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ENTRY BARRIERS AND NEW VENTURE PERFORMANCE: A COMPARISON OF UNIVERSAL AND CONTINGENCY APPROACHES

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This study utilized universal *and* contingency *approaches to empirically investigate the effects of entry barriers on new venture performance. Consistent with prior research utilizing the universal approach, this study found only limited support for the direct independent effects of entry barriers on performance. Conversely, this study provides strong support for utilizing the contingency approach to examine the complex effects of entry barriers on divergent performance measures. Overall, contingency models incorporating the theoretically justified moderating effects of industry life cycle stage and venture strategy explained 31, 61, and 45 percent of the variance in profitability, shareholder wealth creation, and sales growth respectively.* Copyright © 2001 John Wiley & Sons, Ltd.

INTRODUCTION

The establishment of new ventures lies at the foundation of entrepreneurship (Hitt *et al.*, 1999), and the establishment and growth of entrepreneurial ventures is responsible for much of the wealth creation in the U.S. economy (Birch, 1987; Kirchhoff, 1991). It is a widely held premise in the fields of strategic management (e.g., Dess, Ireland, and Hitt, 1990; Porter, 1980) and entrepreneurship (e.g., Sandberg, 1986; McDougall, Robinson, and DeNisi, 1992) that industry structural variables impact both the viability of a firm's strategic choices and measures of firm performance. More specifically, strategic management theory (e.g., Hofer and Schendel, 1978) and entrepreneurship research (McDougall *et al.*, 1992; Sandberg, 1986) suggests that if entrepreneurs are to be successful and thereby create economic wealth, they must craft their strategies and achieve a fit with the external industry structural variables in their competitive environment.

Building on the industrial organization (IO) framework developed by Mason (1939) and Bain (1956, 1959), strategic management theory and entrepreneurship research suggest that entry barriers are key industry structural characteristics that impact business performance (e.g., Hofer and Schendel, 1978; Porter, 1980; McDougall *et al.*, 1992). More specifically, IO and strategic management theory suggests that (1) economies of scale, (2) capital requirements, and (3) product differentiation are the most important entry barriers (Bain, 1956, 1959; Caves, 1972; Hay and Morris, 1991; Hofer, 1975; Hofer and Schendel, 1978; Porter, 1980; Shepherd, 1975; Siegfried and Evans, 1994).

Despite the importance assigned to the independent effects of differing entry barriers, empirical research in the fields of strategic management and entrepreneurship has typically examined the effect of a single measure of entry barriers upon only one measure of business performance. In

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the aggregate, prior studies have produced mixed and often contradictory findings. There are several possible rationales for the mixed results. First, Bain (1956, 1959) argues that different entry barriers are not interchangeable proxies for one another and empirically demonstrated the importance of disentangling the effects of different entry barriers on performance (profitability). Furthermore, recent IPO new venture studies by Robinson and McDougall (1998) and Robinson (1999) provide substantial evidence that differing measures of new venture performance are not interchangeable proxies for one another as industry structural variables have divergent impacts on differing measures of new venture performance. These works provide empirical support for Cooper's (1993) argument that the conflicting evidence produced by prior studies may be due in part to the measure(s) of new venture performance utilized by such studies.

An additional explanation for the mixed and contradictory results produced by prior empirical studies may be provided by examining the moderating effects of theoretically justified contingency variables (Ginsberg and Venkatraman, 1985; Hofer, 1975; Homburg, Krohmer, and Workman, 1999). Prior theory suggests that the effects of different individual entry barriers on performance may be contingent upon industry life cycle stage and venture strategy (Bain, 1959; Hay and Morris, 1991; Hofer, 1975; Peltzman, 1977; Porter, 1980; Sandberg, 1986; Stigler, 1968). Additionally, entrepreneurship studies by Sandberg (1986), Kunkel (1991), and McDougall *et al.* (1992) found that it was the interaction of industry structural variables and strategy that was most important in explaining new venture performance. Despite these arguments and research results, studies examining the interactive effects of differing entry barriers and other theoretically justified variables on differing measures of performance has been scant. Aiken and West (1991) provide an explanation for the relative paucity of such studies as they note that studies utilizing the universal approach to investigate direct effects typically precede studies utilizing the contingency approach to examine interactive effects.

In summary, the conflicting evidence produced by prior studies *vis-à-vis* the independent effects of entry barriers upon business performance may be due in part to the approach used in prior research. Thus, this study heeds calls by Hitt and Ireland (2000) and Hubbard, Vetter, and Little (1998) for more integrative research and replications with extensions of prior research. Overall, this study seeks to integrate prior theory and research in the fields of IO, strategic management, and entrepreneurship to determine the extent to which empirical investigation of the aforementioned important gaps in prior research may shed further light on these important relationships.

Thus, we utilized the *universal* approach to investigate the independent direct effects of three different entry barriers discussed on three measures of new venture performance in building upon the IPO new venture industry structure research of Robinson and McDougall (1998) and Robinson (1999), who found that industry structural elements have differing effects on divergent measures of venture performance. While cash flow and survival are critical performance measures for new ventures and have been utilized in many entrepreneurship studies (e.g., Carter, Williams, and Reynolds, 1997), prior research and reviews of performance measures used in entrepreneurship studies suggest that profitability (ROS) and sales growth are two of the most appropriate performance goals for new ventures (Chandler and Hanks, 1993; Murphy, Trailer, and Hill, 1996; Robinson, 1999). At the same time, it is widely recognized that publicly held ventures pursue goals related to increasing shareholder wealth (e.g., Helfert, 1994; Ibbotson and Ritter, 1995; Porter, 1987; Rappaport, 1986). Thus, we utilize ROS, sales growth, and shareholder wealth created as our three measures of new venture performance.

Additionally, we utilized the *contingency* approach to investigate the extent to which the relationships among different entry barriers and different measures of new venture performance are moderated by (contingent upon) the entrepreneur's decision and actions *vis-à-vis* venture strategy and timing of entry with regard to the stage of industry life cycle. Thus, this study further extends the work of Sandberg (1986), Kunkel (1991), and McDougall *et al.* (1992) by examining the interactive effects of industry structural and venture strategy variables.

We include age of the venture and venture assets as control variables due to the importance assigned these variables in prior entrepreneurship studies (e.g., Chandler and Hanks, 1994; Kazanjian and Drazin, 1990). Finally, we compare mod-

els based upon the *universal* and *contingency* approaches to determine the relative explanatory ability of such models for accounting for the variability of three different measures of new venture performance.

THEORETICAL DEVELOPMENT

Entry barriers and measurement of performance

Two important distinctions *vis-à-vis* prior empirical research on the effects of entry barriers upon business performance are those involving sample selection and performance measurement. First, the majority of entry barrier studies have utilized samples consisting of established incumbents rather than new entrants. Our sample is new ventures[1] that had initial public offerings (IPOs) within the first 6 years of their founding dates. Within the United States, IPO firms represent significant sources of wealth creation. In exemplification of this, U.S. initial public offerings of stock raised $350.81 billion in the period of 1989–99, and in 1999 alone raised a record $69.2 billion (Hennessey, 1999). Secondly, the vast majority of prior research has examined the effects of entry barriers on profitability measures. Relatively few studies (e.g., Feeser, 1987; McDougall *et al.*, 1992; Robinson, 1999) have examined the effects of entry barriers on sales growth, and research on the effects of entry barriers on shareholder wealth creation has been nearly nonexistent. This likely follows from the IO tradition which examined the effects of entry barriers on inter-industry profitability and the widespread use of business profitability measures for the majority of strategic management studies.

A central proposition emanating from the fields of IO and strategic management is that high barriers to entry enhance the profitability and overall performance of established incumbents. By contrast, it would be expected that high barriers to entry would have a negative impact on the profitability of new entrants that must spend heavily to overcome the established advantages of incumbent firms (Bain, 1959; Porter, 1980, 1987). For example, newly entered ventures may incur substantial sunk costs due to the necessity of pursuing strategies in which they must make (1) higher capital outlays for efficient production capabilities, and/or (2) higher advertising outlays to overcome the brand name recognition of larger established incumbents. Porter (1987) further notes that the costs of new entry into industries with high barriers to entry may dissipate any potential profits, thus precluding creation of shareholder wealth.

By contrast, both established incumbents and new entrants would be expected to achieve higher relative sales growth in industries with high entry barriers, *ceteris paribus*, due to several factors. First, prior theory and research provide strong support for the proposition that high barriers to entry have a deterring effect on the likelihood and rate of entry of new venture formations (Bain, 1959; Dean and Meyer, 1996; Harrigan, 1981; Porter, 1980; Yip, 1982). Thus, new ventures that have acquired the necessary resources to enter industries with high barriers to entry benefit from the deterring effects of high barriers on the likelihood/rate of entry of other potential competitors who would represent additional combatants for sales and market share. Second, Caves, Fortunato, and Ghemawat (1984), Sharma (1998), Arend (1999), and Gimeno (1999) note that such dominant firms may focus upon maintenance of high profit margins while accepting some encroachment by newly entered ventures. Thus, new ventures entering industries with high entry barriers may achieve greater relative sales growth as established dominant firms focus upon the achievement of higher short-term profitability rather than cutting profit margins or making additional expenditures aimed at preventing the exploitation of opportunities by new entrants (Arend, 1999; Gimeno, 1999; Reinganum, 1989). Finally, prior theory and research provide strong support that trade-offs exist between pursuing profitability and sales growth during the same period, particularly for new entrants (Biggadike, 1979; Murphy *et al.*, 1996; Robinson and McDougall, 1998; Stigler, 1968). Powell (1996) also found that entry barriers had divergent effects on measures of profitability and sales growth for established incumbents.

In summary, prior theory suggests that entry barriers will have a negative effect on new entrant profitability and a positive effect on new entrant sales growth. While the specific impact of entry

[1] In entrepreneurship research, 6 years old or younger is a conventional operational definition of a 'new venture' (Brush and VanderWerf, 1992; Kunkel, 1991; Robinson, 1999).

barriers on shareholder wealth creation has not been previously explored, research on shareholder wealth creation provides relevant insights for our research. Helfert (1994) argued the main driver of share price appreciation derives from the generation of positive cash flows. Varaiya, Kerin, and Weeks (1987) found that the profitability of the firm, as adjusted for the cost of capital, was the key driver of shareholder wealth creation. And while Rappaport (1986) identified both earnings and sales growth as drivers of shareholder wealth creation, he cautioned that unless a firm operates at a profit margin exceeding the cost of capital, sales growth will not create value. Rappaport further noted that sales growth can create negative cash flows. For rapidly growing new entrants, a negative cash flow situation is fairly typical. Thus, while both profitability and sales growth may be associated with shareholder wealth creation, the greater degree of evidence suggests that shareholder wealth creation is most closely tied to profitability.

The universal hypotheses therefore expect that the three entry barriers will have a negative effect on the profitability and shareholder wealth creation of new entrants and a positive effect on new entrant sales growth. We examine the theoretical and empirical support for (1) the universal approach *vis-à-vis* the independent (main) effects of three different entry barriers, and (2) the contingency approach *vis-à-vis* the moderating (contingent) effects of industry life cycle and venture strategy on the relationship among different entry barriers and venture profitability, shareholder wealth creation, and sales growth below.

Universal approach

Universal approaches are the simplest and most commonly utilized approach for examining the effects of entry barriers on performance. Universal approaches suggest that each predictor (independent) variable has a separate, additive, independent (main) effect on the criterion (dependent) variable of interest that is not contingent upon (moderated by) the values of any other predictor variable(s) (Aiken and West, 1991). Building upon prior strategy, entrepreneurship, and IO theory and research, we examined the effects of three different entry barriers on business profitability, sales growth, and shareholder wealth creation: (1) economies of scale, (2) capital requirements, and (3) product differentiation (Bain, 1956, 1959; Caves, 1972; Harrigan, 1981, 1983; Hay and Morris, 1991; Hofer, 1975; Hofer and Schendel, 1978; Porter, 1980; Shepherd, 1975; Siegfried and Evans, 1994; Yip, 1982).

Two distinctions should be noted *vis-à-vis* prior entry barriers research in the field of entrepreneurship. First, as noted above, a large number of entrepreneurship studies (in addition to strategic management studies) have utilized a composite measure of entry barriers rather than disentangling the effects of differing entry barriers on performance (e.g., Kunkel, 1991; McDougall *et al.*, 1992; Robinson, 1999). These studies have produced limited findings. For example, Kunkel failed to find a statistically significant result for ROE, McDougall *et al.* did not find a statistically significant effect for market share growth, and Robinson (1999) failed to find a statistically significant effect for eight measures of new venture performance. However, such studies are not directly comparable to ours as we utilize three different entry barriers to disentangle such effects. Second, it should be noted that a relatively large number of studies have examined the effects of entry barriers on the rate/likelihood of new venture entry (e.g., Harrigan, 1981; Dean and Meyer, 1996; Yip, 1982). In general, these studies have found that high entry barriers deter new venture entry although there is some disagreement as to which specific entry barriers are the strongest deterrents. These studies focused on the question of whether entry barriers constrain the formation of new ventures, as opposed to the impact on performance. Siegfried and Evans (1994) provide an extensive review of prior empirical studies examining such relationships. Because of space limitations and since these prior studies did not utilize comparable measures and approaches, they are not reviewed in the following discussion.

Economies of scale

Economies of scale typically result from advantages associated with large firm size that facilitates lower costs per unit of output and higher efficiency (Bain, 1956, 1959; Koch, 1974; Scherer, 1970; Stigler, 1968). Scherer (1970: 103) summarized the potential benefits associated with technical and pecuniary economies of scale related to large firm size: 'Size confers advantages along such diverse dimensions as production

costs, advertising costs, brand acceptance, input prices, and access to [and cost of] capital.' In short, technical and pecuniary economies of scale are strongly related to firm size as indicated by asset levels per establishment (cf. Koch, 1974; Scherer, 1970; Stigler, 1968).

Despite the importance assigned to economies of scale as a primary type of entry barrier, key entry barrier studies in the field of IO have provided somewhat moderate empirical support. A review of prior empirical studies of industrial profitability by Hay and Morris (1991) revealed that approximately 50 percent of the published studies failed to find a statistically significant relationship in support of prior theory.

The independent influence of economies of scale, as a unitary measure, on business performance has received scant attention in strategic management. We are unaware of any entrepreneurship study that examined the independent influence of economies of scale on venture performance. Most studies have examined the impact of economies of scale on the occurrence of firm entry, which is not the focus of this study. Harrigan's (1981) study of established incumbents found a positive relationship between economies of scale and ROI. However, Harrigan (1983) later found that changes in scale were not statistically significant in explaining the likelihood of successful entry into mature industries. Other studies by Lieberman (1989) and Sharma (1998) examining measures of median plant size did not find a statistically significant relationship with measures of firm level profitability, survival, or sales growth.

Despite the divergence in prior findings, it is expected that economies of scale will have a negative relationship with venture profitability and shareholder wealth creation and a positive relationship with venture sales growth:

Hypothesis 1a: For new entrants there will be a negative relationship between economies of scale and profitability.

Hypothesis 1b: For new entrants, there will be a negative relationship between economies of scale and shareholder wealth creation.

Hypothesis 1c: For new entrants there will be a positive relationship between economies of scale and sales growth.

Capital requirements

Bain (1959: 250) provided an early examination of the relative importance of differing absolute-cost advantages, stating '… "absolute-cost" advantages of established firms, aside from those connected with *large capital requirements* [italics added], do not appear (from the industries sampled) to be a frequent source of important barriers to entry.' Stigler (1968) and Koch (1974) provide further support for the critical role of capital requirements *vis-à-vis* establishing complicated capital-intensive production processes. More specifically, Koch (1974: 112) states, 'Therefore, to the extent that only a few qualified entrepreneurs exist who are capable of acquiring the large amounts of capital needed in certain productive processes, there may exist capital requirements that discourage the entry of new firms.' Conversely, only one-third of the IO studies Hay and Morris (1991) reviewed found a statistically significant relationship in support of prior economic theory, while over 50 percent of such studies failed to find a statistically significant relationship.

Entrepreneurship scholars have examined the importance of capital to the new venture (e.g., Carter *et al.*, 1997; Bamford, Dean, and McDougall, 2000), and Dean and Meyer (1996) examined the impact of capital requirements on the likelihood of new venture entry. However, we are unaware of entrepreneurship research that specifically examines the impact of capital requirements on new venture performance. Strategy research on the influence of capital requirements/absolute-cost advantages, as a unitary variable, on performance has been negligible. Harrigan (1981) found that higher capital requirements (capital intensity) were associated with higher ROI for incumbent firms. More recent strategy studies have also utilized measures of capital intensity to represent capital requirements. Among such studies, Marshall and Buzzell (1990) found that high capital requirements led to lower profitability with both the PIMS and the FTC-LB data. More recently, Datta and Rajagopalan (1998) did not find a statistically significant relationship between industry-level capital intensity and firm-level profitability or sales growth. Consistent with prior theory on the divergent effects of capital requirements on new entrant profitability, shareholder wealth creation, and

sales growth respectively, it is hypothesized:

Hypothesis 2a: For new entrants there will be a negative relationship between capital requirements and profitability.

Hypothesis 2b: For new entrants there will be a negative relationship between capital requirements and shareholder wealth creation.

Hypothesis 2c: For new entrants there will be a positive relationship between capital requirements and sales growth.

Product differentiation

IO empirical research provides evidence that a high degree of product differentiation is an important barrier to entry influencing inter-industry profitability differences (e.g., Bain, 1956, 1959; Caves, 1972; Mann, 1966). In particular, Bain identified product differentiation advantages of established firms as the most significant source of barriers to entry, which he noted are strongly related to heavy advertising or other sales promotion efforts. In their review, Hay and Morris (1991) reveal that nearly 70 percent of prior studies examining product differentiation/advertising intensity found a statistically significant relationship in support of prior IO theory.

Although there is strong agreement that the degree of product differentiation within an industry is an important type of entry barrier, prior theory offers conflicting viewpoints on the degree to which high vs. low degrees of product differentiation serve as a primary barrier to entry. Traditional IO theory views high levels of differentiation in an industry as an important deterrent to entry, as new entrants must adopt high spending strategies to overcome the brand name recognition and customer loyalty achieved by established firms, thus reducing new entrant profitability (Bain, 1956; Caves, 1972; Scherer, 1970).

Conversely, Porter (1980) argues that industries characterized by low degrees of product differentiation/homogeneous products are unattractive environments for new entrants because strategically they must spend heavily to establish efficient production capabilities aimed at addressing cost and capacity considerations. Additionally, Kessides (1991) argues that industries characterized by high degrees of product differentiation/advertising intensity may induce new venture entry as such firms have the possibility of differentiating their product offerings from those of their competitors.

Both arguments are theoretically sound, leading to the possibility that either *high* or *low* degrees of product differentiation may provide significant barriers to entry. Thus, industries characterized by *moderate* degrees of product differentiation may have the lowest barriers, similar to some of the inverted U relationships Yip (1982) found in his study of entry barriers.

Prior research examining the effect of product differentiation/advertising intensity on business unit performance has also produced divergent findings. Sandberg (1986) provided support for Porter's (1980) argument that ventures entering industries characterized by high product differentiation achieve higher performance than ventures entering industries characterized by commodity products. Conversely, Harrigan (1983) concluded that industries with high degrees of product differentiation/advertising expenditures had a negative effect on the performance/success rate of new entrants. Several other studies did not find a statistically significant relationship between product differentiation/advertising intensity and firm performance (Bloch, 1974; Datta and Rajagopalan, 1998; Kunkel, 1991).

Sharma (1998) examined the effects of industry-level product differentiation/advertising intensity on both *de novo* and acquisitive entrant survival and sales growth. For survival, Sharma found a positive relationship for *de novo* entrants but no relationship with acquisitive entrants. By contrast, for sales growth, Sharma found a positive relationship with surviving acquisitive entrants but no relationship with surviving *de novo* entrants. Overall, Sharma's study provides further evidence that entry barriers have a differential impact on different samples and different measures of performance.

Finally, Robinson and McDougall (1998) found that ventures entering industries characterized by moderate degrees of product differentiation had higher levels of profitability than ventures entering industries with high or low degrees of product differentiation. No significant differences were found for new venture sales growth. When they compared new entrants entering high vs. low product differentiation industries, they did not find any statistically significant differences in

either profitability (ROS, ROE, ROA) or sales growth.

Similar to the approach adopted by Deephouse (1999) and based on Yip's (1982) and Robinson and McDougall's (1998) findings of inverted U relationships, we argue that the conflicting theoretical arguments from IO and strategy are both plausible. We propose that the conflicting propositions be synthesized into the proposition that moderate degrees of product differentiation represent lower entry barriers than either high or low degrees of product differentiation. It is hypothesized:

Hypothesis 3a: For new entrants there will be a negative relationship between high or low (as compared to moderate) degrees of product differentiation and profitability.

Hypothesis 3b: For new entrants there will be a negative relationship between high or low (as compared to moderate) degrees of product differentiation and shareholder wealth creation.

Hypothesis 3c: For new entrants there will be a positive relationship between high or low (as compared to moderate) degrees of product differentiation and sales growth.

Contingency approach

Contingency approaches are substantially more complex than universal approaches. Contingency approaches suggest that two or more predictor (independent) variables have interactive effects on the value of the criterion (dependent) variable(s) rather than the additive effects specified in universal approaches (Aiken and West, 1991). As noted by Arnold (1982: 143), '"Contingency" theories, by definition, hypothesize that the relationship between two variables is "contingent" upon some third variable, and as a result researchers have been concerned with the issue of whether "moderator" variables "interact" with independent variables in some predictable manner.' There have been many calls for utilizing the contingency approach to examine the complex relationships among predictor and criterion variables (e.g., Bain, 1956, 1959; Ginsberg and Venkatraman, 1985; Hay and Morris, 1991; Hofer, 1975).

Thus, we utilized the contingency approach to examine the extent to which the relationships between performance and differing entry barriers are moderated by (1) industry life cycle stage and (2) venture strategy. Prior theory which provides the basis for these expected relationships is reviewed below.

Interactive effects of differing entry barriers and industry life cycle stage

Stage of the industry life cycle captures components of industry growth and industry evolution, with growth rates closely corresponding to certain life cycle stages (Hambrick, MacMillan, and Day, 1982). There is strong support from prior strategic management, entrepreneurship, and IO theory that life cycle stage is an important contingency variable that interacts with entry barriers to jointly influence performance. Bain (1959) noted that product or process innovations, which occur in various life cycle stages, can either raise or undermine entry barriers. Porter (1980) argues that costs of entry are lower in emerging, rapidly growing industries as the intensity of rivalry is typically lower. As the industry transitions toward maturity, competition often shifts toward greater emphasis on costs, and economies of scale become more important. Furthermore, customer loyalties are more established and entrants must spend more heavily to overcome established incumbent advantages in later life cycle stages. More recently, Powell (1996) found that industry maturity and entry barriers had an interactive effect on overall performance and sales growth. However, Powell's results were not statistically significant for business profitability, lending further support for prior theory *vis-à-vis* the differential effects of entry barriers on divergent measures of performance.

In the aggregate, prior theory suggests that the effect of entry barriers on performance is moderated and lessened for early stages of the life cycle. Thus, it is hypothesized:

Hypothesis 4a: For new entrants, stage of the industry life cycle moderates the relationship between differing entry barriers and profitability such that the negative effects of entry barriers on profitability will be smaller for new entrants in the early stages of the industry life cycle.

Hypothesis 4b: For new entrants, stage of the industry life cycle moderates the relationship between differing entry barriers and shareholder wealth creation such that the negative effects of entry barriers on shareholder wealth creation will be smaller for new entrants in the early stages of the industry life cycle.

Hypothesis 4c: For new entrants, stage of the industry life cycle moderates the relationship between differing entry barriers and sales growth such that the positive effects of entry barriers on sales growth will be smaller for new entrants in the early stages of the industry life cycle.

Interactive effects of differing entry barriers and venture strategy

Questions regarding the appropriate degree of strategic breadth have long been central to the development of a new venture's strategy (Shepherd and Shanley, 1998). Much of the conventional wisdom of early entrepreneurship literature advised ventures to pursue strategies of very narrow competitive scope in a niche market that is neglected or underserved by larger competitors (Broom, Longenecker, and Moore, 1983; Hosmer, 1957). The approach was popularized by Porter (1980) and Vesper (1990), who espoused focus strategies as an effective entry mechanism for the new firm and a means by which to avoid retaliation from incumbents. Woo and Cooper (1981) provided empirical support for low-share businesses successfully competing against market leaders by adopting a selective focused niche strategy.

Entrepreneurship studies using the PIMS corporate start-up data base support a broader, more aggressive strategy (Biggadike, 1979; MacMillan and Day, 1987; Miller and Camp, 1985). For example, Miller and Camp's study of adolescent ventures from the PIMS data base led them to suggest that 'if there is anything gained by being more focused than the competition it is apparently only the undesirable distinction of lower profitability' (Miller and Camp, 1985: 99). Studies of independent new ventures have produced differing findings, but those using samples of venture capital-backed and IPO firms generally support using broad strategies (e.g., Kunkel, 1991; Sandberg, 1986).

Several new venture researchers (e.g., Sandberg, 1986; McDougall *et al.*, 1992) have recognized the importance of matching strategy with industry structure. McDougall *et al.* compared multiple models of new venture performance and found that the interaction model of strategy plus industry structure (operationalized as a composite entry barrier score) explained almost twice the variance of any other model examined. Unfortunately, McDougall *et al.* did not dissect their composite entry barrier measure to examine the impact of specific entry barriers on differing strategic prescriptions.

Prior theory suggests that industries characterized by low degrees of product differentiation, i.e., commodity type industries (e.g., raw cane sugar, paper mills) are characterized by high degrees of price competition. New entrants into such an industry environment need to establish economies of scale to achieve a low cost position. Broad scope helps to increase cumulative sales volume if related products are produced and distributed more efficiently and in larger volumes together than they are separately (Shepherd and Shanley, 1998). Broad-scope competitive strategies allow new entrants to realize benefits associated with moving down the experience and learning curve, thus contributing to reduced costs (MacMillan and Day, 1987). Also, ventures choosing to compete with a narrow-scope strategy within an established market space[2] are less well positioned in the market for the rapid sales growth needed by a new entrant to achieve economies of scale. Overall, one would expect that new entrants pursuing a broad-scope competitive strategy would realize higher sales growth and profitability in such industry environments.

Prior theory also suggests that industries characterized by high degrees of product differentiation are typically characterized by high degrees of marketing and advertising expenditures. Ventures with broad-scope strategies are able to capture more of the market (Biggadike, 1979), thus affording them economies of scale in marketing and advertising and the benefits associated with enhanced brand name recognition and reputation/legitimacy. Thus, pursuit of broad com-

[2] Companies creating a new market space (Hamel and Prahalad, 1994) have the potential to build scale economies more quickly when their narrow market niche is unoccupied by other competitors (e.g., Viacom's creation of MTV).

petitive scope should also be more successful in industries with high differentiation.

Empirical support for these expected relationships is provided by Chaganti, Chaganti, and Mahajan (1989) and Kunkel, (1991). Utilizing a classification of competitive environments corresponding closely to industry product differentiation, Chaganti *et al.* found that a broad-scope strategy was associated with higher performance in industries characterized by low degrees of product differentiation. Also, Kunkel found that broad-scope strategy was associated with higher performance for ventures occupying industries with either low or high degrees of product differentiation. Thus, it is hypothesized:

Hypothesis 5a: For new entrants, venture strategy moderates the relationship between differing entry barriers and profitability such that the negative effects of entry barriers on profitability will be smaller for new entrants pursuing a broad-scope strategy.

Hypothesis 5b: For new entrants, venture strategy moderates the relationship between differing entry barriers and shareholder wealth creation such that the negative effects of entry barriers on shareholder wealth creation will be smaller for new entrants pursuing a broad-scope strategy.

Hypothesis 5c: For new entrants, venture strategy moderates the relationship between differing entry barriers and sales growth such that the positive effects of entry barriers on sales growth will be larger for new entrants pursuing a broad-scope strategy.

Comparison of universal and contingency approaches

Strategic management and entrepreneurship theory and research provide strong support for the influence of both firm-specific and environmental characteristics on business performance (e.g., Hofer and Schendel, 1978; Porter, 1980; Sandberg, 1986; McDougall *et al.*, 1992). Hofer and Schendel argue that both external environmental variables (e.g., entry barriers and life cycle stage) and internal firm-level variables (e.g., strategy) must be coaligned in order to achieve superior firm performance. Further, as pointed out by Ginsberg and Venkatraman (1985) a key tenet of strategy is the matching of organizational and environmental variables to achieve superior performance.

Hofer (1975), Ginsberg and Venkatraman (1985), and, more recently, Homburg *et al.* (1999) have argued for the need to incorporate contingency approaches in strategic management research in order to develop a richer, more comprehensive explanation of the complex relationships which exist among predictor and criterion variables. Confirming the importance of the contingency approach, prior entrepreneurship research has found that contingency models incorporating the interactive effects of environmental characteristics and venture strategy explain more variability in performance than universal models which do not examine the interactive effects of such variables (e.g., Kunkel, 1991; McDougall *et al.*, 1992; Sandberg, 1986). More recently, Youndt *et al.* (1996), Powell (1996), and Homburg *et al.* (1999) found that contingency models explained substantially more variability in performance than universal models. Thus, it is hypothesized:

Hypothesis 6: Integrative contingency models incorporating the interactive influence of entry barriers, industry life cycle stage, and venture strategy will account for substantially more variability in alternative measures of business performance than universal models which examine only the independent additive effects of such variables upon performance.

METHODS

Sample

This research utilized a sample of independent manufacturing ventures that had undertaken an initial public offering (IPO) within the first 6 years of the venture's original founding date. To construct our sample we first identified all the firms that had undertaken an IPO between 1980 and 1987. Of these ventures, 245 firms involved in the creation of goods and services (holding companies and real estate investment trusts excluded) were identified as having gone public during their first 6 years of operations. Nine ventures were excluded owing to inadequate or missing data. We eliminated 37 ventures because they were subsidiaries of, or sponsored by, an

existing organization.

The choice of independent new manufacturing ventures for our sample is important for several reasons. First, Bain (1959) argued that barriers to entry in other sectors of the economy outside of manufacturing (e.g., wholesale, retail, services) are low to negligible.[3] Second, a purpose of our research was to compare contingency models to previously studied universal models testing the effects of entry barriers on performance. Prior research on entry barriers has focused primarily on manufacturing; thus to be consistent with prior research we confined our sample to manufacturing firms and drew upon traditional operationalizations of entry barrier measures. Third, Gorecki (1975) found that incumbent firms hold a greater advantage over independent new firm entrants when compared to diversifying corporate sponsored entrants. In addition, Sharma (1998) called for future entry barriers research on entrepreneurial ventures. Fourth, IPO ventures are crucial wealth generators in the U.S. economy. Fifth, the choice of IPO ventures allows for the use of objective and market-based performance measures that can be tracked over a period of time.

The final sample consisted of 115 ventures competing in 31 different 4-digit SIC codes. These ventures were not a homogeneous set of firms with regard to pre-IPO characteristics such as age, revenues, net income, total assets, and total equity. The amount of the proceeds from the IPO that went directly to the venture also exhibited substantial variation. The characteristics of this study's sample with regard to the aforementioned characteristics are shown in Table 1. Even though these were IPO firms, the sample does not consist entirely of 'successful' firms. Nearly 50 percent of the ventures had negative net income in the fiscal year prior to their IPO, and over 10 percent had a negative equity position. Overall, it appears that many of these new entrants experienced liabilities of newness and smallness. The study's final sample included success stories such as Sun Microsystems, Compaq, and Seagate, as well as eventual market failures such as Osborne Communications, Pinetree Computer, and Visual Technology.

A comparison of our sample of new ventures to all industry averages was consistent with the findings of previous new venture researchers (e.g., Biggadike, 1979; Weiss, 1981) who point to the performance differences between new ventures and mature businesses. The median average (nontransformed, nonadjusted) ROS for the new venture sample was −0.4 percent, compared to 4.6 percent for the combined median average for all industries from which the ventures in this sample competed for the corresponding time periods. For sales growth, the sample median average was 14.5 percent, whereas the overall industry average was 8.2 percent.

Multiple sources of data were utilized to operationalize the measures. Four-digit SIC codes were used in gathering industry information. SIC codes are a widely used and accepted industry classification system (Clarke, 1989), and are considered to be the best secondary source for categorizing companies into industry groups (Porac, Wade, and Pollock, 1999). Alford's (1992) research finding that firms at the same four-digit SIC code are relatively homogeneous provides support for the use of 4-digit SIC codes to define industries. Information utilized to operationalize economies of scale and capital requirements were drawn primarily from *Census of Manufactures* documents published by the U.S. Bureau of the Census. The COMPUSTAT (Standard and Poor's Information Services) data base provided information for operationalizing product differentiation and the three measures of performance. Dun and Bradstreet Industry Norms and Key Business Ratios provided data on industry growth rates, which was supplemented by information in each venture's IPO prospectus in order to classify stage of the industry life cycle. Finally, IPO prospectuses submitted to the Securities and Exchange Commission by each venture contained venture strategy, venture age, and venture assets information.

Measures

This study utilized three (criterion) measures of new venture performance, five independent (predictor and moderator) variables and two control variables. It should be noted that prior research has sometimes utilized measures of econ-

[3] While it can be argued that entry barriers are typically higher in manufacturing, resulting changes in the structure of the economy and consolidations among firms have raised entry barriers in retail industries such as grocery stores and department stores and service industries such as video tape rentals.

Table 1. Characteristics of new venture sample used in the study

Characteristic	Lower quartile	Median	Mean	Upper quartile
Revenues for fiscal year prior to IPO	326,674	3,663,661	10,748,959	9,083,000
Net income for fiscal year prior to IPO	–912,000	5,500	–72,062	563,000
Total assets for quarter prior to IPO	1,202,000	5,385,000	11,324,157	10,542,000
Total equity for quarter prior to IPO	290,482	1,885,000	5,158,987	4,169,000
Proceeds of IPO to venture	4,416,000	7,392,000	14,304,996	12,429,051
Age of venture at time of IPO	31 months	42 months	41 months	49 months

SIC code and industry	Number of firms	Percentage of firms
2834—Pharmaceutical Preparations	5	4.3%
2835—Diagnostic Substances	4	3.5%
3571—Electronic Computers	22	19.1%
3572—Computer Storage Devices	8	7.0%
3575—Computer Terminals	6	5.2%
3576—Computer Communications Equipment	10	8.7%
3577—Computer Peripheral Equipment, Not Elsewhere Classified	10	8.7%
3579—Office Machines Not Elsewhere Classified	4	3.5%
3661—Telephone, Telegraph Apparatus	7	6.1%
3674—Semiconductors, Related Devices	5	4.3%
3845—Electromedical Equipment	6	5.2%
2631–3842—All Other Industries (with two or less firms per industry)	28	24.3%

omies of scale and capital requirements interchangeably. However, prior theory and research suggest that although these entry barriers are somewhat related, they represent distinctly different entry barriers. Overall, we selected operationalizations of the measures utilized based on guidance from prior theory and research in the fields of IO, strategic management, and entrepreneurship.

New venture performance

As discussed in the introduction, we selected three measures of new entrant performance. Return on sales was selected as our measure of profitability for several reasons. First, prior research suggests this is the most commonly used measure of profitability in prior new venture studies (Murphy *et al.*, 1996). Additionally, prior research has shown that different profitability ratios often have very high correlation coefficients (e.g., Buzzell and Gale, 1987; Farjoun, 1998). For our sample, the return on sales (ROS) and return on assets (ROA) ratios had a pairwise correlation coefficient of 0.95. By contrast, ROS did not have a statistically significant relationship with the sales growth measure. ROS was selected over ROA as the ROA measure has a direct mathematical relationship with a number of the predictor variables. Such a direct mathematical link between criterion and predictor variables results in a portion of the predictive power of models using such variables to arise directly from this mathematical relationship (see MacMillan, Hambrick, and Day, 1982; Hambrick, 1983, for discussions of this problem). Additionally, sales are stated in current dollars, whereas assets are stated based upon historical book values and the accompanying firm decisions *vis-à-vis* inventory calculation (LIFO vs. FIFO) and depreciation methods. The justification for inclusion of new venture performance measures representing shareholder wealth creation and sales growth was discussed in the introduction.

ROS and *sales growth* were operationalized by taking the average of each for the first three complete fiscal years following a venture's IPO.[4] Shareholder wealth creation was operationalized as the increase in stock price from the end of the first full fiscal year following the venture's IPO to the end of the fourth full fiscal (as adjusted for stock splits) plus average dividends over the 3-year period. The use of 3-year averages is common in prior research (e.g., Sandberg, 1986; Kunkel, 1991). The use of 3-year averages smoothes out yearly fluctuations in the data, which are likely to be quite extreme for new ventures, while also providing measures which are more long term in nature. Additionally, Ritter (1991) suggests utilizing a 3-year period for examining returns to shareholders for IPOs as a measure which is more long term in nature.

For the shareholder wealth creation variable there was an important difference attributable to the time period over which this variable was measured. Thus, we adjusted the shareholder wealth creation measure to reflect changes in the S&P 500 Index for comparable time periods for each venture. Tests for differences based upon industry membership were not statistically significant, thus providing support for prior research that industry membership does not have an impact on shareholder wealth creation for intermediate to long-term periods representing 3 years or more (e.g., Young and Zaima, 1988).

Economies of scale

Bain (1956, 1959), Stigler (1968), Scherer (1970), and Koch (1974) argue that the effects of technical and pecuniary economies of scale in any industry are strongly associated with large firm size (asset levels per establishment) as discussed above. Consistent with these arguments and the measure proposed by Koch (1974), this study operationalized *economies of scale* as the gross book value of depreciable assets per establishment for each venture's entered industry.

[4] For the ROS and sales growth measures, comparable tests were conducted which utilized industry adjusted measures for the time period during which each venture's performance was measured. Such adjusted measures capture differences attributable to the venture's entered industry as well as the time period for which each venture's performance was measured (Deephouse, 1999). Overall, the 'unadjusted' and 'time and industry adjusted' measure of ROS had a correlation coefficient of 0.99 whereas the correlation coefficient between such measures was 0.95 for sales growth, which corresponds to the results of Ocasio (1994). In addition, regression tests using these alternative operationalizations of ROS and sales growth yielded comparable results, supporting the prior findings by Zajac (1990), Ocasio (1994), and Robinson and McDougall (1998) that adjusting performance measures based upon industry membership had little impact on the results obtained.

Capital requirements (absolute cost advantages)

Bain (1956, 1959), Caves (1972), and Shepherd (1975) argued that capital requirements is the primary absolute-cost advantage which can serve as an important barrier to entry. More specifically, Bain (1959), Stigler (1968), Koch (1974), and Harrigan (1981, 1983) argue that the importance of capital requirements is reflected by the amount of funds needed to establish an efficient capital-intensive production process associated with mass production techniques as discussed above. *Capital requirements* was operationalized as the gross book value of depreciable assets per employee for each venture's entered industry.

Product differentiation

Consistent with the vast majority of prior studies, *product differentiation* was operationalized as the advertising intensity ratio, i.e., advertising expenditures divided by sales revenue for each venture's entered industry. Following Robinson and McDougall's (1998) classification scheme, firms were grouped according to their industry's advertising intensity ratios as follows:

1 heterogeneous/high differentiation—greater than or equal to 1.0 percent;
2 partially differentiated/moderate differentiation—between 0.5 percent and 1.0 percent; and
3 homogeneous/low differentiation/commodity—less than or equal to 0.5 percent.

Due to the expected inverted U relationship hypothesized above, we then combined industries with high and low degrees of product differentiation into one category representing high barriers to entry. Industries with moderate degrees of product differentiation comprised the category representing low barriers to entry. Utilizing two categories for this measure also eliminates the high collinearity that results from utilizing squared product terms.[5]

Industry life cycle stage

Following the vast majority of prior empirical research from strategic management and entrepreneurship, we adopted the operationalization utilized in the PIMS life cycle model classification. As presented in Biggadike (1979), the classification of the venture's entered industry life cycle stage is based on the following:

1 introductory—primary demand just starting, many potential users unfamiliar with products;
2 growth—real annual growth 10 percent or more, technology and/or competitive structure still changing;
3 maturity—potential users familiar with products, technology and competitive structure stable; and
4 decline—products viewed as commodities, weaker competitors exiting.

Two researchers independently categorized the industry life cycle stage for each firm using information contained in each firm's IPO prospectus supplemented by industry growth rate information contained in Dun's Industry Norms and Key Business Ratios. The level of initial agreement between the two raters was 87 percent, with differences resolved through further discussion.

Our sample had relatively few firms that entered in either the introductory or decline stages. Thus, we combined the introductory and growth stages into one category representing entry early in the life cycle, and combined ventures entering the maturity and decline stages into one category representing entry later in the life cycle. Hambrick *et al.* (1982) and MacMillan *et al.* (1982) also utilized two stages due to few businesses in either the introductory or decline stages. In addition, Sandberg (1986) chose a two-stage classification (development or growth stages vs. shakeout, maturity, or saturation stages).

[5] We examined the impact of utilizing (1) a continuous ratio operationalization and (2) three-category operationalization of product differentiation and quadratic terms to assess the potential presence of the expected inverted U relationship. While both these tests confirmed the presence of the inverted U relationship, the correlations between the (1) continuous operationalization and its squared term, and (2) three-category operationalization and its squared term were 0.99 for both operationalizations. Subsequent examination of variance inflation factors (VIFs) for 'main effect' regression analysis revealed substantial multicollinearity with VIFs of 106 and 101 for the continuous measure and its squared term and VIFs of 108 and 103 for the three-category measure and its squared term. Additionally, subsequent analyses examining interactive terms revealed severe multicollinearity problems with VIFs exceeding 1000 for each of the base measures and squared terms.

Venture strategy

Venture strategy was operationalized as the breadth of competitive scope of the venture's product/market offerings. Consistent with prior entrepreneurship studies utilizing samples of corporate sponsored or IPO new ventures, competitive scope was classified into three categories based upon the venture's breadth of product/market offerings as compared to its competitors: (1) narrow—lower relative product/market offerings; (2) intermediate—comparable product/market offerings; or (3) broad—higher relative product/market offerings. Two researchers independently categorized the competitive scope for each firm using information contained in each firm's IPO statement. The level of initial agreement between the two raters was 80 percent, with differences resolved through further discussion.

Control variables

Venture age and *venture assets* were included as control variables due to the importance assigned such variables for new entrants in the fields of entrepreneurship (e.g., Chandler and Hanks, 1994; Kazanjian and Drazin, 1990), strategic management (e.g., Hofer and Schendel, 1978; Porter, 1980), and IO (e.g., Bain, 1959; Geroski, Gilbert, and Jacquemin, 1990). *Venture age* was operationalized as the number of months of business activities for each venture prior to the actual IPO date. *Venture assets* (which has also been utilized as a control variable representing venture size) was operationalized as the level of assets in the quarter prior to a venture undertaking an IPO plus the amount of IPO proceeds that went directly to the venture (after fees and equity to shareholders). The asset level at the actual date of the IPO is not available for such ventures. This operationalization represents the approximate asset level of each newly entered venture immediately following their IPO.

Data analysis

Moderated hierarchical regression analysis was utilized to test our hypotheses. Based upon a systematic examination of our data and recommendations from methodologists and prior research, several steps were taken to improve the fit of the models and reduce the multicollinearity. A systematic examination of the data revealed the necessity of variable transformations in order to improve the fit of the models with regard to the underlying assumptions of such models. This study's predictor variables had substantially different magnitudes, ranging from −0.83 to 49,445,495. Neter *et al.* (1996) and Aiken and West (1991) note two difficulties arise when the predictor variables have such substantially different magnitudes: (1) round-off errors in multiple regression models can impact the accuracy of the results of the model; and (2) regression coefficients cannot be compared due to the differences in the units of the predictor variables involved. Thus, all predictor variables were *centered* and *scaled* to have comparable scales and units, with a range of zero to two for all such transformed predictor variables. It was also necessary to transform this study's criterion variables in order to improve the fit of the regression models with regard to the underlying assumptions. More specifically, the logit transformation was utilized for the ROS variable, which Fox (1991) noted as appropriate for data bound above and below such as percentages. The logarithmic transformation was utilized for the positively skewed shareholder wealth creation and sales growth variables, consistent with the recommendations of Fox. Each of these transformations were undertaken after adding a constant to each data point in order to eliminate negative values, following the approach recommended by Fox. Subsequent analyses revealed that such transformations of this study's criterion variables greatly improved the fit of the models. Table 2 shows the descriptive statistics and correlation matrix for all transformed variables.

In order to test whether a problem of multicollinearity was present after such transformations, this study followed the approach recommended by Neter *et al.* (1996) and Birkes and Dodge (1993). Specifically, variance inflation factors (VIFs) were computed for the transformed predictor variables, as both authors note that multicollinearity among three or more predictor variables would not be disclosed by the pairwise correlation coefficients. VIFs ranged from 1.07 to 1.23 for the seven predictor (independent) variables, which is substantially below the VIF value of 10 which Neter *et al.* (1996: 387) specify as an indication of potential problems of multicollinearity.

Table 2. Means, standard deviations, and correlations[a]

	Mean	S.D.	1	2	3	4	5	6	7	8	9
1. Economies of scale	0.41	0.69									
2. Capital requirements	0.18	0.21	0.25								
3. Product differentiation	1.62	0.78	0.18	0.26							
4. Industry life cycle stage	0.73	0.97	–0.24	0.13	0.03						
5. Venture strategy	0.99	0.79	0.02	0.03	–0.15	–0.16					
6. Venture age	1.27	0.47	0.02	0.08	–0.16	0.07	0.03				
7. Venture assets	0.34	0.39	0.16	0.01	–0.08	–0.33	0.33	0.11			
8. Return on sales (logit)	759.84	286.56	–0.06	–0.08	–0.32	–0.18	0.20	0.28	0.25		
9. Sales growth (log)	0.54	1.05	0.20	0.37	0.02	–0.02	0.40	–0.07	–0.03	–0.13	
10. Shareholder wealth creation (log)	–0.23	0.84	0.04	0.31	–0.07	–0.04	0.63	0.11	0.08	0.17	0.56

[a]Correlations greater than 0.20 are significant at $p \leq 0.05$; correlations greater than 0.25 are significant at $p \leq 0.01$.

For contingency tests involving interaction effects, Cohen and Cohen (1983), Aiken and West (1991), and Neter *et al.* (1996) note that centering and scaling of predictor variables reduce multicollinearity problems when adding interaction terms to the regression model(s), while also improving the validity and interpretability of the results. As noted above, the centering and scaling of predictor variables were undertaken prior to subsequent main effect and interaction effect regression analyses.

We also added the interactions simultaneously for our contingency approach, which controls for possible multicollinearity among the variables (Youndt *et al.*, 1996), an approach also utilized in other recent studies (e.g., Boeker, 1997; Dickson and Weaver, 1997). However, Aiken and West (1991), Cohen and Cohen (1983), and Neter *et al.* (1996) argue that statistically insignificant interactions should be omitted, with revised regression models developed. Consistent with these recommendations, our final model removed statistically insignificant interactions while retaining all lower-order terms which are components of statistically significant interactions. Specifically, the final model we used for the contingency approach was based upon the step-down hierarchical procedure recommended by Aiken and West, where nonsignificant higher-order terms are omitted sequentially, beginning with the full model, in each subsequent regression model. Morris, Sherman, and Mansfield (1986) demonstrated that such reduction of terms also reduced collinearity.

Although we employed approaches recommended by methodologists and prior researchers to reduce the potential effects of multicollinearity, it is acknowledged that partial multicollinearity is unavoidable when testing interactive effects due to the mathematical relationships between the coefficients of main effect and interactive terms consisting of components of such main effect variables (Aguinis, 1995; Cohen and Cohen, 1983). Although some degree of multicollinearity is unavoidably present in this study, Gimeno (1999: 116) states, 'It should be noted that, while multicollinearity renders coefficients less precise, they are still the best linear unbiased estimators.'

As a further check of the potential effects of multicollinearity, a series of additional regression equations were examined in order to determine the impact of omitting various predictor and interaction terms. Alternative models examined included a series of regression equations examining the singular effects of each alternative measure of entry barrier, in isolation, on performance as well as other models incorporating various combinations of the predictor and product terms. In short, comparable conclusions were drawn from these alternative models, further indicating that multicollinearity among this study's predictor variables and the product terms was not problematic and did not bias results.

RESULTS

Universal approach/independent effects (Hypotheses 1–3)

To facilitate comparisons with prior entry barriers research that has typically not utilized control variables, Model 1 was utilized for the *universal* approach to assess the direct *independent* effects of the three entry barriers on the three performance measures. Significant effects would indicate support for the *universal* approach *vis-à-vis* the *independent* effects of differing entry barriers on new venture performance. Model 2 was utilized to assess the additional additive effects attributable to industry life cycle stage, venture strategy, and the control variables of venture age and venture assets. Significant effects for these variables would indicate that such measures have an *independent* additive effect on measures of venture performance. Models 3 and 4 were utilized for the *contingency* approach testing the *interactive* effects of differing entry barriers and other moderator variables on performance. Tables 3, 4, and 5 show the results of our analysis for ROS, shareholder wealth creation, and sales growth respectively.

As shown by Model 1 in Table 3, product differentiation was the only entry barrier measure which had a statistically significant relationship with ROS. As predicted by Hypothesis 3a, there was an inverted U relationship indicating that ventures entering industries with *high or low* (as compared to moderate) degrees of product differentiation experienced lower profitability.[6]

[6] Low values of the product differentiation variable reflect moderately differentiated product industries (low barriers to entry) whereas high values of product differentiation reflect

Table 3. Results of regression analyses for return on sales[a]

Explanatory variable	Model 1	Model 2	Model 3	Model 4
X1: Economies of Scale (ES)	–0.86	–33.51	81.23	–1.63
X2: Capital Requirements (CR)	9.09	–1.93	–808.94†	–894.60†
X3: Product Differentiation (PD)	–118.55***	–87.71**	–205.24*	–77.58**
X4: Life Cycle Stage (LC)		–41.95	–43.65	–24.71
X5: Venture Strategy (VS)		31.65	–77.84	–7.94
Control variables				
X6: Venture Age (VAGE)		141.21**	147.47**	148.48**
X7: Venture Assets (VAST)		103.93†	108.60†	100.18†
Entry barriers/life cycle interactions				
X8: X1∗X4 (ES∗LC)			–333.62***	–327.51***
X9: X2∗X4 (CR∗LC)			247.26	257.36†
X10: X3∗X4 (PD∗LC)			14.03	
Entry barriers/strategy interactions				
X11: X1∗X5 (ES∗VS)			–42.73	
X12: X2∗X5 (CR∗VS)			265.40†	283.84†
X13: X3∗X5 (PD∗VS)			54.54	
R^2	0.10**	0.22***	0.33***	0.31***
R^2, adjusted	0.08**	0.17***	0.24***	0.24***

[a]Each entry contains the regression coefficient. Significance levels are indicated as follows:
$^{\dagger}p < 0.10$; $^{*}p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$

Additionally, capital requirements was the only entry barrier which had a statistically significant relationship with shareholder wealth creation, as shown by Model 1 in Table 4. Contrary to our expectation, capital requirements had a positive relationship with shareholder wealth creation. Finally, capital requirements was the only entry barrier which had a statistically significant relationship with sales growth, as shown by Model 1 in Table 5. As predicted in Hypothesis 2b, capital requirements had a positive relationship with venture sales growth. Thus, ventures entering industries with high capital requirements achieved greater sales growth.

Overall, the three differing entry barriers explained 10 percent, 12 percent, and 16 percent of the variability in ROS, shareholder wealth creation, and sales growth respectively, as indicated by Model 1 in Tables 3, 4, and 5. The inclusion of industry life cycle stage, venture strategy, venture age, and venture assets in Model 2 resulted in explained variance of 22 percent for the ROS measure, with both venture age and venture assets having a positive independent additive effect on ROS. For shareholder wealth creation, the inclusion of the additional variables resulted in explained variance of 51 percent, with venture strategy (scope) having a strong positive effect and venture assets having a negative effect. For sales growth, the additional variables resulted in explained variance of 35 percent, with venture strategy having a strong positive effect and venture assets having a negative effect.

In sum, these results provide limited support for the *independent* effects of differing entry barriers on firm performance. However, Aiken and West (1991) caution that interpretational problems arise from examining 'main effects' before considering whether interactions exist. Nonetheless, this has been the approach utilized in the vast majority of prior entry barriers research, which has rarely examined interactive effects.

Contingency approach (Hypotheses 4 and 5)

Model 3 in Tables 3, 4, and 5 presents the results of the moderated hierarchical regression

highly differentiated or commodity product industries (high barriers to entry).

Table 4. Results of regression analyses for shareholder wealth created[a]

Explanatory variable	Model 1	Model 2	Model 3	Model 4
X1: Economies of Scale (ES)	–0.03	–0.04	0.30†	0.32†
X2: Capital Requirements (CR)	1.41**	1.26***	–3.77**	–3.81**
X3: Product Differentiation (PD)	–0.17	–0.05	–0.21	–0.29†
X4: Life Cycle Stage (LC)		–0.05	–0.17	–0.26**
X5: Venture Strategy (VS)		0.71***	0.35*	0.32**
Control variables				
X6: Venture Age (VAGE)		0.15	0.10	0.11
X7: Venture Assets (VAST)		–0.36*	–0.12	–0.14
Entry barriers/life cycle interactions				
X8: X1∗X4 (ES∗LC)			0.09	
X9: X2∗X4 (CR∗LC)			1.55***	1.47***
X10: X3∗X4 (PD∗LC)			–0.07	
Entry barriers/strategy interactions				
X11: X1∗X5 (ES∗VS)			–0.14†	–0.15†
X12: X2∗X5 (CR∗VS)			0.81*	0.90*
X13: X3∗X5 (PD∗VS)			0.14†	0.15*
R^2	0.12**	0.51***	0.62***	0.61***
R^2, adjusted	0.09**	0.48***	0.57***	0.57***

[a] Each entry contains the regression coefficient. Significance levels are indicated as follows:
†$p < 0.10$; *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$

Table 5. Results of regression analyses for sales growth[a]

Explanatory variable	Model 1	Model 2	Model 3	Model 4
X1: Economies of Scale (ES)	0.20	0.23	0.03	0.31**
X2: Capital Requirements (CR)	1.81***	1.74***	4.03*	4.67**
X3: Product Differentiation (PD)	–0.13	–0.09	–0.09	0.03
X4: Life Cycle Stage (LC)		–0.02	–0.27	–0.34**
X5: Venture Strategy (VS)		0.59***	0.23	0.35**
Control variables				
X6: Venture Age (VAGE)		–0.23	–0.24†	–0.26†
X7: Venture Assets (VAST)		–0.55*	–0.27	–0.28
Entry barriers/life cycle interactions				
X8: X1∗X4 (ES∗LC)			0.33	0.31†
X9: X2∗X4 (CR∗LC)			2.01**	1.85**
X10: X3∗X4 (PD∗LC)			–0.08	
Entry barriers/strategy interactions				
X11: X1∗X5 (ES∗VS)			0.13	
X12: X2∗X5 (CR∗VS)			0.65	1.00*
X13: X3∗X5 (PD∗VS)			0.08	
R^2	0.16***	0.35***	0.46***	0.45***
R^2, adjusted	0.14***	0.31***	0.39***	0.40***

[a]Each entry contains the regression coefficient. Significance levels are indicated as follows:
†$p < 0.10$; *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$

analysis for all hypothesized interactive effects for ROS, shareholder wealth creation, and sales growth respectively. Model 4 presents the results for the moderated hierarchical regression analysis based upon the step-down hierarchical procedure recommended by Aiken and West (1991) and others, where extraneous nonsignificant higher-order terms are omitted sequentially as also discussed above. As shown by comparing the R^2 for Models 3 and 4, little overall predictive ability is lost by excluding extraneous terms. Thus, Model 4 in Tables 3, 4, and 5 will serve as the basis for testing this study's hypothesized moderating effects.

The statistically significant interaction effects illustrated by Model 4 in Tables 3, 4, and 5 provide strong support that the relationship between differing entry barriers and profitability, shareholder wealth creation, and sales growth is moderated by industry life cycle stage and venture strategy. However, in the presence of statistically significant interaction effects, Baker and Cullen (1993: 1265) note that '… neither the coefficients of the multiplicative terms nor the coefficients of their component variables can be interpreted separately.' Following the procedure recommended by Cohen and Cohen (1983) and Aiken and West (1991), we ran separate regression equations whereby values for each moderator variable were substituted representing: (1) one standard deviation below the mean to illustrate the effect of the differing entry barriers (predictor variable) at low levels of the moderator variable; and (2) one standard deviation above the mean to illustrate the effects of the differing entry barriers at high levels of the moderator variable. This procedure eliminates the interaction terms and illustrates the effect of the predictor variables (differing entry barriers) for selected values of the moderator variables (industry life cycle stage and venture strategy).

Table 6 presents the results of these tests probing the statistically significant interaction effects between differing entry barriers and the moderating variables. In Table 6, the predictor variables (entry barriers) are listed vertically and the moderator variables (industry life cycle stage and venture strategy) are listed horizontally. Coefficients are shown only for differing entry barriers that had a statistically significant interaction effect illustrated by Model 4 in Tables 3, 4, and 5.

Moderating effects of industry life cycle stage

The results in the top portion of Table 6 provide partial support for Hypothesis 4a. The negative effect of entry barriers on ROS was moderated in the early stages of the industry life cycle. In fact, economies of scale had a positive effect on ROS for new entrants in the early stages whereas a negative effect is shown in the later stages. For capital requirements, a smaller negative effect of entry barriers is shown for new entrants in the early stages of the industry life cycle.

For shareholder wealth creation, only one of the three moderated effects of life cycle stage on the entry barriers relationship was statistically significant. Consistent with Hypothesis 4b, the negative effect of capital requirements was smaller for new entrants in the early stages of the industry life cycle. Overall, partial support is provided for Hypothesis 4b.

The results in the bottom portion of Table 6 provide support for Hypothesis 4c. Thus, for new entrants in the early stages of the life cycle, both economies of scale and capital requirements had a smaller positive effect on sales growth when compared to entrants in the later stages of the life cycle.

Moderating effects of venture strategy

Partial support is provided for Hypothesis 5a that the negative effect of entry barriers on ROS is smaller for new entrants pursuing a broad (high)-scope strategy. This hypothesis is supported for only one of the three entry barrier measures, namely capital requirements.

All three of the strategy/entry barrier interactions were statistically significant for shareholder wealth creation. An unexpected result was the positive effect of economies of scale on shareholder wealth creation. However, as expected the negative effects of capital requirements and product differentiation were smaller for ventures pursuing a broad strategy. In fact, for those ventures pursuing a broad strategy, the negative effect of product differentiation was not statistically significant. Overall, support is provided for Hypothesis 5b as new entrants pursuing a broad strategy fared better with regard to shareholder wealth creation for each of the entry barrier measures.

Partial support is provided for Hypothesis 5c as the positive effect of capital requirements was

Table 6. Effects of different types of entry barriers for interactions with moderator variables[a]

Predictor variables	Moderator variables			
	Life cycle stage		Venture strategy	
Return on sales (logit)	Low	High	Low	High
Economies of Scale	151.31*	–154.57**		
Capital Requirements	–774.41†	–1014.78*	–1118.38*	–670.82†
Product Differentiation				
Shareholder wealth creation (log)				
Economies of Scale			0.20†	0.43†
Capital Requirements	–3.12**	–4.50***	–4.52**	–3.10**
Product Differentiation			–0.41†	–0.17
Sales growth (log)				
Economies of Scale	0.16	0.45**		
Capital Requirements	3.80*	5.53**	3.88**	5.46**
Product Differentiation				

[a]Each entry contains the regression coefficient for statistically significant interactions provided by Model 4 in Tables 3, 4 and 5. Significance levels are indicated as follows: $^{\dagger}p \leq 0.10$; $^{*}p \leq 0.05$; $^{**}p \leq 0.01$; $^{***}p \leq 0.001$

larger for ventures pursuing a broad-scope strategy. This hypothesis was not supported for the other two entry barriers representing economies of scale and product differentiation.

Comparison of universal and contingency approaches (Hypothesis 6)

As previously noted, the results for the *universal* approach are provided by Model 1 in Tables 3, 4, and 5. The additive independent effects of the three differing entry barriers explained 10 percent of the variance for ROS, 12 percent for shareholder wealth creation, and 16 percent for sales growth. Only the hypothesized relationships between product differentiation and ROS and between capital requirements and sales growth were supported. An additional 12 percent of the variability in ROS, 39 percent for shareholder wealth creation, and 19 percent for sales growth were accounted for when adding the independent effects of industry life cycle stage, venture strategy, venture age, and venture assets to Model 2.

The results for the *contingency* approach testing the interactive effects of this study's predictor variables produced substantially stronger results. As shown by Model 4, 31 percent of the variability in ROS, 61 percent for shareholder wealth creation, and 45 percent for sales growth were explained. In sum, these results provide strong support for Hypothesis 6 *vis-à-vis* the superiority of the *contingency* approach to the *universal* approach for explaining variability in alternative measures of business performance.

Control variables

The control variables of venture age and venture assets had a positive effect on ROS for both Model 2 and 4 as shown in Table 3. For shareholder wealth creation, venture assets had a negative effect only for Model 2 as shown in Table 4. For sales growth, venture assets had a negative effect for Model 2 while venture age had a negative effect for Model 4 (the negative effect of venture assets approached statistical significance in Model 4). Although no effects were hypothesized, these findings suggest that older larger ventures were more profitable but had less sales growth.

DISCUSSION

Overview and implication of findings

The results of this study provide strong support for the contingency approach as models incorporating the moderating effects of industry life cycle stage and venture strategy were critical for gaining a greater understanding of the complex effects

of entry barriers on measures of new venture performance. These findings support prior theoretical arguments from strategic management (e.g., Hofer, 1975) and prior research from entrepreneurship *vis-à-vis* the explanatory potential of integrative research models (e.g., Sandberg, 1986; McDougall *et al.*, 1992). These findings provide empirical support for prior theoretical arguments *vis-à-vis* the moderating effects of industry life cycle stage and venture strategy on the entry barriers/performance relationship. Moreover, our results indicate that each of the three entry barriers examined impact measures of new venture performance when utilizing the contingency approach for incorporating moderated effects. By contrast, the results produced when utilizing the universal approach to examine the direct independent effects of entry barriers on performance were limited.

Our results strongly support the need to disentangle the effects of different entry barriers on divergent measures of new venture performance. In short, we found that economies of scale and capital requirements are not interchangeable proxies for entry barriers, as these two entry barriers had divergent moderated effects for both ROS and shareholder wealth creation. This finding builds upon and provides support for Robinson and McDougall (1998), who found that differing operationalizations of industry structural elements had differing effects on measures of new venture performance.

Additionally, this study's results provide further evidence that predictor (independent) variables have differing effects on divergent measures of business performance. For example, capital requirements had negative moderated effects on both ROS and shareholder wealth creation and a positive moderated effect on sales growth. These results support earlier research studies (Robinson and McDougall, 1998; Robinson, 1999) *vis-à-vis* the divergent effects of industry structural elements on differing measures of new venture performance while also reinforcing the theoretical arguments that measures of business performance are not interchangeable proxies for one another (Cooper, 1993).

The moderating impact of life cycle stage on entry barriers is substantial and has important implications for entrepreneurs and investors. For profitability, our results indicate that the negative influence of entry barriers is amplified for ventures entering industries in the late stages of the life cycle. This finding was particularly strong for capital requirements. While ventures entering late stages also experienced a negative effect on profitability for economies of scale, ventures entering early stages experienced a positive effect of economies of scale. This may be due in part to the disequilibrium effect of the early stages of the industry life cycle where entrepreneurial ventures may be favorably positioned to compete with large competitors (high depreciable assets per establishment) who may be constrained in their strategic choices by prior investments in fixed assets. In addition, disequilibrium may create greater opportunities for ventures to compete through product innovations or technological changes, competitive activities on which entrepreneurial ventures are well suited. As an industry moves toward maturity, the rules of the game become more rigid and the cost disadvantages associated with economies of scale and capital requirements impose a greater penalty that shows up in the venture's bottom line. Since product differentiation did not have an interactive effect with either stage of the industry life cycle or venture strategy, one can assess the direct effects of this variable. The results indicate that ventures entering industries with high or low degrees of product differentiation (as indicative of high entry barriers as discussed earlier) had lower ROS. Our results provide strong support for prior theory and research that product differentiation is the most important direct effect of entry barriers on profitability (Bain, 1956, 1959; Mann, 1966; Caves, 1972). Bain also noted that economies of scale was the least perceptible barrier to entry. Our results provide support for this finding as well, as both capital requirements and product differentiation had more consistent negative effects on ROS than did economies of scale. Overall, the results for ROS indicate that new entrants entering industries with high entry barriers should seek to enter such industries in the early stages of the industry life cycle. These results support the theoretical arguments of Porter (1980) that the negative effect of entry barriers on new entrant performance is moderated and lessened for ventures entering industries in the early life cycle stage. At the same time, the results suggest that new entrants seeking profitability would be ill advised to enter industries characterized by high or low degrees of product

differentiation that are indicative of high entry barrier environments due to the negative direct effect of this entry barrier on ROS.

For shareholder wealth creation, our results also indicate that the negative influence of high capital requirements is amplified for ventures entering the late stages of the industry life cycle. This finding suggests that ventures seeking to create wealth for its shareholders would be ill advised to enter industries with high capital requirements, particularly for late stages of the industry life cycle. By contrast, neither economies of scale nor product differentiation had a statistically significant interactive effect with industry life cycle stage.

For sales growth, our findings indicate that the positive effect of economies of scale and capital requirements is amplified for ventures entering the late stages of the industry life cycle. Although economies of scale had a positive effect on sales growth for ventures entering late stages, the positive effect of economies of scale for ventures entering the early stages of the industry life cycle was not statistically significant. The results further indicate that the moderated effects for both economies of scale and capital requirements have a stronger impact on new entrant sales growth than product differentiation, thus providing further support for the need to disentangle the effect of different entry barriers.

In summarizing our entry barrier/industry life cycle interaction results, we found strong empirical support for prior theory that suggests that the effect of entry barriers on venture performance is moderated and weakened for early stages of the industry life cycle (e.g., Caves, 1972; Peltzman, 1977; Porter, 1980). Also, the results further highlight the need to disentangle the effects of different entry barriers. Although economies of scale and capital requirements have been used somewhat interchangeably in prior studies, they are conceptually different and had divergent effects on ROS and shareholder wealth creation. Finally, these results indicate that the moderated effects of entry barriers have differing effects on divergent measure of venture performance, thus supporting earlier studies of the differing effects of industry structural elements on divergent measures of firm performance (Powell, 1996; Robinson and McDougall, 1998; Robinson, 1999).

An examination of our venture strategy/entry barrier interaction results for ROS indicate that the negative effect of capital requirements is moderated and lessened for ventures pursuing a broad-scope strategy. Thus, new entrants pursuing a broad-scope strategy can reduce the negative effect of capital requirements on profitability as such ventures move more quickly down the experience curve, thus lowering costs and reducing the advantages of established incumbents with regard to efficient capital-intensive production facilities. Since product differentiation did not have an interactive effect with venture strategy on ROS, the interpretation of the direct negative effect of this variable on ROS as discussed above is appropriate. Finally, economies of scale did not have a moderated effect contingent on venture strategy, providing further support for the findings of Bain (1956, 1959) and others of its relative weakness as an entry barrier when compared to capital requirements and product differentiation.

The results of this study *vis-à-vis* the moderating effect of venture strategy on the relationship between different entry barriers and shareholder wealth creation are exciting. These results are particularly interesting given the lack of prior entry barriers (and to a large extent, entrepreneurship) research utilizing shareholder wealth creation and the strong empirical support provided by this study's results for the importance of matching strategy to the structure of the entered industry. We expected to find that the negative effects of entry barriers on shareholder wealth creation would be smaller for ventures pursing a broad-scope strategy. This relationship was found for both the capital requirements and product differentiation variables. In fact, the negative effect of product differentiation on shareholder wealth creation found for ventures pursuing a narrow scope strategy was not statistically significant for ventures pursuing a broad-scope strategy. Together, these findings suggest that ventures seeking to create wealth for their investors would be ill advised to pursue a narrow scope strategy in industries with high entry barriers as represented by capital requirements and product differentiation.

A surprising finding was the positive effect of economies of scale on shareholder wealth creation for ventures pursuing either a narrow scope or broad-scope strategy. Although somewhat consistent with our expectation that ventures would realize benefits associated with a broad-scope strategy, a positive effect for economies of scale

was not expected. This finding suggests that industries occupied by larger average firms (depreciable assets per establishment) may present entrepreneurs, particularly those pursuing a broad-scope strategy, with an opportunity to capitalize on the inertia and complacency of such large firms, thus generating above average returns for its shareholders. This would be particularly true in the case of new product, service or process innovations for which established incumbents may have difficulty in effectively responding due to sunk costs in their fixed assets. Overall, this finding and that associated with the interactive effect of life cycle stage and economies of scale on ROS provides support for Bain's (1956, 1959) finding that economies of scale was the least perceptible entry barrier with regard to accounting for differences in profitability for established incumbents.

In sum, the moderating effect of strategy on shareholder wealth creation suggests that, for our sample, market investors recognized that entrants pursuing broader scope strategies are better positioned for future success in industries characterized by high entry barriers. New entrants pursuing a broad-scope strategy realize cost savings from moving more rapidly down the experience curve. At the same time, new entrants pursuing a broad-scope strategy experience greater relative sales growth, thus contributing to enhanced legitimacy, brand name recognition, and larger size. In short, such ventures may more readily overcome the liabilities associated with both newness and smallness and more easily overcome the advantages of established incumbents associated with high entry barriers. Additionally, pursuit of a broad-scope strategy by such ventures may contribute to raising subsequent barriers to entry for other potential competitors. These conclusions are consistent with the strong recommendation by Biggadike (1979) that ventures should enter the market with more aggressive strategies to realize longer-term performance.

Our results for sales growth provides limited support for the moderating effect of venture strategy. As expected, new entrants pursuing a broad-scope strategy realized a greater positive benefit of high capital requirements when compared to ventures pursuing a narrow strategy. This finding suggests that the deterring effect of capital requirements on the potential entry by other competitors is stronger when ventures also pursue a broad strategy, which may also contribute to subsequent barriers to entry for other potential competitors. Venture strategy did not have a moderating effect on the relationship between economies of scale and sales growth. This result suggests that the moderating effect of life cycle stage is more important than venture strategy *vis-à-vis* its effect on the relationship between economies of scale and sales growth. As discussed above, the absence of a statistically significant moderating effect for product differentiation suggests that this variable may not deter entry of niche players who would represent additional combatants for sales in a highly differentiated industry environment.

In summing our venture strategy/entry barrier interaction results, the effects of entry barriers on new venture performance is also contingent upon (moderated by) venture strategy. These findings provide empirical support for prior theory (e.g., Hofer and Schendel, 1978; Porter, 1980) and research findings (e.g., Sandberg, 1986; McDougall *et al.*, 1992) of the importance of matching strategy with the environmental industry structural variables. Additionally, these results further extend the IPO industry structure studies of Robinson and McDougall (1998) and Robinson (1999) *vis-à-vis* the differential impact of different measures of industry structure on different measures of new venture performance.

Limitations and suggestions for future research

Even though research such as Alford's (1992) supports using SIC codes for defining industries, the use of SIC data should be considered a limitation of this research. Yip (1982) details the drawbacks of using SIC data, but then notes that IO economists have primarily used SIC data in studying entry barriers. Furthermore, the widespread use of SIC codes has probably contributed to the almost exclusive focus of entry barrier research on manufacturing firms. Even though the use of SIC data allows us to replicate and compare our research findings with previous entry barrier research, it is important that in today's service economy that future researchers develop appropriate operationalizations of entry barriers for service firms and draw upon different data sources to measure entry barriers.

The selection of this study's sample of inde-

pendent new manufacturing ventures with access to capital resources raised through an IPO may limit the generalizability of its findings. First, while IPO new ventures are important to wealth creation, they represent only a fraction of new ventures. New venture IPO firms generally have higher growth objectives and greater access to financial capital than is typical of most independent start-ups. Also, even though the distinction between corporate-sponsored and independent ventures has become blurry as today's independent ventures have access to substantial levels of funding from a variety of sources (e.g., venture capitalists), there may be distinctions that differentiate this sample from *corporate* ventures such as those contained in the PIMS start-up data base. Thus, future research should attempt to cross-validate these results on other samples of new ventures, as well as other samples consisting of larger and more mature business enterprises.

As previously noted, previous entry barrier research has focused primarily on profitability and to a lesser extent on sales growth. Since researchers have not examined the impact of entry barriers on shareholder wealth creation, our findings should be regarded as tentative until additional studies can confirm our results. Of particular caution is the generalizability of our findings to Internet companies. Internet companies are not classified as manufacturing companies and as such were not included in our sample. High share prices of unprofitable internet start-ups represent an unusual period in market history. However, substantial changes in the market valuations of such firms in 2000 have resulted in dramatically lower share prices of both unprofitable and profitable internet start-ups. Without additional research, our findings should not be generalized to this special set of firms.

Our study provides the most comprehensive examination to date of the potential interactive effects of differing entry barriers and other theoretically justified variables on divergent measures of business performance. However, while the analysis probing the statistically significant interactions provided insight into the directional influences for which prior theory and research have provided little guidance, the scope of the present study and space limitations precluded a more in-depth examination for each of these directional influences. Future studies should explore these relationships in more detail as well as the potential contingent effect of other moderating variables, such as industry concentration or other business strategy variables.

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