Covin et al., 2000). Though monopoly advantages may not hold for long, pioneering organizations can nevertheless enjoy other advantages that can develop over time. For example, a pioneering organization may benefit from building brand loyalty, establishing switching costs, and preempting competition by offering broad product lines (Kerin, Varadarajan, & Peterson, 1992; Lieberman & Montgomery, 1988).

A pioneering orientation is not without its caveats. Lieberman and Montgomery (1988) stated that the disadvantages of being a first-mover are the advantages of being a late-mover. For example, late-moving firms can "free-ride" on the first-mover's investments, enjoy the resolved technological and market uncertainty, and take advantage of the incumbent's inertia (Robinson & Min, 2002). Furthermore, pioneers face significant amounts of uncertainty and bear a high risk of failure (Shepherd, 1999).

Given the potential advantages and disadvantages associated with pioneering behaviors, it is unclear whether a pioneering orientation is generally "good" or "bad" for an organization. Indeed, "it is not clear whether either pioneering or following should generally be considered a normative strategic posture" (Covin et al., 2000: 177). Though there is an extensive amount of work that examines the relationship between order of entry and

various measures of performance, there is little work that empirically examines factors that moderate the relationship between a firm's pioneering orientation and firm growth. Min, Kalwani, and Robinson (2006) recognize that the circumstances within which market pioneers operate need to be explored to yield important insights into the factors that facilitate or attenuate the success of pioneering behaviors.

Rather than exploring the pioneering acts of an organization from the individual-product level, this article investigates pioneering as an overall orientation that a firm adopts in pursuing a proactive introduction of new products to the market across product lines. Entrepreneurship research has often emphasized the status of a pioneer as being the literal first entrant into a given market (Lieberman & Montgomery, 1988), despite research such as Miller and Camp's (1985) finding that both first and second entrants can achieve success through early entry. This view is consistent with a number of studies that explore pioneering behaviors as exhibited by a group of early leaders in a new market, rather than by de facto order of entry (Buzzell & Gale, 1987; Robinson & Fornell, 1985). Pioneering has been previously represented as a continuum ranging from follower-based actions to progressively more pioneering-based actions (Zahra, 1996a). This article joins with previous research by acknowledging the inherent difficulty in recognizing de facto pioneers (determined solely by market entry; Golder & Tellis, 1993) and answers a loud call for the utilization of new data and research methods in future explorations of market pioneering (e.g., Lieberman & Montgomery, 1988). That being said—and in view of the large number of more traditional "first entrant" pioneering studies—pioneering behavior may also be meaningfully explored from the perspective of a pioneering orientation, characterized as a repeated proclivity toward early unique product introduction. In essence, a pioneering orientation explores pioneering from a portfolio level where the firm is the level of analysis, rather than investigating individual product pioneering efforts. Across product lines a firm can be variously pioneering, as a firm can be a pioneer in one product market but not in another. Explication of pioneering from a pioneering orientation perspective allows researchers to explore the success of a firm resulting from an overall strategic posture of pioneering across product markets.

The concept of pioneering orientation shares noteworthy commonalities with other strategic orientations—namely, Miles and Snow's (1978) concept of prospector firms and Porter's (1980) concept of product differentiation strategies—yet pioneering orientation is a distinct strategic orientation in several respects. Briefly, Miles and his colleagues use the label *prospector* to characterize firms whose "prime capability is that of finding and exploiting new product and market opportunities" (Miles, Snow, Meyer, & Coleman, 1978: 551). To the extent that the "new" product and market opportunities pursued by prospector firms represent opportunities that have not been previously explored by other firms (which is a possibility, according to how Miles and Snow describe prospectors, but not a requirement), then prospector firms are operating with a pioneering orientation. Nonetheless, prospectors need not be pioneers in an industry creation sense; they may simply pursue product and market opportunities that are new to them, that is, to the prospecting firms. Moreover, the concept of the prospector firm implies that a host of additional organizational-focused attributes exist for the firm (e.g., structural organicity), attributes that extend well beyond the characteristics of a pioneering orientation as this concept is herein employed.

Product differentiation strategies may also be consistent with a pioneering orientation, although this will not necessarily be the case. According to Porter (1980: 37), differentiation strategies entail “creating something that is perceived *industry-wide* as being unique.” The basis for product uniqueness among firms with differentiation strategies could be any number of factors including, for example, outstanding product quality, superior service, or strong brand identity. Significantly, the notion of the relative timing of market entry is not inherent to the concept of a product differentiation strategy. Thus, while firms with strong pioneering orientations compete on the basis of product lines that are differentiated from those of their competitors, the observed basis of product differentiation among pioneering firms assumes a very specific form—one defined by the timing of the firm’s new product introductions.

In sum, this study extends existing research on the pioneering–firm growth relationship by specifically addressing the context and contingencies within which such a pioneering orientation can be most beneficial to a firm. In doing so, this study also distinguishes itself from the abundance of prior literature delving into various forms of the entrepreneurial orientation–firm performance relationship. Miller’s (1983) study is commonly credited as being the first to define entrepreneurial orientation as a multidimensional construct encompassing a firm’s actions relating to proactiveness, innovation, and risk taking. Building on this theoretical foundation, and incorporating some scale items proposed by Khandwalla (1976/1977) and Miller and Friesen (1982), Covin and Slevin (1989) developed a nine-item measure they used to assess the strategic posture of a firm. This measure consisted of three items for each of the dimensions identified by Miller (1983). Covin and Slevin (1989: 79) theorized that the three dimensions of entrepreneurial orientation—proactiveness, innovation, and risk taking— together comprise a “basic, unidimensional strategic orientation.” The Covin and Slevin measure has become the most commonly used measure of entrepreneurial orientation for empirical research (Rauch, Wiklund, Lumpkin, & Frese, 2009), and it is the measure used in the current study to control for entrepreneurial orientation’s effects on the relationships of interest, thereby empirically distinguishing pioneering orientation’s unique effects on performance from those of entrepreneurial orientation.

While Lumpkin and Dess (1996) suggest that the concept of entrepreneurial orientation subsumes the range of pioneering behaviors, this article emphasizes and reveals pioneering orientation to be an organizational strategic behavior that uniquely explains variance in firm growth above and apart from an organization’s entrepreneurial orientation. Prior literature has emphasized pioneering as a specific exhibition of proactive behavior; however, proactiveness encompasses a host of other behaviors as well and in doing so captures much more than simply market pioneering. The operationalization of proactiveness as a component of entrepreneurial orientation includes items designed to measure the initiation of competitive actions, the introduction of new products or services, administrative techniques, operating technologies, and so on, and the adoption of a competitive “undo-the-competitors” business posture (Covin & Slevin, 1989). Amid this large array of strategic actions, the unique influence of pioneering behaviors upon firm performance can be lost among the commingling of various proactive strategies. From an empirical perspective, focusing on pioneering as a distinct behavior set enables researchers to tease out important firm outcomes related to the introduction of new goods or services, which may be overlooked in a broader analysis using proactiveness as a component of entrepreneurial orientation.

The purpose of this article is to investigate the relationship between a firm's pioneering orientation and firm growth and to explore two potential moderating variables to this relationship: strategic learning and industry technological sophistication. The following section will introduce the research model, discuss the constructs involved, and expound the theory underlying the hypotheses.

Theoretical Development and Hypotheses

The Research Model

The research model for this study adopts sales growth rate as the dependent variable. This particular dependent variable was chosen for a number of reasons. First, the estimates for sales growth are more readily available and reliable than profitability measures such as return on assets (ROA), return on investment (ROI), and so on, which are more prone to suffer from accounting measurement problems (He & Wong, 2004). Second, consistent with a recent meta-analysis conducted by Rauch et al. (2009), relationships between a global entrepreneurial orientation measure (a construct theoretically linked to pioneering orientation) and measures of both firm growth and firm profitability have been found to be so similar as to make differences statistically insignificant. Third, survey-based sales growth rates have been found to achieve very high and significant correlations with archival-based sales growth rates (He & Wong, 2004). Finally, sales growth rate is regarded as an appropriate indicator of market pioneering performance, especially where a study focuses on firm-level performance rather than on product-level performance (Covin et al., 2000). Other firm performance measures such as ROA and ROI are designed to primarily measure firm efficiency, whereas sales growth is a measure of firm effectiveness at creating and thriving in new markets. Thus, average sales growth rate appears an appropriate measure of firm pioneering performance.

The independent variable in the model is pioneering orientation. For the purposes of this article, pioneering orientation represents a continuum of pioneering behaviors such that a high level of pioneering orientation indicates a firm operating with a heavy bias toward early entry of uniquely innovative products into the market, while a low orientation indicates less of a reliance upon early entry as a business strategy as well as the introduction of more incrementally new products. A firm's degree of strategic learning and the level of industry technological sophistication were investigated as the two proposed moderating variables in this study. These two variables incorporate a mix of organizational and environmental factors that potentially facilitate the pioneering orientation-firm growth relationship. A more comprehensive theoretical rationale for each variable's inclusion into our model is further discussed below.

The pioneering literature has emphasized the importance of environmental context in determining the efficacy and necessity of engaging in pioneering behaviors (Golder & Tellis, 1993; Kerin et al., 1992; Zahra, 1996a). Past pioneering studies have explored environmental differences related to growing versus mature markets (Buzzell & Gale, 1987), dynamic versus stable markets (Ali, 1994), and benign versus hostile environments (Kerin et al., 1992), but there is a relative dearth of research exploring pioneering as applied

within high- or low-tech industry contexts. The choice of industry sector is critical, as it determines the external environmental forces that will act upon the firm and to which the firm must adapt and respond with appropriate organizational strategies (Garnsey, 1998). Certain industry environments may be more advantageous than others to pioneering behaviors. For example, in environments flush with rapid change and short product life cycles, future cash flows from existing operations are rife with uncertainty, and organizations may need to constantly seek out new opportunities in order to survive (Rauch et al., 2009).

Accordingly, one of the moderating variables explored in this study is the degree of technological sophistication associated with the pioneering firm's industry environment. A technologically sophisticated environment is characterized by industry-wide heavy investments in research and development (R&D), frequent product and process technology changes, and heavy reliance on technical personnel as a basis for industry competitive advantages (Eisenhardt & Brown, 1998). These types of environments are associated with high levels of dynamism, a harbinger of elevated uncertainty that undermines the ability of managers to accurately forecast future events as well as their impact upon the organization (Khandwalla, 1977). Pioneering involves the exploration of resources and innovation leading to new products and services. This type of opportunity-seeking behavior is more likely to prove successful in environments where the costs and risks incurred by exploration and experimentation are rewarded by capturing new product market niches (Lumpkin & Dess, 2001). The benefits accruing to pioneers may also be necessary to offset the threat of obsolescence, a condition heightened by dynamic and ever-changing environments (Miller & Friesen, 1983). Firms that confront technologically sophisticated environments may experience higher growth when they engage in pioneering activities.

Lieberman and Montgomery (1998) postulate that it is the resources and capabilities of certain firms that enable them to achieve higher levels of pioneering success relative to their peers. From the perspective of the resource-based view, the decision regarding when to enter a new market would be based upon the strengths and weaknesses of a firm's resource base, as well as upon the capabilities they can bring to bear. While researchers have investigated various firm capabilities, including marketing skills, shared manufacturing abilities, and R&D competencies, prior to our study, strategic learning capabilities have yet to be empirically explored in terms of their impact upon the pioneering-performance relationship (Robinson, Fornell, & Sullivan, 1992).

A firm's ability to strategically learn has been theoretically linked to pioneering behaviors in the existing literature (Atuahene-Gima, Slater, & Olson, 2005; Baker & Sinkula, 1999; Levinthal & March, 1993; March, 1991). Organizations involved in pioneering behaviors necessarily put themselves in the position of operating in environments and circumstances that can vary widely from previous experience. It is within these domains of uncertainty and ambiguity that an organization's adaptive capabilities are critical, as the firm actively learns from potential missteps and takes corrective action to ensure future improved performance (Herriott, Levinthal, & March, 1985). In particular, *strategic learning* is the term commonly used in reference to learning behaviors and processes that enable long-run adaptive capability (e.g., Kuwada, 1998). Pioneering is essentially an experiment with an unknown outcome; however, pioneers can arrive at a more positive outcome by utilizing learning processes to minimize mistakes and apply valuable experi-

ence. Pioneering firms that show a capability for strategic learning may be able to leverage that capability into higher growth relative to firms without such capabilities.

The Impact of Pioneering Orientation on Firm Growth

As discussed earlier, the literature on market pioneering considers the many different advantages and disadvantages available to firms that pioneer. One study examined the survival rates of pioneering firms and found that they tend to survive longer than early followers do (Robinson & Min, 2002). Pioneer survival rates were higher as a function of the length of lead time the pioneer had before other competitors entered the industry. However, the disadvantages posed by strong pioneering orientations are considerable. Indeed, being the first to enter a new market is like “an archer shooting at a target shrouded by a veil of fog” (Hamel & Prahalad, 1994: 238). Pioneering organizations face a great deal of market and technological uncertainty, for example, where the former arises from the difficulty of forecasting customer response to the pioneer’s innovation, and the latter arises due to the uncertain success of the new first-generation technology (Robinson & Min, 2002).

Keeping these various advantages and disadvantages in mind, it seems clear that “market pioneering is not a normative strategic behavior conducive to superior performance for all firms” (Kerin et al., 1992: 48). Thus, an important question arises: Under what circumstances does a pioneering orientation lead to firm growth? This study investigates potential moderators of the pioneering orientation–firm growth relationship. However, an additional point of inquiry for this article is the *degree* of pioneering best or most optimally exhibited by an organization. In essence, a firm’s pioneering orientation measures the degree to which it emphasizes pioneering behaviors across product lines, encapsulated by two dimensions— the level of firm reliance upon pioneering endeavors and the uniqueness associated with those pioneering initiatives. Firms with a high level of pioneering orientation are those firms with a proclivity toward pioneering with uniquely innovative products. As such, is there a point of diminishing marginal return to emphasizing a pioneering orientation such that an organization can benefit from pioneering to a certain point, beyond which firm growth is diminished? We propose that organizations can largely benefit from pioneering, but developing overly high pioneering orientations will impede organizational growth.

Min et al. (2006) explore this idea of degree of pioneering by investigating the various survival rates for pioneers and early followers engaging in what they call “really new” versus “incrementally new” products or innovations. According to Urban, Weinberg, and Hauser’s (1996: 47) description, “Really new products shift market structures, represent new technologies, require consumer learning, and induce behavior changes.” An incremental innovation, on the other hand, is designed to satisfy an identified market need and utilizes an existing technology or refinement of it. This is consistent with the extant literature’s categorization of innovation as ranging between the more incremental to the more radical in terms of the product’s newness to the company and marketplace (Ali, 1994; McDermott & O’Connor, 2002). Min et al.’s conclusion from their study is that the market pioneer is much more likely to fail when it creates a new market with a really new product than when it creates a market with a more incremental innovation. Other empir-

ical work (Golder & Tellis, 1993; Olleros, 1986) supports this idea of an inherently higher survival risk for pioneers of radical products compared to the materially lower survival risk for incremental innovators (Robinson & Min, 2002; Urban, Carter, Gaskin, & Mucha, 1986). In other words, the degree of pioneering has a significant impact upon the success or failure of the pioneering initiative involved.

Lieberman and Montgomery (1988) explore some of the reasons for this in recognizing that many of the disadvantages for pioneers of really new initiatives are actually advantages for early followers. These disadvantages include free-rider effects, market and technological uncertainties, changing technology or customer needs, and incumbent inertia. These disadvantages are all exacerbated in extremely novel environments, whereas in incrementally innovative markets they are more muted. For more radical products, followers have the advantage of observing evolving market and environmental forces and responding to take advantage of more certain and favorable dynamics. Due to the high levels of uncertainty and evolving customer or technology dynamics, pioneers in such environments often miss out on the best opportunities, a situation that is difficult to fix retroactively as factors such as incumbent inertia and the purchase of certain fixed assets limit the flexibility available to an organization (Lieberman & Montgomery, 1988). Pioneering firm adaptations or corrective actions are also delayed by the allocation of firm attention away from critical environmental and competitive factors, which may be difficult to correctly identify as pioneers mistakenly rely on experience originating from altogether different markets. More moderate pioneering ventures often retain the primary first-mover advantages while avoiding the aforementioned disadvantages. In their study, Min et al. (2006) empirically show that, for market pioneers, the 12-year survival rates for pioneers of more radical products are drastically lower (23%) than that of pioneers in incremental product markets (61%). Thus, the challenges attributed to more radical product markets often outweigh the benefits of first-mover advantages. Such prior research seems to support the idea that a high degree of pioneering orientation is inimical to organizational survival.

Another perspective on the dangers of utilizing a high degree of pioneering relates to the issue of firm balance and tension as tied to organizational initiatives of exploration and exploitation. Organizations that are actively engaging in the exploration process may not be involved in product exploitation to its most beneficial degree. Exploitation can be thought of as "the refinement and extension of existing competences, technologies, and paradigms" (March, 1991: 85), while exploration is "experimentation with new alternatives" (March, 1991: 85). Organizations face a trade-off between where resources should be invested—that is, organizations must ask to what degree investment should occur in either exploration or exploitation, acknowledging that investing in one will take away from the other. As March (1991: 72) stated, "Choices must be made between gaining new information about alternatives and thus improving future returns . . . and using the information currently available to improve present returns." Organizations adopting strong pioneering orientations may be sacrificing present returns and growth gained through harvesting activities in exchange for unknown and uncertain future returns from high-risk initiatives.

Organizational ambidexterity has been identified in the literature as an organizational metaphor for firms that are equally dexterous at both exploratory and exploitative processes. The importance of maintaining a balance between the two processes has been rec-

ognized with near consensus, as scholars note that exploitation and exploration enable distinct, yet complementary, changes in firm performance through their differential influence upon the size, timing, and riskiness of firm cash flows (Levinthal & March, 1993). He and Wong (2004) provide empirical support for the importance of ambidexterity in a study showing that organizations that maintain a balance between exploratory and exploitative processes achieve higher rates of firm growth than those firms with an imbalance between the two processes. Firms with elevated pioneering orientations rely upon pioneering endeavors across and throughout their multiple product lines, creating an imbalance between exploratory and exploitative processes. This imbalance may lead to diminished firm growth.

Given the growth potential presented by pioneering, but recognizing that there exist implicit dangers in engaging in pioneering beyond a certain degree, we posit that the relationship between a firm's pioneering orientation and firm growth is curvilinear.

Hypothesis 1: The relationship between a firm's pioneering orientation and firm growth is curvilinear (inverted *U* shaped), with optimal performance occurring when an intermediate level of pioneering orientation is exhibited.

Strategic Learning as a Moderator

Strategic learning involves the ability of firms to interpret the outcomes of past decisions and adjust future tactics based on what was learned from prior actions. Mintzberg (1991) depicted strategic learning as a process of continuously reformulating and crafting strategies. Organizations that exhibit strategic learning continually "rethink" the nature of their business and strategic postures in response to feedback on the efficacy of past efforts (Leavy, 1998). In this article, strategic learning is defined as a firm's ability to learn from the perceived efficacy of its business strategies or processes and change them when warranted.

There is an abundance of prior literature explicating the role of strategic learning within organizations. This literature explores such topics as strategic learning's relationship with firm performance (Das & Elango, 1995; McKee, Varadarajan, & Pride, 1989; Sanchez, 1997; Shimizu & Hitt, 2004), organizational survival (Brittain, 1989), the evolution of firm capabilities (Dutton, Thomas, & Butler, 1984; Mody, 1989; Muth, 1986; Yelle, 1979), and a firm's level of innovativeness (Baker & Sinkula, 1999). Collectively, the literature on the topic lends credence to the common observation that strategic learning represents a true source of sustained competitive advantage (De Geus, 1988; DiBella, 2001; Goh, 2003).

Past research, however, has largely ignored the idea that the link between strategic learning and organizational performance may be strongly influenced by the context under which that learning occurs. The context investigated by this article is that of the market pioneer; this study explores how a firm's strategic learning capabilities interact with the particular realities faced by pioneering firms. There are a number of reasons to believe that strategic learning would be particularly beneficial to a pioneering firm. Market pioneering is an exploratory behavior that forces an organization into an environment that is beyond the scope of its experience (March, 1991). In order to thrive in such an environment, a firm must interpret and utilize new information in ways that reflect learning. For example, a firm must learn which of its prior practices it can retain, which it needs to

modify, and which it needs to discard. Because it is a foray into a relatively unknown environment, pioneering is essentially an experiment with an unknown outcome; however, it is an outcome that can be modified by a firm utilizing its strategic learning in order to minimize unproductive or harmful processes and strategies (Atuahene-Gima et al., 2005; Baker & Sinkula, 1999). Strategic learning would enable an organization to improve its response to unknown or changing market conditions because it would enable the organization to learn from past strategic actions and adapt current strategies midstream, thereby increasing the effectiveness of current actions and improving the likelihood of successful pioneering ventures (Stalk, Evans, & Shulman, 1992). Strategic learning also can enhance a firm's ability to utilize market information for the purposes of product development and commercialization, improving its responsiveness to market demand and conditions (March, 1991; Levinthal & March, 1993). There are theoretical suggestions that strategic learning may be instrumental in increasing effective organizational responsiveness, a potentially critical competency for pioneers (Atuahene-Gima et al., 2005).

In short, the novel environment of the market pioneer magnifies the importance of strategic learning competencies, which may serve to enhance the pioneering orientation-performance relationship.

Hypothesis 2: The relationship between a firm's pioneering orientation and firm growth is positively moderated by a firm's strategic learning capabilities.

Industry Technological Sophistication as a Moderator

In numerous industries, organizations have used their technological prowess to create enduring competitive advantages relative to their peers by adopting new processes, offering new products, redrawing industry boundaries, or revising the rules of competition (Utterback, 1994). These outcomes are especially crucial in industry environments where technological advances and utilization are commonplace and ever-shifting technological dynamics play key roles in determining new market leaders and benchmark technologies. Such industry environments are referred to in this article as *technologically sophisticated*.

Technologically sophisticated industries are populated by firms competing in fast-changing and unpredictable markets where the pace of product and process technology change is a strong determinant of market leadership (Eisenhardt & Brown, 1998). In technologically sophisticated industries, pioneers have a number of first-mover advantages that position them for success. First, in industries characterized by frequent product change, the market will be accustomed to and gravitate toward the latest offerings. Past research indicates that the first product introduced in a market receives a disproportionate amount of attention in the consumer's mind (Lieberman & Montgomery, 1988), has the greatest influence in determining customer preferences (Carpenter & Nakamoto, 1989), more easily gains access to supplier shelves (Montgomery, 1975), and can establish enduring loyalty with early adopters (Schmalensee, 1982). Pioneers can, therefore, achieve enduring brand loyalties and successfully differentiate themselves from competitors by being first-movers (Zahra, 1996b). Pioneers, because they are first to enter a given market space, may also be able to select the most attractive market niches and take strate-

gic actions to limit the amount of remaining space available to support competing firms (Lieberman & Montgomery, 1988). The importance of rapid product development to firm success is well illustrated by Vesey's (1991) study on high-technology products, which showed that when products were 6 months late entering the market, they earned 33% less than they would have if "on time."

Second, under conditions of rapid product change, a first-mover status is often necessary to recoup product R&D costs by capturing attractive product market niches ahead of the competition. A pioneer's proactive introduction of new products and services also helps attenuate the threat of eventual obsolescence, an imminent concern in dynamic markets (Lawrence & Lorsch, 1967; Miller & Friesen, 1983). Additionally, while the trajectory of technological process and product innovation is relatively uncertain, pioneers have an opportunity to impact the direction of industry technological growth by establishing an introduced product or process technology as the de facto standard and, thereby, dictate the rules of competition (Zahra, 1996a). In so doing, first-movers can capitalize on R&D investments already aligned with future technology headings. While there are pitfalls to rapid product development and deployment, within the context of high-velocity, technologically sophisticated industries, it appears first-market entrants generate sizable advantages.

While it is often the case that market pioneers incur costs associated with their first-mover status—including, for example, operating with limited knowledge of customer requirements (Golder & Tellis, 1993)—our contention is that, on the whole, an industry environment characterized by technological sophistication confers first-mover benefits to early entrants and penalizes latecomers. As such, technological sophistication would effectively moderate the relationship between a firm's pioneering orientation and firm performance.

Hypothesis 3: The relationship between a firm's pioneering orientation and firm growth is positively moderated by industry technological sophistication.

Method

Sample and Data Collection

The data for this research study were acquired through the partial sponsorship of the Southwestern Pennsylvania Industrial Resource Center (SPIRC), a regional economic development organization. Firm data were accumulated through the SPIRC's census of businesses in the tri-state region (Pennsylvania, Ohio, and West Virginia) during the mid-1990s. Prospective firms were narrowed down using selection criteria specifying that businesses be nondiversified business units (as classified by the SPIRC and verified by respondents), operate on a manufacturing basis, and have 50 or more employees. This resulted in a total of 418 candidate firms. Diversified firms were excluded from the sample in order to avoid confounding results with pioneering orientation philosophies that might differ across multiple businesses. The focus on manufacturing-based organizations effectively controlled for macroindustry effects by eliminating multiple and diverse industry sectors such as agriculture, mining, wholesale or retail trade, and so on, from the sample. The selection of firms employing only 50 or more people was made in order to avoid known size-related biases in the data.

In following with the procedure of Greer and Ireland (1992), two questionnaires, and self-addressed, stamped, return envelopes, were mailed to the senior-most executive of each of the 418 firms selected for the study as described above. This individual, considered the primary respondent, was asked to complete a questionnaire personally and to refer the second questionnaire to another senior executive who would serve as a secondary respondent. The primary respondent was directed to select this second individual on the basis of that individual's overall understanding of the business and level of involvement in the firm's strategic processes. The secondary respondents' data were used solely for measure corroboration and reliability purposes. Those firms that did not respond to the initial mailing were contacted 1 month later via telephone.

Usable responses were received from 170 respondents, of which 115 were primary respondents and 55 were secondary respondents; this represents an organizational response rate of 27.5% (115/418). This study utilized information from 101 firms, as only these firms had complete data available on all the study's measures. The diversity of this final sample is reflected in the 74 different four-digit standard industrial classification (SIC) codes among the 101 firms, with no identical SIC code being represented by more than 6 firms. Sixty-three of the 101 firms were privately owned, while 38 were publicly owned. The average sales revenue and age of the firms in the sample were \$134.23 million ($SD = \440.38 million) and 48.63 years ($SD = 31.12$ years), respectively. The average number of employees among these firms was 805.60 ($SD = 2,469.91$).

A power analysis was conducted to determine the sample size necessary to achieve the target power level of .80 proposed by Cohen (1992). Given a conventional significance criterion (α) of .05, an anticipated large effect size (based on the average values of R^2 observed in similar research), and 11 independent variables in our regression equation, a total sample size (N) of at least 81 is indicated for the current study (as computed based on a formula and effect size standards presented by Cohen, Cohen, West, & Aiken, 2003). Appropriately, the current sample size of 101 well exceeds this figure.

The t -test comparisons of the average size (computed by both number of employees and annual sales) and age of the responding firms with the same data for nonresponding firms (where available from secondary sources such as *Ward's Business Directory of U.S. Private and Public Companies*) showed no significant differences ($p > .10$) between the two groups. Therefore, the study sample appears to be representative of the population at large in terms of size and age. The t -test comparisons of early respondents (those firms that returned the questionnaires without second contact) and late respondents (those firms that replied after the second telephone contact) also revealed no significant differences ($p > .10$) between the two groups in number of employees, annual sales revenue, firm age, or any of the other research variables of interest to this study.

Measures

The next few paragraphs expand upon the various measures utilized in this research. Table 1 illustrates the summary statistics (i.e., mean scores, standard deviations, and Cronbach's alpha coefficients, where appropriate) as well as the correlation matrix. The ap-

Table 1. Summary Statistics and Correlation Matrix (N = 101)

Variable	M	SD	α	1	2	3	4	5	6	7	8	9	10	11
1. Relative sales growth rate	-746	14.878	NA											
2. Firm size (employees)	805.60	2,469.907	NA	-.035										
3. Firm age (years)	48.63	31.116	NA	-.039	.238*									
4. Firm ownership (1 = public, 0 = private)	0.376	0.487	NA	.021	.289**	.053								
5. Environmental hostility	4.270	0.971	.680	-.077	-.165	-.126	-.133							
6. Entrepreneurial orientation	4.047	1.044	.843	.255*	.131	.019	.136	-.218*						
7. Pioneering orientation (PO)	3.591	1.329	.800	.157	.108	.159	.216*	-.235*	.520**					
8. Strategic learning	4.708	0.966	.855	.103	-.040	-.149	-.118	.008	.280**	.222*				
9. Industry technological sophistication	3.578	1.246	.830	-.042	.066	-.137	.116	.108	.189	-.008	.109			
10. PO ²	1.749	2.135	NA	-.163	-.064	-.022	.009	.097	.042	.159	.120	.027		
11. PO × Strategic learning	0.2823	1.565	NA	-.292**	-.077	-.016	-.025	.111	-.092	.119	-.175	-.111	.446**	
12. PO × Industry technological sophistication	-0.013	1.865	NA	.236	-.044	-.048	.035	.001	-.127	.029	-.120	.015	-.071	.046

* $p < .05$. ** $p < .01$.

pendix presents the tests conducted to assess levels of internal response consistency – an indicator of construct validity for each of this study’s measures.

The *t*-tests comparing the primary and secondary respondents’ mean scores across each research measure indicated no significant differences ($p > .10$) between the two respondents. Thus, no discernible measurement bias exists within the sample as a function of who the respondent was within the firm. Overall, comparisons between secondary and primary respondents supported the treatment of the primary respondents as the key data informants for this study.

Firm sales growth rate. This study operationalized firm performance as a firm’s sales growth rate relative to its industry. Sales growth rate was operationalized as the firm’s average rate of growth in sales revenue over its most recent 3-year period. The study employed a measure of sales growth that is relative to the industry growth rate to account for industry effects on the observed relationships. As discussed later in the Tests for Common Method Bias section, the self-reported sales revenue figures were corroborated where possible with secondary data (originating from the *Harris Pennsylvania Industrial Directory* and *Ward’s Business Directory of U.S. Private and Public Companies*). To account for the differing growth rates of the industries represented in the sample, the 3-year average industry growth rate for each firm (as shown in the industry “value of product shipment” figures provided by the U.S. Department of Commerce) was subtracted from the firm’s 3-year average growth rate. This created an industry-controlled relative growth rate that was used as the dependent variable in this study.

Pioneering orientation. This four-item, 7-point scale was developed by Covin et al. (2000) to measure the degree of a firm’s pioneering orientation. The items in this scale included the following: (1) We offer products that are very similar to those of our major competitors (reverse coded); (2) We offer products that are unique and distinctly different from those of our major competitors; (3) We compete heavily on the basis of being first-to-market with new products; and (4) We typically precede our major competitors in bringing new products to market. The pioneering orientation construct is thus consistent in reflecting the two primary elements of pioneering as espoused by the literature: market timing and distinctiveness (Carpenter & Nakamoto, 1989; Golder & Tellis, 1993). A high score on this scale indicates a strong firm emphasis toward pioneering behaviors, that is, a high pioneering orientation.

Strategic learning. This construct was measured using the six-item, 7-point scale proposed by Garrett et al. (2009). The items composing this scale included the following: (1) My business unit is good at identifying strategies that haven’t worked; (2) My business unit is good at pinpointing why failed strategies haven’t worked; (3) My business unit is good at learning from its strategic/competitive mistakes; (4) My business unit regularly modifies its choice of business practices and competitive tactics to see what works and what doesn’t; (5) My business unit is good at changing its business strategy midstream as we get a sense of the likely effectiveness of our actions; and (6) We are good at recognizing alternative approaches to achieving our business unit’s objectives when it becomes clear that the initial approach won’t work. Higher average scores on this scale indicate greater strategic learning.

Industry technological sophistication. This five-item, 7-point scale was developed by Covin, Slevin, and Heeley (2001). The items in this scale include the following: (1) Heavy investments in R&D are characteristic of my industry; (2) Frequent product technology changes are characteristic of my industry; (3) Frequent process technology changes are characteristic of my industry; (4) Having superior technical personnel is a key basis for competitive advantage in my industry; and (5) The widespread employment of new or advanced process or product technologies is characteristic of my industry. A higher score on this scale is indicative of greater industry technological sophistication.

For the purpose of determining the structure of the data used to construct the multi-item scales, the 15 items of the above measures were factor analyzed using principal components analysis and a varimax rotation. Results indicated that the 15 items load (using a loading criterion of .50) on three separate factors corresponding to the theoretical structure of the scales. Moreover, no items loaded on more than one factor, and in all cases the items that loaded on a factor did so at a magnitude of at least twice that of the nonloading items. In short, the factor analysis suggested a very clean factor structure for the independent variable scales.

Control variables. Firm size, age, and ownership status (public or private) were controlled by this study because of expectations that the adoption of pioneering strategies and their associated outcomes might differ systematically with these variables (Teece, 1986). The measure of firm size used in this research is the respondent-reported number of employees. Firm age was assessed as the number of years the firm had been in business, also as reported by the respondents. Firm ownership status was measured as a dichotomous variable (1 = *public*, 0 = *private*).

Entrepreneurial orientation was also employed as a control variable in this study in order to (1) distinguish this study from prior studies involving entrepreneurial orientation and its effect upon firm growth (Covin, Green, & Slevin, 2006; Davidsson & Achtenhagen, 2005) and (2) partial out the unique contribution of a firm's pioneering orientation to the determination of firm growth above and beyond that explained by entrepreneurial orientation. Pioneering behavior, or the lack thereof, is typically exhibited as a consistent strategic posture among nondiversified, single-industry firms, at least in the short to medium term (Bobrow & Shafer, 1987). Stated differently, most single-industry firms view themselves as exhibiting greater or lesser degrees of product market leadership or followership in comparison to their industry rivals (Covin et al., 2000). This observation suggests an alternate perspective with which to operationalize pioneering, not as a nominal variable (e.g., literal order of entry into a new market) but as an overall strategic orientation toward pioneering— a pioneering orientation. This is similar to how other corporate entrepreneurship-related phenomena have been operationalized in empirical studies (e.g., Miller, 1983; Smart & Conant, 1994) and allows a firm's overall pioneering posture to be plotted on a continuum ranging from a low reliance on pioneering as a business orientation to a high level of overall pioneering reliance. Firms exhibiting low levels of pioneering orientation are also characterized by their introduction of more incrementally new products, while firms high in pioneering orientation introduce more uniquely innovative products into the market. We believe the operationalization of market pioneering as an organizational orientation toward pi-

oneering behaviors enables a unique analysis of the relationship between pioneering and firm performance.

In this study, entrepreneurial orientation was measured by a nine-item, 7-point scale proposed by Covin and Slevin (1989), which contains some items adapted from Khandwalla (1976/1977) and Miller and Friesen (1982). These nine items consist of three items designed to measure the innovativeness dimension of entrepreneurial orientation, three items to measure proactiveness, and three items to measure risk taking. A higher overall entrepreneurial orientation score is indicative of a greater entrepreneurial orientation, while lower scores indicate a more conservative orientation.

Finally, the effects of environmental hostility on the relationships of interest in the current study were also controlled for because prior research (Covin et al., 2000) has shown that a pioneering orientation operates in conjunction with environmental hostility as an influence on the relationship between firm growth and various competitive tactics. Environmental hostility was measured by a six-item, 7-point scale developed and utilized by Covin et al. (2000).

Analytical Techniques

The hypotheses in this study were tested using two-tailed significance tests through hierarchical regression analysis. Our five control measures (age, size, ownership status, environmental hostility, and entrepreneurial orientation) were entered prior to other independent variables in order to partial out their effects from the variables of interest. Natural logs were used for firm size and age in an attempt to normalize the distribution of these variables, as they were somewhat skewed. Our hypotheses were tested using a moderated regression analysis technique recommended by Arnold (1982). The study's analysis of the proposed curvilinear relationship between pioneering orientation and firm growth proceeded by means of hierarchical regression, with the independent variable-squared term following the independent variable in the regression analysis. If the results are found to be significant, this is taken as evidence of curvilinearity, with a positive coefficient of the squared term demonstrating a *U*-shaped relationship and a negative coefficient indicating an inverted *U*-shaped relationship. Pioneering orientation was mean centered prior to computation into a squared term in order to address multicollinearity concerns, as noted by Cronbach (1987) and Jaccard, Wan, and Turrisi (1990).

To minimize correlations between the independent variables and their interaction terms, the independent variables were mean centered, as recommended by Aiken and West (1991), prior to the computations involving the interaction terms. The computed variance inflation factors (VIFs) associated with the measures were all well within the acceptable range of less than 10 (Hair, Anderson, Tatham, & Black, 1998); the highest VIF was 1.70.

Tests for Common Method Bias

To determine whether the usage of common data sources was resulting in method effects (see Podsakoff, MacKenzie, Lee, & Podsakoff, 2003, for a review of method effect tests),

two tests were conducted upon the data. The first test consisted of comparing data taken from the primary source (sales growth rate data) to corresponding data from a secondary source (sales growth rate data from public documents). Specifically, secondary sales data were available for 25 of the firms in the sample, and the correlation coefficient for the relationship between the firms' actual, year-to-year sales figures and the self-reported 3-year average sales growth rates was $r = .85$. In those cases where secondary data were available, the primary and secondary numbers matched each other or were rounded approximations of each other. The second test utilized a technique that looks for a latent methods factor to capture the effect of common methods variance on the correlations between the research variables. This technique is based on a form of confirmatory factor analysis in which each survey item is allowed to load on both the theoretically intended construct and the proposed common methods factor. The resulting correlations between the constructs can be compared to the nonadjusted zero-order correlations to determine if the magnitude of differences between the two suggests that common methods bias may be influencing the results. Both tests indicated that methods effects upon the data were likely to be minimal and not significant in influencing the analysis or results. (The average difference between the adjusted and nonadjusted correlations was 0.036.)

Results

Table 2 presents the regression analysis results. Model 1 incorporates the control variables plus the primary independent variable of pioneering orientation, but not its squared term. Models 2, 3, and 4 add the curvilinear effect variable (i.e., the pioneering orientation-squared term), the proposed moderators, and the interaction terms, respectively.

As revealed in prior research (Covin et al., 2006), entrepreneurial orientation is positively associated with firm sales growth rate. The significant ($p < .05$) and negative b for the pioneering orientation-squared term shown in Model 2 is consistent with Hypothesis 1, indicating a curvilinear relationship between pioneering orientation and sales growth. Because of the negative b , an inverted U relationship between the two variables is supported, indicating that both low and high levels of pioneering orientation have negative effects upon firm growth. Hypothesis 2 is not supported by the results, as Model 4 reveals a significant ($p < .01$) though negative b for the interaction between strategic learning and pioneering orientation. This indicates that strategic learning negatively moderates the relationship between pioneering orientation and firm growth, in contradiction to our hypothesis. Finally, Hypothesis 3 is supported as Model 4 reveals a significant ($p < .01$) and positive interaction between a technologically sophisticated industry environment and pioneering orientation, affirming the belief that a pioneering strategy's effectiveness is supported by this type of environment.

Discussion

The main effect relationship found in this article warrants further discussion. This article posited that an overly strong pioneering orientation can be detrimental to firm growth. Pioneering orientation is operationalized in this study to reflect both the degree of new-

Table 2. Hierarchical Regression Analyses of Pioneering Orientation, Strategic Learning, Industry Technological Sophistication, and Their Interaction Effects on Firm Relative Sales Growth (N = 101)

Dependent Variable: Relative Sales Growth	Control	Model 1	Model 2	Model 3	Model 4
Step 1: Control variables					
Log firm age (years)	-0.049 (-0.901)	-0.058 (-1.058)	-0.058 (-1.057)	-0.064 (-1.167)	-0.070 (-1.269)
Log firm size (employees)	-0.086 (-0.982)	-0.083 (-0.954)	-0.126 (-1.436)	-0.132 (-1.514)	-0.115 (-1.314)
Firm ownership (public vs. private)	0.020 (0.606)	0.013 (0.393)	0.027 (0.811)	0.051 (1.544)	0.023 (0.695)
Environmental hostility	-0.038 (-0.582)	-0.034 (-0.516)	-0.009 (-0.132)	0.004 (0.057)	0.032 (0.487)
Entrepreneurial orientation	0.266* (0.379)	0.242* (3.453)	0.244* (3.471)	0.264* (3.760)	0.284* (4.041)
Step 2: Independent variable: Pioneering orientation					
		0.047 (0.531)	0.091 (1.020)	0.071 (0.794)	0.083 (0.929)
Step 3: Squared term: Pioneering orientation²					
			-0.207* (-1.445) ¹	-0.210* (-1.461)	-0.054 (-0.377)
Step 4: Moderator variables					
Strategic learning				0.042 (0.650)	-0.004 (-0.055)
Industry technological sophistication				-0.107 (-1.280)	-0.148 (-1.766)
Step 5: Interaction terms					
Strategic learning × Pioneering orientation					-0.296** (-2.815)
Technology sophistication × Pioneering orientation					0.273** (2.174)
Model significance	.183	.264	.107	.167	.004**
Model R ²	.075	.077	.116	.128	.255
Adjusted R ²	.027	.018	.050	.041	.163
Model F	1.546	1.302	1.750	1.480	2.765

Standardized (and unstandardized) regression coefficients are reported. Bedeian and Mossholder (1994) and Bing, LeBreton, Davison, Migetz, and James (2007) support the confirmatory significance of regression coefficients in hypothesis testing, even when the underlying regression equation is insignificant. However, we acknowledge that some scholars do not accept using insignificant equations for hypothesis testing.

* $p < .05$; ** $p < .01$

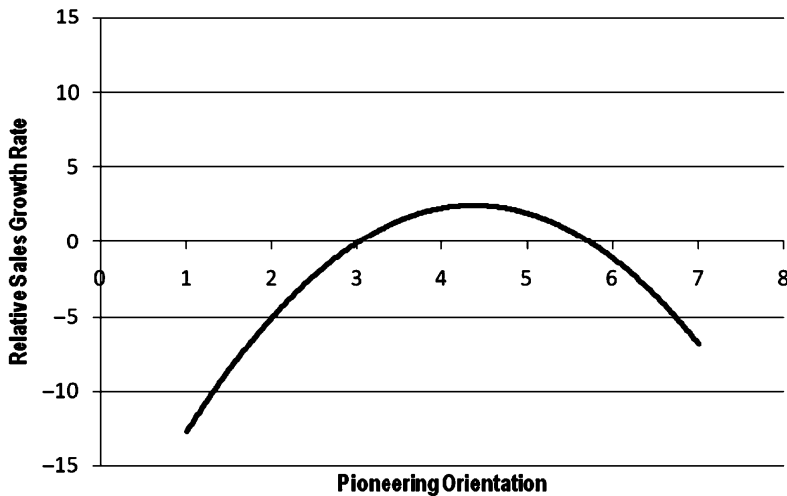


Figure 1. Pioneer Orientation–Sales Growth Relationship

ness or novelty in a pioneering pursuit and the overall proclivity of a firm to bring new products to market across product lines. Min et al. (2006) concluded in their study, which compared and contrasted pioneer survival rates for both “really new” and incrementally new products, that market pioneers are often the first to fail in really new environments while the first to succeed in incrementally new markets. The lower survival rate for firms pioneering really new products reflects the high degree of market and technological uncertainty that confronts pioneers in extremely novel markets. In such novel environments, early followers have numerous advantages that allow them to leapfrog first-movers by virtue of their waiting until some degree of uncertainty has been resolved (Min et al., 2006). While profitable for an early follower, really new product markets often spell the demise of first-movers. Studies such as that conducted by Min et al. (2006) are fueling a shift away from a historical preoccupation with discontinuities and radical, revolutionary innovation to the recognition that the true competitive advantage in pioneering environments may lie in the realm of incremental innovation and the myriad of benefits to be had in pushing existing technologies in new directions and refining them into streams of new products (Reich, 1987).

The curvilinear relationship between pioneering orientation and firm growth as constructed from relevant study data is illustrated in Figure 1.

This figure can be used to infer the average (industry-adjusted) sales growth rates of the sampled firms that exhibit particular levels of pioneering orientation. Specifically, Figure 1 suggests that the sampled firms are likely to grow more slowly than their industry averages if their pioneering orientation scores are at (approximately) 3.0 or below on the 7-point scale. The firms with pioneering orientation scores in the low 4-point range (i.e., approximately 4.3) grow most rapidly relative to their industries, outpacing those firms with average pioneering orientation scores of 3.0 by about 3% per year. As the firms’ pioneering orientation scores increase beyond the low 4-point range, their industry-adjusted sales growth rates decline. For example, the firms with scores of 6.0 on

the pioneering orientation scale grew more slowly than their industries by about 1% per year, and the most pioneering-oriented firms in the sample were outperformed by their industries, on average, by nearly 7% per year.

The somewhat surprising result of our study was that Hypothesis 2 was unsupported. In fact, strategic learning was shown to negatively, rather than positively, moderate the pioneering orientation–performance relationship. This finding is rather counterintuitive when compared to the wealth of literature that indicates that strategic learning and firm performance are positively linked. Past research has revealed that learning can benefit firms by decreasing manufacturing costs (Leavy, 1998), promoting successful diversification (Porter, 1987), enabling innovation (Cohen & Levinthal, 1990), and facilitating sustainable competitive advantages (Schroeder & Robinson, 1991). Generally speaking, strategic learning appears to hold numerous benefits for firms; however, when applied within the specific context of the market pioneer, there are a number of possible explanations for the observed negative moderation effect.

First, strategic learning does not always increase an organization's effectiveness, or even its potential effectiveness, as what a firm learns in one environment may be irrelevant when that knowledge is applied in a different environment. That is, operating in a new or uncertain environment may result in findings that overturn what was "known to be true" based on prior learning. Learning per se does not produce positive organizational results when such learning is mistakenly applied in environments within which its lessons no longer hold true (Huber, 1991). The misapplication of previous experience has been explained by core rigidities and competency traps (Leonard-Barton, 1992; Levitt & March, 1988). Specifically, as an organization learns more about a specialized routine and achieves favorable performance, it becomes increasingly blind to alternatives that might be superior. Further, primacy effects (Michael & Palandjian, 2004), the overweighting of earlier experiences relative to later ones, and the reliance on these experiences in dictating firm action, could become increasingly prevalent. Utilizing previously acquired knowledge can be particularly disastrous when a firm's market context is being newly experienced.

Research suggests that the relative predictability of stable environments can promote and extend the usefulness of strategic lessons, making these lessons relevant across longer periods of time (Lant & Mezias, 1990). This is because the familiarity of a firm with salient aspects of its operating environment is a critical component leading to the effective application of strategic learning. In contrast, pioneering firms operate in novel domains where prior learning may have greatly discounted value or even prove detrimental to the firm when acted upon. As observed by Levitt and March (1988), pioneering firms operate in unfamiliar environments, accentuating a "sample representativeness" problem where situational learning occurs within a context different from that where it is applied. Unrelenting pioneering behavior often leads to random strategic drift rather than to organizational improvement. Moreover, learning in novel environments is inherently more difficult than learning in known environments. Pioneering firms face high levels of environmental ambiguity, making it difficult to differentiate valid signals from noise (Lant & Mezias, 1990). Such ambiguous stimuli can lead to an understanding of the environment that is more influenced by prior learning and perception rather than by the stimuli itself (Huber, 1991). Consequently, pioneering firms may have a tendency to utilize irrelevant

lessons from the past when confronted with new and uncertain environments, leading to unsatisfactory organizational outcomes.

Another connected explanation for the negative moderating effect of strategic learning on a pioneering firm's performance relates to the concept of dominant logic. Organizational members carry with them mental models of deeply ingrained assumptions, generalizations, and understandings or perceptions of the world that are called their "dominant logics" (Leavy, 1998). These mental models are composed primarily of the tacit knowledge individuals use to make quick decisions or responses. An individual's dominant logic helps shape the information that is received such that, oftentimes, the interpretation of stimuli is determined more by what is "in" the mind of the individual than by what is "in" the stimuli (Bruner, 1957). To make effective use of novel information, individuals need to unlearn prior mental assumptions and connections in order to act or perceive things in a different manner than that which their prior experience dictates (Huber, 1991).

Unfortunately, there is a built-in limit to the diversity of information an individual can correctly interpret based on the various cognitive maps he or she uses to manage that information (Prahalad & Bettis, 1986). Herein lies the problem for a pioneering firm. The managers of pioneering firms are faced with the challenge of continually adapting, modifying, and unlearning their respective dominant logics in an effort to assimilate new perceptions and interpretations of incoming information. At some level, this learning process may entail costs to organizational performance, as prior mental maps lead to erroneous decisions during the process of new experiential feedback and assimilation.

In short, there is evidence in the literature and existing theory for our unanticipated finding that strategic learning negatively moderates the relationship between pioneering orientation and performance. In particular, our findings are consistent with the results of a recent study by Michael and Palandjian (2004), which found that in new product introductions, organizations find it harder to learn from experience as experience grows. Their study and our own results suggest that strategic learning, while not in and of itself detrimental to the firm, may be grounded in past experience in environments that are no longer representative of the operating environment of the firm. The exhibition of strategic learning in such cases may result in unsatisfactory firm outcomes where prior learning is unconnected with present environmental dynamics. The negative moderation of the pioneering orientation-firm growth relationship by strategic learning is illustrated in Figure 2 and corroborated through the subgroup analysis shown in Table 3. Of particular note, as suggested by Table 3, a pioneering orientation may be most predictive of sales growth rate among firms with low strategic learning scores. As such, a pioneering orientation may benefit firms most when current pioneering efforts are directed by real-time information rather than by knowledge derived from potentially irrelevant or misleading past strategic lessons.

The hypothesized positive moderation of the relationship between pioneering orientation and firm growth by a technologically sophisticated industry environment was supported in our analysis. In high-tech industry environments, first-mover advantages are enhanced by the market dynamism and frequent product or process technology changes that lend themselves to brief periods of product exploitation. Fleeting windows of market opportunity may be completely missed by later entrants. The positive moderation of

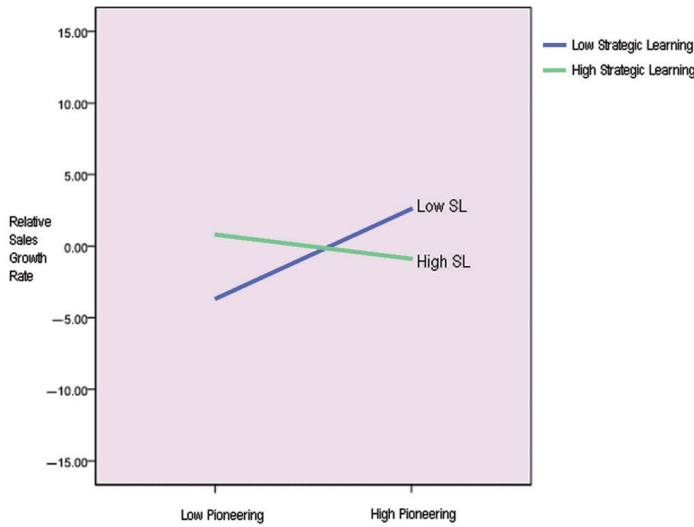


Figure 2. Effect of Strategic Learning on the Pioneering Orientation–Firm Growth Relationship

Table 3. Subgroup Analysis Reflecting the Interaction of Strategic Learning (SL) and Pioneering Orientation (PO)

High SL	Average sales growth rate = 0.796 Standard deviation = 14.325 Number of observations = 21	Average sales growth rate = -0.876 Standard deviation = 13.861 Number of observations = 25
	Average sales growth rate = -3.668 Standard deviation = 16.951 Number of observations = 34	Average sales growth rate = 2.601 Standard deviation = 12.961 Number of observations = 21
Low SL	Low PO	High PO

Median splits on variables representing the *x* and *y* axes were used to create the quadrants.

the pioneering orientation–firm growth relationship by industry technological sophistication is graphically depicted in Figure 3 and corroborated through the subgroup analysis shown in Table 4.

Finally, an important finding from this study concerns the explication of and support for pioneering orientation as a distinctly different construct from entrepreneurial orientation. Prior to this study, entrepreneurial orientation was commonly viewed as subsuming market pioneering behaviors through its innovativeness, risk-taking, and,

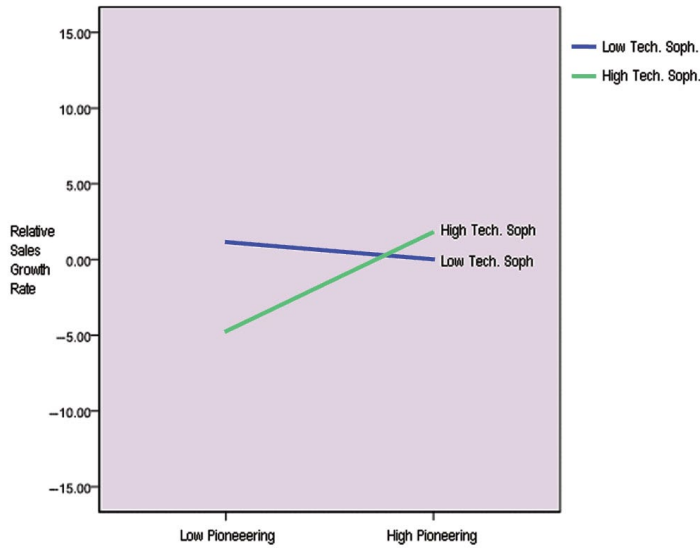


Figure 3. Effect of Industry Technological Sophistication on the Pioneering Orientation–Firm Growth Relationship

Table 4. Subgroup Analysis Reflecting the Interaction of Industry Technological Sophistication (TS) and Pioneering Orientation (PO)

High TS	Average sales growth rate = -4.735 Standard deviation = 18.302 Number of observations = 29	Number of observations = 22 Average sales growth rate = 1.804 Standard deviation = 14.376
	Average sales growth rate = 1.127 Standard deviation = 12.639 Number of observations = 26	Average sales growth rate = -.291 Standard deviation = 12.715 Number of observations = 24
Low TS	Low PO	High PO

Median splits on variables representing the *x* and *y* axes were used to create the quadrants.

particularly, proactiveness dimensions (Lumpkin & Dess, 1996). Somewhat counterintuitively, however, this study revealed highly significant pioneering orientation interactions with strategic learning and industry technological sophistication after the effects of entrepreneurial orientation had been partialled out of the relationships in question. Thus, pioneering behaviors appear to have significant effects upon firm performance above and beyond those explained by a firm’s entrepreneurial orientation. Rather than functioning as a subdimension of entrepreneurial orientation, a firm’s pioneering ori-

entation has independent effects on firm growth, which suggests the need to treat entrepreneurial orientation and pioneering orientation as separate constructs for theory-building and theory-testing purposes.

A more incisive look at the items comprising the entrepreneurial orientation and pioneering orientation scales helps to distinguish the theoretical rationale undergirding the differences between the two constructs. As presented in the introduction, a firm's entrepreneurial orientation is reflected by a scale measuring items related to proactiveness, innovativeness, and risk taking. As such, entrepreneurial orientation represents an overall strategic orientation of a firm that can be implemented through a number of distinct behavior sets. For example, the scale items designed to measure firm proactiveness encompass various firm behaviors including the introduction of new products or services, administrative techniques, operating technologies, and so on. The scale items comprising the dimension of risk taking measure a firm's proclivity toward bold, aggressive action and investment in high-risk projects. These measures are deliberately broad and summate to form an overall strategic posture capable of being reflected in a wide range of distinct behaviors.

Pioneering behaviors are one such specific enactment of an entrepreneurial orientation. Importantly, however, firms with similar levels of an entrepreneurial orientation may have their entrepreneurial postures enacted in markedly different fashions, resulting in disparate impacts upon firm performance and growth. The construct of pioneering orientation measures a specific implementation of a firm's entrepreneurial orientation, that of pioneering behaviors. Moreover, while the entrepreneurial orientation dimension of proactiveness is consistent with the exhibition of market pioneering, this dimension is also consistent with other preemptive or "early-mover" behaviors (e.g., implementing new administrative techniques, incorporating new operating technologies). This study suggests that the effects on performance of a firm's pioneering orientation will not be fully captured by examining its entrepreneurial orientation. Given the high level of interest and extensive empirical literature surrounding the study of both entrepreneurial orientation (Rauch et al., 2009) and pioneering (Gorecki, 1986; Lambkin, 1988, 1992; Lilien & Yoon, 1990; Miller, Gartner, & Wilson, 1989; Mitchell, 1991; Robinson, 1988; Robinson & Fornell, 1985), evidence that pioneering orientation explains additional variance in performance outcomes above and beyond that of entrepreneurial orientation is significant and useful for demonstrating the appropriateness of having separate research streams.

Limitations

There are several limitations to our study. First, this study is based on cross-sectional survey data, which by nature is unable to establish the existence of causal relationships. Research indicates that poorly performing organizations may be more likely to engage in bold solutions (Ketchen & Palmer, 1999); that is, poorly performing organizations may exhibit pioneering behavior to a greater degree as an attempt to revive performance. Should this be the case, it may account for some of the diminished relationship between pioneering orientation and firm growth found at the higher end of the pioneering spectrum.

Second, the study relied largely upon self-report data for key research variables. While measures of these variables correlated as expected with theoretically relevant constructs,

per tests of internal response consistency, the measures could not be corroborated via relevant secondary data, as none were available. Self-report data can fall prey to social desirability and percept-percept biases.

Third, as a qualification to the empirical results, while the data confirmed the existence of a curvilinear relationship between pioneering orientation and firm sales growth rate, the identified inverted *U*-shaped relationship is not particularly dramatic. That is, while firms operating with moderate pioneering orientations outperform those firms with very high and very low pioneering orientations, the absolute size of this performance effect is modest. By contrast, the absolute size of the performance effects revealed through the interactions between pioneering orientation and both industry technological sophistication and strategic learning are relatively substantial by strategic management research standards (see Misangyi, Elms, Greckhamer, & Lepine, 2006). As such, the true “story” revealed by the data is principally one about the importance of context to pioneering success.

Finally, the dependent variable chosen for this study – firm sales growth rate – while appropriate as an indicator of a firm’s overall success in pursuing a market pioneering strategy does not imply anything about a firm’s efficiency at generating profits from operations. Growth and profitability – corresponding to a firm’s effectiveness versus its efficiency (Venkatraman & Ramanujam, 1986) – are two distinctly different dimensions of firm performance (see Murphy, Trailer, & Hill, 1996). That being said, the results of this study may not have held if a profitability measure had been chosen as the dependent variable.

Implications

There are several important implications to this study. First, firms need to carefully consider the benefits and risks imposed upon market pioneers before acting. Firms’ decisions to enter novel markets need to be tempered by an understanding of the associated technological and market uncertainties and the rapid adaptive capability such environments demand. In some industry environments, under certain conditions, it makes more sense to adopt an early-follower stance in order to appropriate value from an innovation or novel product (Min et al., 2006). Firm managers need to ask themselves a series of key questions prior to deciding if and when to move into new markets, such as: Do they have the protection of a strong appropriability regime? Can they protect their product or process from imitation long enough to provide a buffer of lead time and experience in order to carve out a proper niche? Is the market or technological uncertainty surrounding the product market so great as to unduly increase their incumbent risks? Might it be better to analyze others’ forays into the market and capitalize on their mistakes while waiting for certain market uncertainties to be resolved?

Second, the discovery of a curvilinear relationship between pioneering orientation and firm performance suggests that finding the right balance in terms of product novelty (degree of newness) and in a firm’s overall reliance upon pioneering strategies across product lines is a critical factor in determining the resulting success of the pioneering initiatives. Past studies indicate that the strength of market pioneers exists in incrementally new product markets rather than in overly novel domains (Min et al., 2006). Organizations tempted to enter into completely new product markets might want to reconsider the

brashness of that decision in light of all the evidence indicating that early-follower tactics are often more successful in such environments (e.g., Lieberman & Montgomery, 1988; Robinson & Min, 2002; Urban et al., 1986). The uncertainty implicit to such novel domains recommends a wait-and-see mentality with which to better define and understand the nature of the market.

Third, firms need to be more aware of and intentional in directing their R&D initiatives toward innovations or discoveries that can be more readily protected. In explicating the positive moderation of the pioneering orientation–firm growth relationship via industry technological sophistication, this study emphasizes the pioneering benefits of operating within environments characterized by heavy investments in R&D and frequent product and process technology changes. While this study did not directly address the idea of appropriability regimes and strategies that pioneers can use to secure and protect intellectual property rights within technologically sophisticated environments, this study reveals the importance to the pioneer of innovating within industry environments amenable to appropriation. An innovator can improve the effectiveness of its investments in R&D by adjusting its portfolio to maximize the probability that technological discoveries will develop that either are easy to protect via intellectual property law or require for commercialization certain competencies or co-specialized assets already within the firm's repertoire (Lieberman & Montgomery, 1988). R&D investment decisions cannot be divorced from the strategic analysis of markets and industries, nor from the calculation of the types of innovations from which value will most likely be appropriated. Prior to a pioneering decision, firms can take actions that increase the likelihood that first- or early-mover advantages will be realized, such as pursuing patents, focusing on lead time and learning curve advantages during the monopoly period, and securing key finite resources (e.g., retailing locations or distribution networks; Lieberman & Montgomery, 1988; Teece, 1986).

Finally, when entering novel environments firms need to guard against mistakenly applying knowledge accumulated in prior contexts. Inferences that managers make regarding past strategic action–outcome relationships may not remain accurate or valid in new environments. Pioneering firms may need to reevaluate their prior learning along with many of the routines and practices they have developed to codify this knowledge. Results of the current research indicate that when firms enter new and uncertain environments, they might be well advised to utilize a learning-by-analysis approach over a learning-by-doing approach to strategic learning. In a learning-by-doing approach, firms seek out applicable knowledge within their operating environments by taking action and then analyzing the results. Significantly, these actions are often informed by prior experience in different environments where the factors of success may bear no relation to those governing the pioneering environment (Sorenson, 2003). By contrast, a more conservative learning-by-analysis approach can reduce the uncertainty inherent to the pioneering domain through extensive data collection and analysis prior to taking strategic action. While it is true that “learning your way in” will sometimes be the only way for firms to understand the strategic requirements of novel operating environments (McGrath, Keil, & Tukiainen, 2006), utilizing a learning-by-analysis approach can enable firms to validate the accuracy of their prior assumptions, thereby lessening the likelihood that avoidable strategic missteps will occur.

Future Research

Future research topics might consider further the issue of market entry timing. Under what circumstances and in which types of market environments are first-mover, early-follower, and slow-follower strategies most predictive of success (Min et al., 2006)? Another perspective on this might delve into how particular characteristics and competencies of firms—such as the firm's past pioneering experiences or the diversity of the product markets in which the firm operates—affect the level of performance associated with the pursuit of a market pioneering strategy (Lieberman & Montgomery, 1988).

The time period during which strategic learning takes place is a variable that might be fruitfully explored in future research. Questions such as how organizations can hasten their speed of learning and the associated benefits and risks of such a capability have yet to be materially addressed. The learning research stream is moving toward contingency and context-based analysis of learning capabilities and their effect upon firm performance. The current study also prompts questions regarding the usefulness of prior learning in novel domains. How do organizations minimize the misapplication of past experience and accelerate the process of strategic learning when entering new markets? In general, novel environments such as those explored by market pioneers offer a rich backdrop in which to explore the benefits of strategic learning.

Finally, the curvilinear nature of the relationship between pioneering orientation and firm performance suggests a number of opportunities for further investigation. The contour of this curve is no doubt dependent on the degree of novelty of the markets entered and the speed with which pioneering firms learn as they navigate their novel domains. Are there other characteristics that are particularly promising as facilitators of success among firms that choose to enter unfamiliar environments? An organizational response capability is one such characteristic suggested for examination. The attributes of the new markets being entered may also affect whether these novel domains represent congenial or hostile contexts for the pioneering firm. As noted previously, tight appropriability regimes can enable pioneering firms to capture the value created through their market actions (Teece, 1986). Research should investigate the possible impact of other factors inherent to or associated with markets—such as information diffusion rates and the structure of customer networks and alliances—as factors that determine the shape of the pioneering-performance relationship.

Conclusion

Pioneering behaviors can function as a double-edged sword, variously serving to enable firm growth and threaten firm survival. This study extends the knowledge frontier by positing and empirically confirming the importance of strategic learning and industry technological sophistication as factors moderating the pioneering orientation-firm growth rate relationship. Additionally, this study demonstrates the curvilinear nature of the pioneering orientation-firm growth relationship, highlighting the dangers of both very high and very low pioneering orientations. In closing, Olleros (1986: 8) commented on the inherent risk of pioneering, by stating, "Again and again, we see industries emerge

over the dead bodies of their early pioneers." Thus, it seems crucial, both in theory and in practice, to continue exploring those factors that explain the performance outcomes realized by firms that embrace a pioneering orientation. This research is offered as another step toward this important end.

Appendix

Tests of Measurement Validity

As a more direct test of the validity of this study's measures, tests of internal response consistency for the key research variables were performed. The internal response consistency of this study's measures was assessed by concurrently collecting data using scales expected to correlate with these measures. Moderate-to-high internal response consistency can be interpreted as suggesting the presence of convergent validity for measures (Bagozzi, Tybout, Craig, & Sternthal, 1979).

Pioneering orientation scale. Internal response consistency was assessed by examining this scale's correlation with a scale composed of items intended to measure proactiveness, as taken from the larger, nine-item entrepreneurial orientation scale proposed by Covin and Slevin (1989). The proactiveness-related items of the entrepreneurial orientation scale are replicated as follows:

In dealing with its competitors, my business unit . . . Typically responds to actions that competitors initiate	1 2 3 4 5 6 7	Typically initiates actions to which competitors then respond
Is very seldom the first business to introduce new products/ services, administrative techniques, operating technologies, etc.	1 2 3 4 5 6 7	Is very often the first business to introduce new products/ services administrative techniques, operating technologies, etc.
Typically seeks to avoid competitive clashes, preferring a "live-and-let live" posture	1 2 3 4 5 6 7	Typically adopts a very competitive, "undo-the-competitors" posture

As argued by Cahill (1996), entrepreneurial orientation and market pioneering are very similar constructs, with both constructs implying the exhibition of proactive behavior. Lumpkin and Dess (1996: 606) further specify that "the concept of entrepreneurial orientation *contains* the idea of pioneering." As such, the pioneering orientation scale was expected to correlate positively with the proactiveness-related items from Covin and Slevin's (1989) overall entrepreneurial orientation measure. In the current database, the proactiveness-related items were combined to form a scale with a reliability of $\alpha = .69$. As anticipated, the pioneering orientation and proactiveness scales are positively and significantly correlated ($r = .50, p < .01$).

Strategic learning scale. Internal response consistency was assessed by examining this scale's correlation with a measure of strategic control. Research by Lant, Milliken, and Batra (1992) suggests that strategic learning occurs as firms recognize the need to alter their strategies and that recognition of the need for strategic change is typically prompted by the exercise of strategic control. As such, a positive and significant correlation was expected between the strategic learning scale and a strate-

gic control scale developed expressly for this research ($\alpha = .87$). Specifically, strategic control was assessed using a 7-point scale where the respondent was asked to indicate his or her level of agreement (from 1 = *strongly disagree* to 7 = *strongly agree*) with the following two items: "My business unit keeps close track of how well our business strategy is being carried out" and "My business unit regularly conducts performance reviews to determine whether we are likely to achieve our principal objectives through our business strategy." The strategic learning and strategic control scales are positively and significantly correlated ($r = .34, p < .01$).

Industry technological sophistication scale. Internal response consistency was assessed by computing the mean value of the industry technological sophistication scale among firms that indicated they operate in high-tech industries and among firms that indicated they operate in low tech industries. Among the former group of firms, the mean industry technological sophistication score is 4.59 ($SD = 1.13$). Among the latter group, the mean industry technological sophistication score is 3.26 ($SD = 1.10$). These two mean scores are significantly different at the $p < .001$ level, indicating that the managers of firms in high-tech industries perceive a much higher level of industry technological sophistication than do managers of firms in low-tech industries.

Additionally, a one-way ANOVA analysis was conducted to ascertain the validity of the industry technological sophistication scale relative to the American Electronics Association's (AEA; the largest association of high-tech companies in the United States) proposed high-tech/low-tech industry classification system (http://www.aeanet.org/Publications/IDMK_definition.asp). Among those firms that would be classified as operating in high-tech industries according to the AEA, the mean industry technological sophistication score is 4.06 ($SD = 1.21$). Among those firms that would be classified as operating in low-tech industries according to the AEA, the mean industry technological sophistication score is 3.40 ($SD = 1.21$). These two mean scores are significantly different at the $p < .05$ level, providing objective support for the validity of the industry technological sophistication scale.

Note

1. Bedian and Mossholder (1994) and Bing et al. (2007) support the confirmatory significance of regression coefficients in hypothesis testing, even when the underlying regression equation is insignificant. However, we acknowledge that some scholars do not accept using insignificant equations for hypothesis testing.

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