BUSINESS-LEVEL STRATEGIES AND PERFORMANCE IN A GLOBAL INDUSTRY

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ABSTRACT

Both conventional wisdom and theoretical arguments lend support to the proposition that in global industries multinational enterprises (MNEs) will outperform their domestic rivals. According to this position MNEs benefit from economies of scale in production, purchasing, distribution, and R&D, which places them in an advantageous position. Furthermore, they may enjoy lower labor costs, have easier access to capital and engage in cross-subsidization across national markets. But is this really the case? Extant research has not provided us with an unequivocal answer. This study attempts to address this issue, among others, by looking at the business-level strategies and performance of firms operating in a global industry.

The literature review provides the theoretical foundation for the hypotheses. Issues pertaining to industrial organization (IO) economics and the resource-based view (RBV) of the firm are presented, which is then followed by a discussion on MNEs, the environment, and business-level strategies.

This dissertation utilizes Porter's (1980) well-known typology of generic business-level strategies while analyzing the competitive actions of both MNEs and domestic firms to uncover the appropriate strategies for these entities. A twenty-seven firm sample from the semiconductor industry is used to test the hypotheses. In contrast to traditional survey type approaches, the generic strategies of low-cost leadership, differentiation, and focus are measured with objective data. Also, due to the small sample size, this study employs nonparametric techniques while tackling the research question.

The results provide support for the hypothesis that domestic firms will follow focus low-cost strategies in a global industry. Some of the remaining results are in the right direction but do not reach statistical significance. Of great interest, however, is that no evidence was found for the widely held position that MNEs outperform their domestic rivals in global industries. It seems that domestic firms are holding their own in the semiconductor industry by simply exporting their products, and thus are avoiding the problems associated with having production facilities in more than one nation.

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CHAPTER I

INTRODUCTION

In the mid-19th century, "Go West" was the battle cry behind the development of the fledgling United States. This movement turned out to be a seminal era, transforming this nation from a resource rich, but mainly vast and unexplored continent, into an economic and military powerhouse that would lay its stamp on the 20th century. Now, as the millennium descends upon us, a new battle cry has arisen from Corporate America--"Go Global." More specifically, this usually entails "going west" (i.e., Asia) or "going south" (i.e., South America). In these regions we are witnessing a seemingly inexorable rise in the ranks of a previously nonexistent middle class, mirroring the advent of more open national trade policies. This new movement, unlike its 19th century predecessor, is based on the conventional wisdom that now challenges and opportunities emanate from beyond U.S. borders, and hence firms that are not prepared to respond to this reality are doomed to fail.

But is this really the case? Cannot the vast U.S. marketplace support firms that are essentially domestic in their orientation? Is it necessary to establish foreign production facilities in a truly global marketplace that is mostly unhindered by tariffs and trade barriers? Are some types of business-level strategies better suitable for competing in a global environment? These are just some of the increasingly relevant questions that this study attempts to answer.

Evidently, the globalization of industries and markets is making national boundaries more permeable. Products, capital, technology, ideas, and people flow from nation to nation in ways that were traditionally infeasible or impractical. This trend also impacts the way firms operate, as both new challenges and opportunities arise on a regular basis. Obviously, pressures arising from globalization influence firms, but not all of them respond to or are affected by these forces equally. Factors such as country of origin, industry, and level of available resources play a role in the business-level strategies employed by these entities.

In this vein, the ever changing rules of competition have different ramifications for firms that are predominantly domestic in their orientation vis-á-vis those that have a strong international presence, such as multinational enterprises (MNEs). The strategic management literature, by and large, does not draw a clear-cut distinction between these types of firms. In today's global business environment, this is a curious absence. Accordingly, this paper attempts to analyze how industry-level and organization-level factors interact, and in turn, help determine the business-level strategies utilized by both domestic and international organizations. Business-level strategies are the competitive weapons or attributes that firms choose to employ in the marketplace in their quest to secure a competitive advantage. This dissertation utilizes a number of established constructs and frameworks while tackling the research question. That is, links between both Porter's (1980) business-level strategies and his international strategy dichotomy of global and multidomestic industries (1986) are explored for both domestic and multinational firms.

The usefulness of distinguishing international strategy as a separate field of study has been questioned before (Melin, 1992). Indeed, with the increasing globalization of industries distinguishing between international and purely "domestic" strategy may have become a moot point. Actually, the two are closely intertwined as most research on international strategy is conducted under the integration-responsiveness (IR) framework (Porter, 1986; Prahalad and Doz, 1987) that is implicitly built on business-level strategies. The IR framework's foundation is based on the industrial organization (IO) perspectives of competition, whereby industry pressures dictate the strategic responses undertaken by businesses. These industry pressures are the result of the globalization process. Essentially, globalization leads to the formation of international industries that are characterized by high levels of cross-border trade and the presence of MNEs (Morrison, 1990). Thus, for the purposes of this paper, only international industries are considered, as we will be looking at the business-level strategies adopted by MNEs and domestic firms that operate in the same national market.

Under the IR framework, global integration pressures force businesses to seek efficiency through carefully coordinating and integrating activities across national borders in the quest for competitive advantage of the organization as a whole. In contrast, local responsiveness pressures compel businesses to make strategic decisions in order to cater to local demands or needs. Here, a unit's activities are carried out irrespective of the needs of sister business units. Under Porter's (1986) classification of international strategies, organizational responses to pressures for global integration are labeled as "global strategies" while activities undertaken due to pressures for local

responsiveness are called "multidomestic strategies." Hence, when the underlying industry pressures demand a low-cost orientation global strategies are employed, and when industry pressures call for a differentiation approach multidomestic strategies are put into action. Although this link between international and business-level strategies has been discussed and tested before (Morrison and Roth, 1992; Roth and Morrison, 1990) the results are rather tentative and would benefit from further study. These studies only show the existence of business-level strategies in international industries, and do not explore why firms choose one strategy over another.

Evidently, the international strategy literature mostly utilizes IO perspectives. Another established theoretical orientation in strategic management is the resource-based view (RBV) of the firm. This approach postulates that a combination of idiosyncratic and bundled resources provides for a sustainable competitive advantage (Wernerfelt, 1984) due to causal ambiguity and isolating mechanisms (Lippman and Rumelt, 1982). Aspects of this theory have been adopted into international strategy by Dunning (1988) and his eclectic theory of the MNE, and, likewise, by Fladmoe-Lindquist and Tallman (1994) in a model that explicitly incorporates RBV into a discussion on how MNEs secure competitive advantages. Thus, IO economics and RBV are complementary by nature, with the former harboring an external orientation, and the latter adopting an internal focus. Hence, when looking at the responses of organizations to globalization both internal and external factors should be accounted for. Organizations should respond to globalization pressures differently based on their industry and the level of resources they possess.

However, what is really lacking in the strategic management literature is a systematic stream of research that looks at the business-level strategies of both domestic competitors and international firms that operate in the same national market. International strategy research has mainly focused on the operations of multinational enterprises and has slighted other types of firms. In contrast, the mainstream strategy literature has mostly ignored the international component of the operations of firms. The globalization of industries and markets only pronounces this flaw. An approach that integrates both sets of literature provides an opportunity to fill in this gap.

The Research Question and Purpose of the Study

Both the international and domestically oriented strategic management literature do share a common goal--a concern for performance. Indeed, high performance is the result of having the "right" strategy under the prevailing external and internal factors facing the organization. So, a key question is: "Do MNEs and domestic firms exhibit superior performance when they adopt a business-level strategy in line with firm-level resources and industry level conditions?" Accordingly, the purpose of this study is to determine the business-level strategies employed by MNEs and domestic firms in an international industry in a single national market, and subsequently analyze the performance implications associated with these strategies.

Therefore, this study calls for the tentative analysis and resolution of a number of issues: (1) identifying domestic firms and MNEs; (2) selecting an industry for in-depth study based on the global-multidomestic industry spectrum; (3) determining the business-

level strategies pursued by these firms; and (4) measuring the performance of these firms.

Organization of the Succeeding Chapters

The following chapter provides a review of the relevant literature that assists in answering the research question presented above. It also presents the proposition development process and the associated theoretical model. Next, Chapter III introduces the methodology used in this study along with a thorough discussion of the variables and statistical techniques employed to test the hypotheses. Chapter IV presents the results pertaining to the hypotheses. Last, Chapter V discusses the implications of the findings and addresses this dissertation's strengths and weaknesses.

CHAPTER II

LITERATURE REVIEW

This chapter reviews the literature that is subsequently used in the proposition development section. Accordingly, a number of topics are covered. First, the literature on industrial organizational economics and the resource-based view of the firm that pertains to the globalization of markets and production is presented. Next, the relevant literature on business-level strategy, multinational enterprises, and the environment is discussed. Finally, propositions are generated that are based on a theoretical model that pertains to the strategies of domestic firms and MNEs operating in global and multidomestic industries.

A Review of the Relevant Strategic Management Literature

What is Strategic Management?

Strategic management can be defined as the search for rents (Bowman, 1990). Rents are returns in excess of a firm's breakeven point, and their existence does not lead to more competition. How to obtain these rents is thus the issue of key concern. In this quest the work of contingency theorists is widely utilized. Essentially, this perspective suggests that there is no one best way to organize and the success of an organization is based on organizational choices that must be matched to the external environment (Lawrence and Lorsch, 1967). Hence, this approach is deterministic by nature and implies that a manager's job is to scan the environment in order to detect the relevant

factors that affect the organization while formulating the organization's strategy (Mintzberg, 1990). The literature on IO economics is an excellent example of this orientation.

However, this "external fit" approach mostly overlooks the existence of the internal resources possessed by organizations, that were first coined as "distinctive competencies" by Selznick (1957). Wernerfelt (1984) provides us with an early challenge to the prevalence of contingency theory in his resource-based view of the firm, by putting forward that unique and nonimitable resources provide a basis for achieving sustainable competitive advantage.

In their review of the strategic management literature, Summer et al. (1990) point to the predominance of these two approaches. They imply that both theories share a high degree of overlap, in that organizational success in the field of strategic management is based on "fit" arguments. Accordingly, they depict strategic management as a process of attaining a comprehensive alignment between the firm's environment and internal capabilities.

IO Economics and International Strategy

IO economics has its roots in the structure-conduct-performance (SCP) paradigm (Bain, 1956). In SCP models competitive advantage is obtained when a firm competes in an attractive industry and occupies an advantageous position in that industry vis-á-vis its rivals. These positions are maintained through the existence of market barriers to entry

and exit into the industry in question, or through tacit collusion between established competitors aimed at excluding newcomers (Porter, 1980).

IO economics has a long tradition in international strategic management. Hymer (1960), Kindleberger (1969), and Caves (1971) depict foreign direct investment by MNEs as an extension of their market power into international markets, where power comes from size or product differentiation. In sum, oligopolistic industries enable MNEs to enjoy high levels of performance.

A more sophisticated approach to international strategy that utilizes IO economics concepts has materialized under the IR framework (Kobrin, 1991; Porter, 1986; Prahalad and Doz, 1987). Of particular importance is Porter's (1986) classification scheme for international industries. He asserts that the proper unit of analysis in the field of international strategy is not the firm, but the industry, as "the industry is the arena in which competitive advantage is won or lost" (p.17). More precisely, he conceptualizes international competition as varying along a spectrum ranging from global to multidomestic industries. Global industries are found when competition occurs on a worldwide basis, and where the competitive position of a firm in one country is affected by its competitive position in another country. Alternatively, multidomestic industries form when competition occurs on a country to country basis and there is relatively little linkages between different national markets.

This framework was developed for MNEs as it provides the foundation for these firms' choices concerning the location of their value chain activities, and for decisions regarding the reporting and control relationships between different national units. These

choices have been eloquently summarized in the notions of configuration and coordination. Simply, in multidomestic industries issues of coordination are less paramount than in global industries, as each national subsidiary is essentially independent of its sister units. In multidomestic industries all value chain activities are segmented by country and no cross country synergies are realized. Essentially, every country contains major portions of the value chain, and thus a firm's operations are geographically dispersed (i.e., they are not integrated). In contrast, in global industries issues of coordination and configuration are of paramount importance as economies of scale and scope are sought.

In short, structural forces in industries may exhibit a great level of variation, and these variations determine where an industry falls on the global-multidomestic spectrum. Birkinshaw, Morrison, and Hulland's (1995) review of the structural forces affecting the globalization of competition can be summarized under three broad factors: "(1) the potential for economies of scale in value adding activities; (2) differences in comparative advantages across countries, and; (3) standardized market demand across countries" (p.639). Simply, a global industry would score high on all three factors.

As Porter's (1986) work was developed with the international strategy literature in mind, it has an obvious bias in its attention towards MNEs' operations. This is understandable as these entities are one of the driving forces behind globalization (Kobrin, 1991). In general, the IR framework (Prahalad and Doz, 1987) is mostly structural in nature as it looks mainly at how MNEs should distribute their activities around the globe. All in all, it does not focus heavily on competitive weapons (e.g.,

Birkinshaw et al., 1995), preferring to focus on issues related to decision making, centralization, and coordination (Prahalad and Doz, 1987). Indeed, Carpano, Chrisman and Roth (1994) note that the IR approach mainly focuses on matching the structure to the environment rather than on matching the strategy to the environment.

The IR framework has been tested extensively. Extant research (Morrison and Roth, 1993; Roth and Morrison, 1990; Carpano et al., 1994; Birkinshaw et al., 1995) focuses on global industries and the pressures leading to their formation but does not make a concerted effort to differentiate between domestic competitors and MNEs. Baden-Fuller and Stopford (1991), however, do account for smaller, regional competitors in the white goods and tire industries in Europe, but they too do not consider purely domestic firms. The overall findings of these studies indicate that global industry forces do indeed influence MNE operations.

Accordingly, in multidomestic and global industries there are both MNEs and domestic firms. Falling trade barriers, improvements in communication and transportation, and homogenizing world consumer demand lend even greater importance to analyzing the strategies employed by these different type of firms. Fortunately, the IR framework does provide us with the means to analyze these strategies because international strategy and its dimensions of global and multidomestic industries (i.e., the IR framework) are subservient to business-level strategy (Morrison and Roth, 1993). Simply, global industries are associated with low-cost strategies, while multidomestic industries are linked to differentiation strategies.

In global industries issues concerning integrating the MNE's operations across national boundaries is of utmost importance. Value chain activities are located in nations that offer a comparative advantage for the activity in question so as to take advantage of economies of scale and scope. Worldwide standardized demand is the driving force behind economies of scale--be it in manufacturing, distribution, R&D, or marketing. Thus, the whole orientation is to minimize costs in accordance with the driving forces in the industry.

On the other hand, when local responsiveness pressures are great, either due to governmental regulations, idiosyncratic demand characteristics, or different national infrastructures, we have multidomestic industries. Here, satisfying each domestic market leads to a tailored approach. Since this results in a duplication of activities by having many identical value chain activities located in numerous countries, costs are higher than under global industries. Furthermore, MNEs follow a differentiation strategy by meeting the demands of each market by providing tailored products and marketing approaches.

Summary of IO economics in an international context. In short, due to the dominance of the IR framework, business-level strategies have not been of great interest to the international strategy scholar, though Morrison and Roth (1992) have bucked this trend by developing a taxonomy of business strategies based on the activities of US-based multinationals. To sum up, one major gap in the international strategy literature is the overall lack of attention devoted to the choice of business-level strategies. Another weakness is more conceptual in nature and stems directly from the aforementioned condition. This pertains to domestic companies, or more exactly, the fact that their

activities in global and multidomestic industries have been overlooked. The globalization phenomenon only exacerbates this missing link. Indeed, with falling trade barriers and the creation of numerous trade pacts is it truly meaningful to make a distinction between the domestic economy and world economy? Why do we have this sharp discrimination between MNEs and other types of firms? In an open global economy are not all firms that are operating in the same industry, in some degree or another, competitors?

It is obvious that though many industries may be international in nature, there are also domestic competitors that do compete in these markets. The unfortunate segmentation of international strategy into its own niche has prevented the cross-fertilization of some concepts from the more mainstream (i.e., domestically oriented) strategy literature.

RBV in an International Context

On the other hand, mainstream strategy research has by and large not focused on the impact of globalization on firms. Indeed, industries are mostly segmented not on global forces, but on SIC codes (e.g., Rumelt, 1991). It is also common to have particular industries chosen for in-depth studies. Recent salient examples include pharmaceuticals, high-tech industries, automobiles, health care, banks, and the airline industry. The theoretical perspectives employed in these studies are likewise diverse, ranging from population ecology to stakeholder management, and from transaction cost economics to strategic group analysis. Unfortunately, most single industry studies suffer from

generalizability problems and hence some of their findings may not be applicable to other industries. In addition, firms that have strong international ties are not differentiated from firms that are mainly domestic in terms of their operations, procurement, and sales.

The last weakness mentioned above is an interesting deficiency when one considers that the resource-based view of the firm has gained in predominance over the last decade (Wernerfelt, 1995). The RBV of the firm has been mainly applied to the domestic context. It says that a firm can sustain competitive advantage when it has a unique bundle of resources (Conner 1991; Mahoney and Pandian, 1992; Wernerfelt, 1984). These resources must be valuable, rare, imperfectly imitable, and imperfectly substitutable in order to provide for rents (Barney, 1991).

But should not international exposure provide a firm with the opportunity to expand its customer base, gain access to cheaper factors of production, or just simply learn from its more extensive and diverse contacts? In any case, the more complex and diverse operations undertaken by MNEs may facilitate the generation of resources that exhibit causal ambiguity (Lippman and Rumelt, 1982), resulting in a sustained competitive advantage.

Accordingly, we can view international operations as a difficult to imitate, unique bundle of idiosyncratic resources. These ideas are evident in Dunning's (1988) work on MNEs and the benefits of international production, and in Bartlett and Ghoshal's (1989) notion of a firm's administrative heritage. But what also seems to be of great importance is the MNE's home country characteristics. Porter's (1990) "diamond" model stresses the

interactive role that demand conditions, factor conditions, related and supporting industries, and, finally, rivalry, strategy and structure have on enabling MNEs to enjoy sustainable competitive advantages. Similarly, Kogut's (1991) research provides insight into why some MNEs benefit from their home location -- national borders are less permeable than organizational boundaries. Indeed, even Dunning's work points to the importance of the home country. In his Eclectic Model the ownership, internalization, and locational advantages that may accrue to MNEs suggest that in any given industry home country characteristics have the potential to bestow unique ownership advantages upon a firm. Finally, Collis' (1991) case study on the ball bearing industry emphasizes the importance of the home country characteristics in the creation of resources.

The above looks at macro issues and how these lead to resource creation. In a more micro sense MNEs can also be conceptualized as networks (Ghoshal and Bartlett, 1990). If their organizational structure and reporting relationships are designed properly this can facilitate the transfer of knowledge around the organization, and thus this network structure may represent a firm-specific resource. Finally, by operating in diverse environments they have more potential to learn from their surroundings as well (Hamel, 1991).

Summary of RBV of the firm in an international context. The RBV of the firm readily applies to MNEs, as they are simply conceptualized as a bundle of unique resources, but are more complex than their domestic rivals. Therefore, along with advantages stemming from, among others, economies of scale and scope, superior brand name recognition, greater procurement and sales options, the possibility of having profit

sanctuaries and cross-subsidization, and enjoying global access to capital markets, the MNE may benefit from firm specific resources whose origin can be found in home country institutional and organizational characteristics (Fladmoe-Lindquist and Tallman, 1994).

However, the advantages that MNEs may seem to have over their domestic rivals is probably more pronounced in global industries, since company-wide know-how and efficiencies are more readily captured in these industries. In contrast, if domestic firms possess market specific resources such as strong brand names, strong distribution channels, or long-standing buyer-supplier relations then these firms may not suffer from a competitive disadvantage (Porter, 1986).

Recapitulation of IO economics and the RBV of the firm. IO economics has found a home in the international strategy literature (along with a strong following in the mainstream strategy literature), while the RBV of the firm is mainly domestically oriented, though it has a growing presence in MNE studies. Therefore, when trying to link the actions of MNEs and domestic firms in the same context it is appropriate to utilize aspects of IO and RBV.

It seems that international and purely domestic studies are dealing with similar issues but are not taking advantages of more cross-fertilization opportunities. However, since the international strategy literature is built on business-level strategy concepts (Morrison and Roth, 1993), namely, on cost or differentiation issues, a focus on competitive weapons may open up an avenue to break this artificial separation. Second, the

international strategy literature provides us with a framework for categorizing industries that can be readily applied to a single national market as well.

Nothing theoretically precludes us from looking at a single national market under the IR framework and subsequently dividing it into multidomestic and global industries. In these different international industries both MNEs and domestic firms may exist. What is important is finding a basis for comparing the activities of these different types of firms. Fortunately, we can use the business-level strategies that are employed in national markets as an integrative mechanism for two reasons. First, the theoretical groundwork behind the separation of global and multidomestic industries is based on business-level strategies. Second, business-level strategies are generic in the sense that they can be applied "generally regardless of industry, organization type or size, etc." (Herbert and Deresky, 1987, p.135). Another benefit of utilizing business-level strategies comes from the aim of strategic management--determining why firms obtain sustainable competitive advantage. Indeed, business-level strategies help determine the competitive weapons employed that may lead to this condition. We will next discuss in detail the pertinence of business-level strategy for this dissertation.

Different Levels of Strategy

As previously indicated, this study is concerned with business-level strategies. However, that is not the only level of strategy that one can look at. Indeed, Schendel and Hofer (1979) maintain that the strategic management process is carried out on four organizational levels: (1) enterprise; (2) corporate; (3) business; and (4) functional.

In this hierarchical view of strategy, we have the enterprise level at the apex, where the organizational strategy focuses on meeting social legitimacy concerns. The enterprise strategy has not received a lot of explicit attention from researchers, though the work on institutionalization theory (DiMaggio and Powell, 1983; Meyer and Rowan, 1977) tackles mostly the same issues. But institutionalization theory does not strictly abide to notions of strict rationality, as organizational actions may be symbolic or ceremonial in nature. However, more recent work in this area (Oliver, 1990, 1991; Suchman, 1995) incorporates traditional strategic management rationality assumptions, such as the importance of obtaining strategic legitimacy and how this affects the survival of organizations.

On the bottom of the strategic management hierarchy we have functional-level strategy. As the name implies, this level deals with functional level activities, and how different subfunctional activities are interrelated and how they support the organization's higher level strategies. Like its enterprise-level counterpart, not a lot of research has been conducted that focuses explicitly on this level. But the RBV of the firm in many ways does cover functional-level issues, as it seeks to uncover the core competencies (Prahalad and Hamel, 1990) of the firm. For instance, Honda's core competency lies in its manufacturing and R&D departments, which have consistently produced innovative and high quality engine designs.

The remaining two levels, corporate and business level, have been heavily researched. Corporate-level strategy tries to answer the question, "What business (es) should we compete in?", while business-level strategy tackles the question, "How should a firm

compete in a given business?" Thus, corporate level strategy focuses on decisions regarding the composition of the overall business portfolio. This area has generated countless studies on a myriad of issues, ranging from mergers and acquisitions to restructuring, and from corporate synergy to international expansion decisions (e.g., Hill and Snell, 1988; Kim, Hwang, and Burgers, 1993; Markides, 1995; Walter and Barney, 1990).

Business-level strategy, which is the focus of this study, also has a long research tradition. It is concerned with the competitive weapons employed by firms in the marketplace in the quest to obtain sustainable competitive advantage. To facilitate their interpretation, these competitive weapons have been grouped into typologies. Some well-researched typologies are: Buzzell, Gale and Sultan's (1975) building, holding, and harvesting; Hofer and Schendel's (1978) share increasing, growth, profit, and liquidation; Miles and Snow's (1978) prospectors, defenders, analyzers, and reactors; Abell's (1980) categories of scope of offerings, the degree of competitive differentiation, and the level of differentiation across different product/market segments; and Porter's (1980) notions of low-cost leadership, differentiation and niche strategies.

Business-Level Strategy

But why should we choose to study business-level strategies over other strategic approaches, such as functional or enterprise levels? First, there is a great interest in business-level strategies in the literature (Chrisman, Boulton, and Hofer, 1988) as these competitive weapons indicate how firms try to obtain rents. Second, they enable us to

highlight the fundamental patterns that firms adopt when faced with certain situations (Herbert and Deresky, 1987). Third, both MNEs and domestic firms utilize these generic strategies. This paper will, in part, utilize Porter's (1980) well-established typology of generic strategies dealing with business-level strategy.

Business-level strategy can be thought of as the different competitive weapons available to firms (Chrisman, Boulton, and Hofer, 1988) and is a key construct in the strategic management literature (Fahey and Christensen, 1986). As previously mentioned, Porter's (1980) work points to the existence of three business-level (i.e., generic) strategies. These are low-cost leadership, differentiation, and niche. Firms not following one of the above are "stuck in the middle", and are said to exhibit lower levels of performance than their rivals who adopt a generic strategy.

The low-cost leadership strategy revolves around efforts to increase market share by occupying the low-cost position in the industry. In general, the larger the firm, the more viable this strategy is, as the firm's objective is to have overall lower per-unit costs than its competitors. This can be achieved by taking advantage of economies of scale, having greater access to resources, and by having lower per-unit overhead costs.

On the other hand, a differentiation strategy is about offering a unique product that customers desire and value. Thus, customers are relatively price insensitive, leading to premium pricing. However, this strategy is also associated with costly activities such as higher R&D expenditures, higher inventory levels, and greater marketing and distribution costs.

Last, a focus, or niche strategy, is about serving the needs of a unique segment of customers, products, or geographic area. Simply, a firm that caters to numerous market segments has a wide strategic breadth, while a firm that concentrates on only one or on a few segments has a narrow strategic breadth (i.e., a niche strategy). A firm using a niche strategy will also employ either a low-cost leadership or differentiation strategy while serving the needs of its target market. Table 2.2 (adapted from Miller and Dess, 1993) displays these generic strategies.

Porter's (1980) approach has by far received the most attention from scholars than any other typology. Indeed, many theoretical refinements have been added to this framework (Hambrick, 1983; Miller, 1988, 1992). For instance, Hambrick adds "asset parsimony" to Porter's framework to account for the effect of capital intensity on performance. Similarly, Miller (1988) provides a finer grained approach to differentiation by arguing that differentiation is composed of two separate dimensions--innovation and marketing.

In addition, Porter's (1980) typology has received conceptual challenges (Chrisman et al., 1988; Hill, 1988; Murray, 1988) concerning the mutual exclusivity of these generic strategies. Hill (1988) and Murray (1988) show that firms may employ joint low-cost leadership and differentiation strategies in order to secure a competitive advantage. Also, a number of researchers have questioned the validity of Porter's typology through their empirical studies (Galbraith and Schendel, 1983; Kotha and Vadlamani, 1995; Robinson and Pearce, 1988) as their research did not produce results in line with Porter's framework.

On the other hand, some scholars have found empirical support for Porter's conceptualization (Dess and Davis, 1984; Miller, 1988). Miller (1988) enters into the debate by saying that Porter's generic strategies are "really dimensions along which firms can score high or low" (p. 283), and thus they do not necessarily have to choose one over another. Therefore, adding a joint low-cost and differentiation approach to Porter's (1980) original typology is in line with recent theoretical and empirical developments. Thompson and Strickland (1995) refer to this as a "best cost provider" strategy.

These business-level strategies (i.e., Porter's work) are generic in the sense that they are applicable to all businesses and industries. However, not all strategies are equally viable for all businesses and industries. This reasoning is based on contingency theory (Lawrence and Lorsch, 1967) and the notions of fit and the environment (Venkatraman, 1989). Organizational choices must be matched to the organization's external context to ensure an organization's long-term success. Globalization, through its impact on the environment, influences organizations in different degrees. The industry in which an organization operates, and its susceptibility to globalization pressures, greatly influences the business-level strategy employed by this entity. For instance, in Porter's (1986) conceptualization of international industries we see that, overall, organizations that compete in multidomestic industries are less affected by globalization than their counterparts that operate in global industries. In addition to the industry structure, firm-level resources also determine the impact that globalization has on firms, and subsequently help firms decide which business-level strategy to adopt. Next, the two categories of firms used in this study are discussed.

MNEs versus Domestic Firms

What is a MNE?

There is no widely accepted definition of what a MNE is (Stopford, 1992). In the widely used economics perspective, Caves (1982) postulates that it is an enterprise that controls and manages production establishments located in at least two countries. Its existence is tied to economies of scale, intangible assets, and the problem of establishing fair (i.e., market) prices for these assets. More recently, there has been alternative conceptualizations of MNEs. Bartlett and Ghoshal (1990) maintain that the MNE is an interorganizational network. They posit that the MNE is a network of exchange relationships among organizational units, and hence managers must pay special attention to the social and institutional environments that the company operates in. More recently, Sundaram and Black (1992) describe the MNE as an enterprise that carries out transactions in or between two sovereign entities, operates under a system of decision making that permits influence over resources and capabilities, and its transactions are influenced by factors exogenous to its home country environment.

There has not been an abundance of studies comparing the performance of MNEs to domestic firms. Multinationality is usually conferred when firms have substantial foreign investments or sales (Daniels and Bracker, 1989; Leftwich, 1974; Michel and Shaked, 1986) or when firms engage in international expansion such as exporting (Mitchell, Shaver and Yeung, 1992, 1993). The overall findings of these studies has been mixed. Leftwich (1974) found that the after-tax rates of return on assets for MNEs was greater than that of primarily domestic firms in the US manufacturing sector. However,

when using a risk-adjusted market-based performance measure Michel and Shaker (1986) discovered that domestic firms out-performed their multinational rivals. In turn, Daniels and Bracker (1989) found mostly a positive relationship between profits and reliance on foreign sales and/or foreign production in the industries they studied. On the other hand, Mitchell et al.'s (1992, 1993) research points to the benefits of international expansion in the form of higher market share and survival rates in US medical sector industries, though international expansion can be a risky proposition. In short, these studies suggest that, in general, MNEs benefit from overseas operations.

A related set of literature on MNEs is that concerned with international diversification (e.g., Kim, Hwang, and Burgers, 1989) that traces its roots to finance's portfolio theory. This research area maintains that MNEs can increase performance by expanding into foreign countries. In general, findings have been mixed. Geringer, Beamish, and de Costa (1989) found that at high degrees of geographic diversification firm performance begins to fall, while Grant, Jammine, and Thomas' (1988) study of British manufacturing companies positively associates greater geographic expansion with performance. More recently, Hitt, Hoskisson, and Kim (1997) find, like Geringer et al. (1989), a nonliner relationship between international diversification and performance.

Due to the difficulty in defining what a MNE is, it is not surprising that studies have tried to operationalize MNEs using different criteria that are mostly financial in nature. Daniels and Bracker (1989) operationalize multinationality by measuring a firm's reliance on foreign sales and/or foreign production. Similarly, Kelly and Phillippatos' (1982) and Michel and Shaked's (1986) criteria for multinationality is based on a firm

having at least 20% of its sales overseas and having made at least direct capital investments in six countries outside its home country. Geringer et al. (1989) and Grant et al. (1988) use the ratio of sales from foreign operations to the total sales of the firm as a measure of multinationality. Alternatively, some have used the foreign asset ratio (e.g., Ramaswamy, 1993), while others have used both the number of foreign countries in which a MNE has subsidiaries in and the ratio of foreign sales to overall sales while operationalizing these entities (Tallman and Li, 1996). Thus, one can say that a MNE is a firm that sells and produces in more than one country.

Evidently, these criteria have been applied rather arbitrarily. For instance, a firm that has made multibillion dollar direct capital investments in only five countries is not considered to be a MNE by Michel and Shaked (1986). The number of locations where a firm has established production facilities in many cases does indeed imply a firm's multinational status. However, the new global economy is characterized by regional trade pacts, a growing influence of international trade regimes, and the widespread acceptance of free trade ideology--all of which lessen the need to set up shop (in the production sense) in many countries. For instance, regional trade pacts like the European Union (EU) entail the formation of larger markets, and hence enable firms to benefit from economies of scale. Likewise, international trade associations promote global economic ties. The newly formed World Trade Organization (WTO) provides for institutional governance mechanisms to resolve disputes between member nations. A corollary to the above is the global prevalence of free trade ideology, following the collapse of communism and the failure of autarkic national development policies. Today,

many nations have lifted restrictions and cumbersome regulations on trade and investment. Thus, MNEs that entered certain foreign markets only after agreeing to set up production bases there (e.g., the multinational car makers in Brazil) can now more fully rationalize their operations. This can be accomplished by serving a larger regional market (Mercosur in Brazil's case), or through procuring supplies and components from global sources.

In short, a better criterion in determining MNE status than the number of countries where a firm has made a direct capital investment in, would be to look at the percentage of total foreign assets that a company has, since this takes recent global economic trends into account. Also, including foreign sales as a criterion makes theoretical sense, as it accounts for exports as well as for revenue obtained through foreign production. However, this study, while adopting the criteria on the level of foreign sales, confers multinationality on a firm when it also has at least one production base outside the home country. This is an appropriate approach when the industry is global in nature, as a firm may not need six or seven production facilities to capture economies of scale and scope. In addition, Caves (1982) puts forward that a MNE is simply an entity that sells and produces in more than one country.

It seems that the benefits of multinationality may be better realized in some industries. Indeed, global industries bestow a greater advantage on MNEs as they facilitate the use of economies of scale in all aspects of these firms' operations. Accordingly, a more robust and theoretically sound study would have to account for the different international

environments surrounding MNEs when comparing their performance to primarily domestic rivals.

Environment-Performance Issues

In strategic management the environment is one of the central constructs (Hambrick, 1989). However, what constitutes the environment depends on the purpose of the study and the theoretical lens employed. For instance, institutional theory considers the general public and governmental agencies to be important aspects of the environment, while an agency theory perspective (Jensen and Meckling, 1976) mainly considers market control mechanisms as relevant environmental dimensions.

In very broad terms, we can assume that anything laying outside of an organization's boundaries to be the environment (Hall, 1996). The environment poses both opportunities and threats for organizations since it is composed of rivals, suppliers, customers, regulations and so on (Katz and Kahn, 1966; Thompson, 1967). Over the years, there have been numerous attempts at classifying organizational environments. Lawrence and Lorsch (1967) depict environments as being stable or unstable, while Emery and Trist (1972) conceptualize it as being either placid, disturbed, or turbulent. Similarly, Duncan's (1972) work points to environments as being either simple-complex or static-dynamic. Staw and Szwajkowski's (1975) position that any description of the environment needs to also account for munificence was heeded by Dess and Beard (1984). Their well known categorization of the environment has three dimensions: munificence, complexity, and dynamism. This work has been extended by D'Avenni

(1994), who has pioneered the notion of the "hypercompetitive" environment, that has arisen from the globalization of markets, rapid technological change, shorter product life cycles, and the presence of aggressive new competitors which actively seek out new product markets.

Indeed, as D'Avenni (1994) notes, the effect of globalization on organizational environments is profound. In this vein, this study focuses on the impact of globalization on both MNEs and domestic firms, and thus utilizes an IO approach, among others. Accordingly, the environment is represented by the pressures and opportunities emanating from international industries as portrayed by the IR framework. These international industries are characterized by a high level of intra-industry trade and the presence of MNEs (Roth and Morrison, 1990). As many as thirty-three such industries which meet this criteria have been identified (e.g., Carpano et al., 1994).

This paper assumes that certain strategies will lead to significantly higher performance than other strategies in certain environments, and hence is based on fit arguments. Therefore, an appropriate business-level strategy must be chosen in light of industry forces and the level of resources available in order for a firm to obtain high performance. The level of resources possessed is mainly a function of a company being a domestic firm or a MNE, and these resources provide for different opportunities and courses of action. For the study's purposes the environment (i.e., international industries) is conceptualized as a spectrum that runs from global to multidomestic industries. Last, while analyzing firm behavior this study assumes that companies have the following choices of business-level strategies: low-cost, differentiation, and focus.

In short, superior performance is achieved by having an appropriate fit between environmental demands, firm-level resources, and strategy.

Recapitulation of the environment and business-level strategy literature. The study of business-level strategy, which looks at the competitive weapons used by businesses in the marketplace, is well-established, none more so than that of Porter's (1980) typology of generic strategies. However, theoretical refinements have slightly altered this framework, as it is now widely agreed upon that the mutually exclusivity of these generic strategies is not a viable condition. Both theoretical and empirical developments point to the presence of a joint low-cost leadership and differentiation strategy.

According to fit arguments, the success of a firm is due to the choice of the appropriate business-level strategy in light of the prevailing environmental conditions. The environment is represented in many different ways, but it is essentially everything that lays outside of organizational boundaries. In today's hypercompetitive environment, determining these boundaries is a task in itself, especially with the growing popularity of strategic alliances (Osborne and Hagedoorn, 1997). The globalization of products and markets plays a major role in the fortunes of companies and hence is a relevant environmental construct worthy of further study. Accordingly, global and multidomestic industries and propositions relating these environments to business-level strategies and performance are presented in the next section.

Evidently, this exploratory study attempts to cover a very diverse topic. But in order to ensure an acceptable degree of rigor, not all aspects of the economy nor types of firms will be included in this study. Namely, the propositions are generated for manufacturing

industries. Almost all research conducted on MNEs and international industries within the IR framework is based on firms operating only in this sector. In addition, the measures developed for Porter's (1980) business-level strategies have been mostly done in manufacturing industries (Kotha and Vadlamani, 1995). This study aims to compare the business-level strategies employed by MNEs and domestic firms, and for the sake of parsimony and feasibility, the manufacturing sector is the subject of investigation.

International Industries, Business-Level Strategies and Performance

Global Industries

Global industries are characterized by worldwide standardized customer demand, economies of scale, and different factor costs across nations. According to Porter (1986), in a global industry "a firm's competitive position in one country is significantly affected by its position in other countries or vice versa" (p.18). Thus, firms must do their best to integrate their activities around the world in order to benefit from different factor costs and facilitate the transfer of resources and assets between subsidiaries.

MNEs achieve this with the proper configuration of their value chain activities. Simply, they locate these activities in nations that perform them in the most efficient manner. Indeed, numerous factors favor MNEs that have such value chains. These include benefiting from: economies of scale in the activity; a proprietary learning curve in the activity; a comparative advantage of one or a few locations for performing the activity; and coordination advantages of co-locating activities such as R&D and production (Porter, 1986). In addition, MNEs can benefit from having access to the

global capital markets. One also cannot discount the greater learning potential that exists for MNEs due to their exposure to numerous markets. Conversely, a domestic firm has almost all of its value chain activities based in a single nation, and may not be able to take advantage of differentials in the cost or productivity of factors across nations.

In addition, if a MNE has appropriate internal coordination mechanisms in place, it can efficiently manage international transportation and communication issues, along with facilitating the transfer of product and market information between markets (Stopford and Wells, 1972). Finally, the possibility of cross-subsidizing operations across national markets due to the presence of profit sanctuaries is another opportunity available to MNEs.

All of the above seem to point to a competitive disadvantage for domestic firms operating in global industries. However, in reality this might not be the case. For instance, if the domestic company is located in a "diamond" region (Porter, 1990) then it might even have an advantage over MNEs in that industry. Also, domestic firms that possess strong brand names, long-term supplier relationships, and captive distribution channels may mitigate the threat posed by MNEs as they have idiosyncratic resources (Barney, 1991) that are not easily replicable.

We see that global industries provide a forum that mostly benefits MNEs. These firms, in turn, can develop unique resources that further solidify their competitive advantage over purely domestic rivals. Dunning (1988) captures this with his three sources of MNE advantages: locational, internalization, and organizational. Thus, overall, domestic firms are at a competitive disadvantage vis-a-vis MNEs as they have

strategies based on a single national market and do not seek to leverage their competencies (Prahalad and Hamel, 1990) and take advantage of competitive interdependencies that may exist across different national markets.

Domestic firms: focus low-cost or focus differentiation? Theory indicates that MNEs in global industries should follow a low-cost strategy to benefit from their international operations (Morrison and Roth, 1992). As standardized products characterize these industries, efficiency is the driving force behind a firm's operations. But domestic firms are at a distinct disadvantage, as they lack global access to markets and factors, and cannot match MNEs' economies of scale in their overall operations. In addition, they have inferior learning opportunities due to their lack of exposure to foreign markets. All of these obstacles preclude them from employing a purely low-cost strategy. Thus, they must concentrate on utilizing their knowledge of the local market and capturing distribution channels, and thereby will focus on certain customer segments by providing a distinct product. Catering to a niche is a way of avoiding competition (Chen, 1996), which is an appropriate strategy considering the greater amount of resources possessed by MNEs. A focus strategy is used in conjunction with either differentiation or low-cost approaches to competition, thus providing a domestic firm with two strategic alternatives. Next, the theoretical and empirical support for these alternative positions is reviewed.

According to Bartlett and Ghoshal (1992), for "companies that are focused on their national markets and lack either the resources or the motivation for international expansion, the challenge is to protect their domestic positions from others that have the

advantage of being MNCs" (p. 288). These companies are said to have three broad strategic alternatives. The first two do not directly pertain to business-level strategy--seeking government protection from foreign competition, or striking up alliances with other global companies. These go under political and corporate strategy respectively. The third alternative is labeled as a "defensive" strategy. Essentially, it deals with actions undertaken to control distribution and supply channels, along with increased efforts directed at satisfying local consumer preferences. Hence, one can say that this approach closely resembles a differentiation strategy.

But in global industries a key structural driving force is the need for efficiency. However, following a differentiation strategy implies having higher costs relative to a low-cost strategy. Therefore, solely following a differentiation strategy in a global industry is problematic, especially when one considers the commodity-type products that dominate these industries. In this vein, domestic firms will follow a focus differentiation strategy as a way of avoiding head on competition with MNEs by offering non-commodity products to a niche in the marketplace. In short, this is a focus differentiation strategy.

Along with Bartlett and Ghoshal 's (1992) work, further theoretical support for this position can be found in Chen's (1996) framework for competitor analysis. This framework is built on two dimensions--market commonality and resource similarity. Market commonality is based on the multimarket competition literature (Karnani and Wernerfelt, 1985), and is described as "the degree of presence that a competitor manifests in the markets it overlaps with the focal firm" (p.106). This means that firms

see each other as greater competitors when they compete against each other in many markets. Here, the market is broadly defined as a construct that covers geographical market, market segment, or brand (Day, 1981).

On the other hand, resource similarity is a concept quite similar to the ideas developed in the RBV of the firm. Basically, firms that have similar bundles of strategic endowments have a high degree of resource similarity, and hence have similar strategic capabilities and vulnerabilities. Likewise, "firms with divergent competitive resource bundles are likely to have diverse competitive repertoires to draw on because of their unique profiles of their strategic resources" (p.107). This means that these firms will follow different business-level strategies.

In Chen's (1996) framework, a domestic firm has low market commonality (in both the product and geographic sense) and low resource similarity with a MNE in global industries, therefore leading to the adoption of divergent strategies. This condition enables domestic firms to survive as MNEs do not consider them to be a threat, and overlook their activities in the marketplace, thus exhibiting so-called "blind spots" (Zahra and Chaples, 1993) while they conduct an industry analysis. Domestic firms, in turn, closely follow the actions of their global rivals, and seek out niches that MNEs do not consider worth pursuing. In essence, "competitive asymmetry" exists since domestic firms and MNEs place different degrees of importance to each others moves due to the low overlap in market commonality and resource similarity. This may explain why some domestic firms are able to penetrate the home market of MNEs by developing a strong competitive advantage in their niche (Bartlett and Ghoshal, 1992).

In addition, some tentative empirical support for the existence of focused differentiation business-level strategies in global industries can be found in the literature. Roth and Ricks (1994) found firms from Japan, the U.S. and the U.K. utilizing differentiated strategic approaches in global industries. Unfortunately, they did not distinguish between MNEs and domestic firms in their analysis. Likewise, Carpano et al. (1994), Morrison and Roth (1992), and Roth and Morrison (1990) uncovered the existence of "non-global" (i.e., locally responsive) competitors in global industries. However, Morrison and Roth (1993) failed to find companies pursuing country centered strategies (i.e., domestic competitors) in global industries. Essentially, these studies show that in global industries low-cost strategies lead to higher performance than domestically oriented approaches, though the latter strategy is appropriate in the multidomestic segments (i.e., niches) of these industries.

In sum, a number of theoretical developments and empirical evidence point to MNEs using low-cost strategies in global industries, with domestic firms adopting focus differentiation strategies. In global industries there are multidomestic segments (e.g., Roth and Ricks, 1994), and domestic firms are in position to satisfy these customers for three reasons. First, they lack the resources to compete on a low-cost basis with MNEs and hence avoid the mainstream market. Second, MNEs may not regard these segments to be large enough to warrant their attention. Third, domestic firms may have special knowledge of local demand conditions, possess strong brand names, and also may be able to tie up distribution and supply channels.

But another strategic alternative available to domestic firms is to follow a focus low-cost strategy, as it too avoids direct competition with MNEs. Theory suggests that if economies of scale can be achieved in a niche, then a focus low-cost strategy is viable. The implication is that this niche must be large enough to support a low-cost strategy. So, the market/industry size is of utmost importance in determining the strategies pursued by domestic firms that compete in global industries.

Carrying capacity and business-level strategy. Theory indicates that domestic firms operating in global industries have two broad strategic alternatives: either follow a focus low-cost or a focus differentiation strategy. It seems that the "carrying capacity" of the domestic market will have a large influence on this choice.

The carrying capacity concept is usually applied to populations, which are roughly analogous to industries. Essentially, environmental conditions set a finite carrying capacity, which is the equilibrium size for the organization population. However, the carrying capacity can expand with the growth of industries, like we are witnessing in the semiconductor industry. A greater carrying capacity means that the environment can support more organizations than before (Carroll, 1988).

A natural corollary to this concerns market size--as the carrying capacity goes up, the market size increases. This has implications for generalist and specialist organizations. A generalist organization is analogous to a mass producer, while a specialist organization appeals to peripheral market segments. Essentially, a larger market promotes the proliferation of specialists (e.g., domestic firms) as they can occupy "small pockets of resources on the periphery of the market" (Carroll and Hannan, 1995, p.216). On the

other hand, generalists (e.g., MNEs) can take advantage of economies of scale in their quest to appeal to a broad range of customers. In sum, in a large market one would expect to find both large firms focusing on lowering costs, and numerous smaller firms catering to certain types of customers or areas. In smaller markets specialist firms are more rare, since less resources exist in the marketplace for them to flourish.

But how does this all relate to domestic market sizes? Next, we present a hypothetical situation that relates market size to business-level strategies. For instance, the U.S. market has different characteristics than the Irish market, as the latter has a population of only 4 million versus some 260 million for the U.S. In addition the U.S. has a higher per capita GDP, a condition that may further raise domestic demand levels. We can safely say that the U.S. market, and by extension, almost all of its industries, has a greater carrying capacity than the Irish market. Accordingly, domestic firms operating in global industries in Ireland will not be able to successfully follow a focus low-cost strategy, as potential niches would not be large and munificent enough for them to reap benefits from economies of scale. In contrast, the domestic U.S. firm may be able to serve niches by employing a low-cost strategy as the overall market sizes of these segments can be quite large.

These ideas receive empirical support from Arora and Gambardella (1997) who found that in the engineering sector U.S. niche producers that nurture product specific competencies have lower costs than their Japanese and European rivals. Their analysis attributes this to the size of the domestic market, as larger markets can support a variety of efficient specialist producers. They also show that in smaller markets firms develop

generic competencies that they can employ in numerous activities/products, providing support for a differentiation strategy. Likewise, Rosenberg's (1963) study of the machine tool industry in the 1840s and 1850s indicates that U.S. producers (they operate in a large market) occupied the international low-cost leadership position, while British and other European firms (they operate in smaller markets) held their own in custom produced goods.

In short, both theory and empirical evidence support the notion that in large markets (markets with high carrying capacities) domestic firms can pursue a focus strategy and still be efficient, since there are many resource pockets that these specialists can utilize and so achieving economies of scale is within their grasp. On the other hand, though smaller markets do afford one the opportunity to specialize, mainly the generalists (i.e., MNEs) will be in a position to pursue low costs due to the relatively restricted market resource base. This situation compels the small firms to become specialists with differentiation skills.

On the other hand, different market sizes provide different strategic avenues for MNEs. Although they are in a position to garner economies of scale in both types of markets, larger markets offer an opportunity to follow a differentiation strategy as well. Hill (1988) convincingly argues that when numerous competitors occupy the identical low-cost position in an industry the only way for a firm to have a sustainable competitive advantage is for it to differentiate its products. Evidently, the probability of large markets having numerous competitors sharing the same low-cost position is greater than that being the case in small markets.

Accordingly, a careful study of IO economics, RBV and the market size literature provides us with a theoretical rationale for predicting the business-level strategy of MNEs and domestic firms operating in global industries. These courses of action are based on fit arguments. That is, according to the external constraints and internal capabilities associated with a firm, there is one "right" strategy to choose. In this vein, firms that do not employ the hypothesized strategy should exhibit lower levels of performance than firms that do so. Next, propositions are generated based on the arguments presented above. If we assume that, in general, domestic competitors are small firms and that MNEs are large firms, then we have the following:

Proposition 1a: In a global industry that has a large (national) market size, domestic firms will place a greater emphasis on focus low-cost strategies than on other business-level strategies.

Proposition 1b: In a global industry that has a large (national) market size, domestic firms that follow focus low-cost strategies will have a higher level of performance than domestic firms that adopt other business-level strategies.

Proposition 2a: In a global industry that has a small (national) market size, domestic firms will place a greater emphasis on focus differentiation strategies than on other business-level strategies.

Proposition 2b: In a global industry that has a small (national) market size, domestic firms that follow focus differentiation strategies will have a higher level of performance than domestic firms that adopt other business-level strategies.

Proposition 3a: In a global industry that has a large (national) market size, MNEs will place a greater emphasis on joint low-cost and differentiation strategies than on other business-level strategies.

Proposition 3b: In a global industry that has a large (national) market size, MNEs that follow joint low-cost and differentiation strategies will have a higher level of performance than MNEs that adopt other business-level strategies.

Proposition 4a: In a global industry that has a small (national) market size, MNEs will place a greater emphasis on low-cost strategies than on other business-level strategies.

Proposition 4b: In a global industry that has a small (national) market size, MNEs that follow low-cost strategies will have a higher level of performance than MNEs that adopt other business-level strategies.

A tautology or not? There is a possible danger that a tautology exists in Propositions 3a--4b since the definition of a global strategy by itself may imply the existence of a low-cost strategy. Simply, are we measuring the same construct? In addition, will we find any variance in MNEs' strategies when investigating these propositions?

We argue to the contrary--there is no tautology. Extant research indicates that multinationals competing in global industries do not always adopt low- cost strategies (Carpano et al., 1994; Morrison and Roth, 1992; Roth and Morrison, 1990; Roth and Ricks, 1994). Essentially, even in global industries there are multidomestic segments that a firm can cater to, even though the industry characteristics are global. Internal resources, alongside industry level factors, help determine the strategic approach taken,

as "resource constraints may encourage businesses to pursue a number of reasonable nonglobal strategies in global industries" (Morrison and Roth, 1992, p. 401). Indeed, governmental rules and regulations may also hamper a MNE's ability to follow a low-cost strategy

In addition, a number of studies have emphasized the possibility of firms not responding in line with the prevailing industry pressures. For instance, Morrison, Ricks, and Roth (1991) and Baden-Fuller and Stopford (1991) show the superiority of regional strategies over more global ones, indicating that the latter firms "overglobalized." In this line of thought, Birkinshaw et al. (1995) found that businesses in some industries tend to be "under-globalized" relative to the underlying industry pressures. Hence, there is not an alignment between the dominant competitive patterns in these industries and the industry structure.

The above arguments indicate two things: (1) based on resource availability, firms have some leeway in the strategy they employ; and (2) firms may not respond according to dominant industry pressures as there are also nonglobal segments that they can compete in. Thus, the propositions are not tautological since a global industry does not predetermine the use of a low-cost strategy.

Multidomestic Industries

Multidomestic industries are characterized by local responsiveness. Products are tailored to local demand characteristics, infrastructure requirements, or government regulations. In essence, competition occurs on a country-by-country basis. This implies

that in each nation a firm will locate all or most of the value chain activities necessary for production and distribution, resulting in duplication of activities across nations. Thus, MNEs operating in these industries have subsidiaries that are mostly independent from one another, and the overall competitive position of these MNEs does not hinge on the performance of any one subsidiary.

These conditions seem to eradicate any competitive advantage that MNEs might possess relative to domestic firms, especially when one considers that the latter have better knowledge of domestic demand characteristics. Indeed, Hitt et al.'s (1997) review of the empirical studies conducted on the relationship between international diversification and firm performance points to mixed results. They postulate that international diversification may result in higher transaction costs and managerial information processing demands. MNEs in some industries may have to deal with "trade barriers, logistical costs, cultural diversity, and country differences" (p.772)--all of which add to costs. In addition, in multidomestic industries, isomorphic pressures may be greater (Rosenzweig and Singh, 1991), forcing MNEs to sacrifice efficiency in the name of satisfying local conformity pressures. Likewise, the notion of the "liability of foreignness" (Zaheer and Mosakowski, 1997) points to the difficulties encountered by firms operating in foreign environments, leading some MNEs to acquire domestic producers.

But, on the other hand, MNEs have a presence in numerous markets, and do benefit from the transfer of intangible assets (e.g., R&D) between units and are able to leverage their core competencies across these markets. New and diverse ideas may crop up from

being exposed to a variety of market and cultural perspectives (Hitt et al., 1997). Also, by adopting network organizations (Ghoshal and Bartlett, 1990) MNEs can facilitate the transfer of this knowledge. Last, they have access to global capital markets.

Theory says that in multidomestic industries differentiation strategies should be pursued. But MNEs in multidomestic industries may benefit from having international operations in the form of lower costs--be they R&D, capital, or advertising. Hence, MNEs are likely to follow a joint low-cost and differentiation strategy in this environment. On the other hand, domestic firms, while faced with higher costs, will utilize their experience in the local market and follow a differentiation strategy. Thus, we have the following propositions:

Proposition 5a: Domestic firms operating in multidomestic industries will place a greater emphasis on differentiation strategies than on other business-level strategies.

Proposition 5b: Domestic firms operating in multidomestic industries that follow differentiation strategies will have a higher level of performance than domestic firms that adopt other business-level strategies.

Proposition 6a: MNEs operating in multidomestic industries will place a greater emphasis on joint low-cost and differentiation strategies than on other business-level strategies.

Proposition 6b: MNEs operating in multidomestic industries that follow joint low-cost and differentiation strategies will have a higher level of performance than MNEs that adopt other business-level strategies.

Table 2.2 illustrates propositions 1a, 2a, 3a, 4a, 5a, and 6a.

MNEs versus Domestic Firms

Global industries favor firms that can benefit from economies of scale, differentials in nations' factor costs, and homogeneous demand characteristics. MNEs are in a position to take advantage of these conditions. However, global industries may also have multidomestic segments (i.e., niches) that domestic firms may satisfy. By concentrating on a niche in the industry these firms avoid head on competition by having low market commonality (Chen, 1996) with MNEs. Also, they may have an advantage over MNEs due to their superior knowledge (which is a resource) of local conditions. But which type of company will have superior performance?

MNEs, due to their unique resource configuration, are more fully able to take advantage of the industry structural drivers than their domestic rivals. On the other hand, domestic firms mainly take advantage of their resources in light of the existence of a niche market. Nevertheless, their strategy is not totally in line with the overall industry structure as it does not capitalize on economies of scale, though higher pricing may offset higher expenses. Moreover, there will be a cap on the premium they can apply to their pricing since the industry is mostly characterized by commodity type products. An excessive price will compel their customers to forsake their special product/service in favor of lower prices. These conditions point to MNEs enjoying a higher level of performance than their domestic counterparts. In short, "(r)egardless of the level of international involvement the firm is, therefore, confronting essentially the same industry context" (Roth and Ricks, 1994, p.106). Simply, MNEs' capabilities are more congruent

with the environment--they have a strategy-resource-environment fit versus domestic firms' strategy-resource fit.

On the other hand, if tastes, preferences and regulations do not converge worldwide in some industries, then a tailored approach is needed for national markets. This also eradicates the need to possess economies of scale. In this scenario, there are no strong theoretical grounds for hypothesizing whether MNEs or domestic firms will outperform one another. Accordingly, we have the following propositions:

Proposition 7: MNEs operating in global industries will have higher levels of performance than domestic firms operating in global industries.

Proposition 8: There are no significant performance differences between MNEs and domestic firms operating in multidomestic industries.

Summary of the Chapter

Despite the joint roles played by environmental effects and internal capabilities in the determination of business-level strategy, they are rarely studied in tandem. Globalization has made this deficiency even more evident. The IO literature mainly focuses on the influence of the industry on organizational actions, while RBV attributes organizational performance to internal capabilities. These two sets of literatures provide us with insight regarding the actions of domestic firms and MNEs competing in an international environment.

Porter's (1980) business-level strategies are generic, and hence can be found in both MNEs and domestic firms. Likewise, a global competitive environment provides threats

and opportunities, in the form of industry pressures, for both types of firms. Since strategic management has much of its roots based in contingency theory, it provides us with a theoretical framework to speculate on the business-level strategies employed by firms operating in international environments. The propositions developed here are mainly applicable to the manufacturing sector. They cover both global and multidomestic industries, along with accounting for the role that national market size plays in regard to business-level strategies. In addition, in line with the aim of IO economics and the RBV of the firm, performance implications associated with these strategies has also been included in some of the propositions.

Table 2.1. Porter's Typology.

Strategic Breadth	Basis of Competitive Advantage	
industry-wide	DIFFERENTIATION	COST LEADERSHIP
particular segment	FOCUS	FOCUS

Table 2.2. Preferred Generic Strategies Based on Industry and Firm-Level Factors.

Industry	MNE	Domestic Firm
Global	P1a: Small market: low-cost strategy P2a: Large market: low-cost and differentiation strategy	P3a: Small market: focus differentiation strategy P4a: Large market: focus low-cost strategy
Multidomestic	P6a: low-cost and differentiation strategy	P5a: differentiation strategy

CHAPTER III

METHODOLOGY

Each of the propositions developed in the previous chapter must be stated in a form that is conducive to testing them. As stressed earlier, these propositions are applicable to many settings, and hence set the foundation for testing the strategic actions of firms in different types of international environments (i.e., global or multidomestic). However, this work is mainly exploratory and has not undergone an empirical examination and thus it would be premature to investigate all of these propositions simultaneously using a multi-industry sample. It would be more appropriate to look at certain aspects of this overall theoretical model before launching a full-fledged investigation. By doing so, any inherent flaws that have not been detected can be uncovered and rectified before a lot of resources have been spent. In this vein, the in-depth examination of a single industry is an appropriate approach to take. Accordingly, this leads us to selectively test the following hypotheses based on the U.S. semiconductor industry. Note that they are based on, respectively, propositions 1a, 1b, 3a, 3b, and 7. They have been slightly reworded in line with the measurement techniques that will be used to test them. In these hypotheses, market size refers to the size of the domestic market.

Hypothesis 1a: In a global industry that has a large market size, domestic firms tend to have focus low-cost strategies as compared with MNEs.

Hypothesis 1b: In a global industry that has a large market size, domestic firms that follow a focus low-cost strategy will have higher levels of performance than domestic firms that do not adopt this strategy.

Hypothesis 2a: In a global industry that has a large market size, MNEs tend to follow joint low-cost and differentiation strategies as compared with domestic firms.

Hypothesis 2b: In a global industry that has a large market size, MNEs that follow a joint low-cost and differentiation strategy will have higher levels of performance than MNEs that do not adopt this strategy.

Hypothesis 3: MNEs operating in a global industry will have higher levels of performance than domestic firms.

Next, the sample, the measures, and the statistical techniques employed in this study are thoroughly reviewed.

Methods

Sample

This study is exploratory in nature--it attempts to uncover the impact of globalization on MNEs and domestic firms. In this preliminary effort, a case study is conducted on a single global industry. The semiconductor industry meets the criteria put forward by Birkinshaw et al., (1995) of being an industry where economies of scale are important, customer needs are standardized worldwide, and differential factor costs exists (primarily in the form of wages) across national markets.

A total of 27 firms are included in this study. These firms are US-based public companies that are profiled in the Standard and Poor's 1996 Semiconductor Industry Survey and are used for intra-industry comparative purposes. In this sense, though a convenience sample, these firms are by and large representative of the industry's competitive environment, as they are explicitly used in guiding investor decisions. However, this sample only includes firms that primarily compete in the semiconductor industry. Therefore, firms that have a sizable presence in the industry, like IBM, Motorola, and DEC are not part of this study. My sampling technique is in line with Ferber (1977) who says that convenience samples should be used only for either exploratory or illustrative purposes, or be employed when a case study or clinical approach is deemed to be appropriate.

The semiconductor industry in the US is one with a great "carrying capacity" (Hannan and Carroll, 1996) and hence falls into the large market classification as argued in Chapter II. It is a large and growing industry, with sales topping $145 billion worldwide in 1995. However, the following year (1996) a glut in production depressed prices, resulting in the first decline in industry revenues since 1985. According to the Semiconductor Industry Association (1997), the outlook for growth though is very favorable with predictions for double digit demand increases, reduction in global production capacity, and the selling off of excess inventory.

The semiconductor industry has frequently been the target of investigation in strategic management, due to its dynamic characteristics (e.g., Eisenhardt and Schoonhoven, 1996; Kim and Kogut, 1996; Schoonhoven, Eisenhardt, and Lyman, 1990). This industry

is multifaceted, composed of 4 broad product categories: analog semiconductors, microprocessors, memory, and logic devices. Descriptions of these chips adapted from Standard and Poor's 1996 Semiconductor Industry Survey can be found in Appendix A.

Measures

Traditionally, Porter's (1980) business-level strategies have been measured using subjective (perception based) methods. There are numerous examples of survey instruments that address these generic strategies (e.g., Dess and Davis, 1984; Kotha and Vadlamani, 1995; Miller, 1988; Robinson and Pearce, 1988). These are composed of Likert-based scales directed at top management, and ask the respondents to answer the questions by using the past three years as a time frame. As presented in Chapter II, there has been some difficulty of consistently generating Porter's conceptualization, especially the niche strategy.

Snow and Hambrick's (1980) review of the problems and prospects associated with using different research methods maintains that subjective measures may suffer from respondent recall problems. In addition, managers may be recanting not realized strategy, but intended strategy (Mintzberg, 1978). If this is the case, then the responses do not accurately portray the firm's business-level strategy. Other issues that may be salient in this type of research concern response size and bias. In other words, are the respondents representative of the population that you are trying to generalize your findings to?

Case based methods are fraught with difficulties as well, especially researcher bias. The organizations that one tends to select for in-depth investigation, and the issues uncovered may serve to substantiate one's "implicit theory" (Argyris, 1996). Snow and Hambrick (1980) imply that this is not a good method to use while testing strategic management hypotheses.

The fourth method which they review is the solicitation of advice on organizations' strategic actions by using expert opinion. Benefits associated with this approach are the removal of the "intended versus realized" strategy problem, and gaining access to the in-depth information that these individuals may possess. However, if one wants to conduct a multi-industry study this method becomes cumbersome, as most outside experts are single industry specialists.

The use of objective data in strategic management research is quite common, though it is usually reserved for the corporate strategy domain. Databases such as COMPUSTAT, NEXIS/LEXIS, and PIMS have generated much of this research. In the business-level strategy field the use of objective measures is not nearly as common, though Miller and Dess (1993) do provide a PIMS based study of Porter's strategies. It seems that difficulties associated with operationalizing the niche strategy, which has also been so problematic in survey type research, has led many scholars to forsake the use of objective measures in the investigation of business-level strategy. When coupled with the charge that these measures are coarse grained and thus cannot uncover the richness of these strategies (i.e., they are secondary data), researchers have opted not to use these methods.

This study, being exploratory, does have the advantage of being able to stray away from survey type measures. But before doing so, one has to have a strong theoretical foundation while employing alternative approaches. Next, such alternatives are presented. More specifically, this study will utilize a combination of objective and case based approaches while answering the research question. Accounting based measures such as those found in 10-K filings, Annual Reports, industrial surveys, and the EDGAR database provide us with a rich source of objective data. In addition, the Predicasts directory contains a wealth of data that pertains to business-level strategy issues. These sources will be complemented with information from trade journals and the popular press. When used in tandem, all these sources provide us with a viable mechanism to address the hypotheses.

In testing the hypotheses, this paper does not utilize traditional multivariate, large sample approaches based on parametric statistical techniques. Hence, the distinction between independent and dependent variables is not of pivotal importance. We are measuring the degree of association (or correlation) between variables, and are assuming that certain strategies are associated with certain types of firms and that these associations will be coupled with superior performance. Note that a causal relationship is not necessarily implied. Next, the operationalization of the variables is presented. It is discussed in four main sections. These are business-level strategies, type of firms, performance measures, and control variables.

Business-Level Strategies

Low-cost strategy. As stressed in Chapter II, this strategy is mostly about minimizing costs by achieving economies of scale and scope. Hence, one must pay special attention to costs associated with parts, labor, and overhead, besides making sure that a high level of capacity is being utilized (Thompson and Strickland, 1995). The latter is especially important in capital intensive industries, such as the semiconductor industry. Financial statements do provide us with the means to measure major aspects of the low-cost strategy. In short, there are three measures that serve in combination as proxies for this generic strategy. First, the Gross Profit Margin (GPM) is a measure of operating efficiency as it accounts for labor, parts/materials, and overhead. It is calculated as follows: (Total Sales-Cost of Goods Sold)/Total Sales. Second, as a measure of labor productivity, the ratio of Total Sales/Number of Employees will be used. Last, a measure of capacity utilization (Total Sales/Net Property, plant and equipment) will be included. Data will be collected over the period 1992-1996 for all three measures as this is a sufficient time period for business-level strategies to be realized. A score for the low-cost strategy will be assessed by calculating an average score for each of these scales over this five year span. To provide for comparability these scores will be subsequently standardized using z scores (i.e., a mean of zero and a standard deviation of one). Last, the sum of these z scores will be the final measure of the low-cost strategy. Thus, in accordance with theory, a firm can score high or low on this measure. Appendix B displays the data and the calculations used in determining the low-cost strategy.

Differentiation strategy. This is about providing a product that is seen as unique in the eyes' of customers, enabling a firm to command a premium price for its product. So the organization's effort must be geared towards offering a product that is distinct from its competitors' product. This implies that R&D activities (both product and process) are of utmost importance, as are marketing, sales, and customer service activities (Thompson and Strickland, 1995). In addition, outbound logistics and distribution activities play an important role in the business-level strategy as an emphasis on these operations provides for faster delivery and assists in the prevention of stockouts. Accordingly, three accounting based measures can be used to represent differentiation strategies. These are: R&D/Total Sales; Marketing, general, and administrative expenses/Total Sales; and, finally, the inventory turnover ratio (Inventory/Total Sales). The mean of each of these scales will be taken over the years 1992-1996 to account for the differentiation strategy. Also, they will be adjusted into z scores to provide for standardization. The sum of the z scores for these 3 scales represents the differentiation strategy. Again, a firm can score high or low on this strategic dimension. Appendix B displays this process.

Niche (focus) strategy. A niche or focus strategy can be measured in three ways: does the organization segment the market based on geography, customer type, or product line? Obtaining detailed information on geographic sales is possible, but unfortunately the data is very coarse, as companies tend to segment the market based on US sales, Asia sales, Europe sales, and so on. On the other hand, data on segmentation by customer type is hard to come buy, and it too tends to be coarse grained (e.g., industrial versus consumer markets). That leaves us with segmentation by product line.

A Herfindahl-type index offers a way to measure a focus strategy with product line data. Essentially, if a firm sells many types products it has a wide strategic breadth, while a firm that offers only a few different types of products is following a focus strategy. Herfindahl-type indices are widely used in studies on corporate diversification and product diversity (e.g., Grant et al., 1988). Typically, firm sales are divided at the four digit SIC code level, summed up, and subsequently divided by total firm sales. There are many variations to this approach, with some coined as concentric (Robins and Wiersema, 1995) while others are labeled as entropy measures (Palepu, 1985).

This paper utilizes, and adapts, an approach used by Tallman and Li (1996). Their measure for product diversity = $1 - \Sigma Sj^2$, with S being the proportion of a firm's sales reported in product group j. Their measure "takes into account the number of segments in which a firm operates and the relative importance of each segment in sales" (p. 187). Instead of using sales level per SIC code and total sales figures for each firm, the entropy measure used in this paper employs, respectively, the number of new product releases and announcements of new product developments in each product category over the period 1992-1996, and the total number of products released and being developed in all categories during this time span.

The paramount issue is how to obtain information on these product categories and new product releases. Fortunately, the Predicasts directory provides us in-depth coverage of the semiconductor industry (SIC code 3674) by reviewing news stories in over 750 periodicals that cover industry related topics. Essentially, on an annual basis, it reports new product lines and new product developments, along with a myriad of other activities,

for companies that operate in the semiconductor industry. It also breaks down this four digit SIC code into over 100 product categories. This study assumes that each product category represents a niche. The total number of product releases and announcements of new product developments that a company makes in a niche over 1992-1996 is used in calculating the numerator of S^2. Again, the total number of products released and being developed in all categories over this time period is used in the denominator of S^2. Next, this ratio is squared. The sum of squares for each product category ratio is subtracted from one to get a partial measure of a firm's strategic breadth. For instance, according to this entropy measure, a firm that competes in only one product category (a single niche player) is assigned a score of zero (i.e., 1-1), while a firm that has a presence in numerous product categories will receive a score closer to 1.

Last, this entropy measure is multiplied by the logarithm of the number of product categories that a firm competes in. A logarithmic transformation is used to account for the fact that large firms tend to compete in more product categories. This approach is line with Grant et al.,'s (1988) adjustment to the entropy measure used in their study on British MNEs. Thus, by applying the entropy measure to a different level of analysis, a technique mainly reserved for corporate level strategy now has a role to play in measuring business-level strategy.

In sum, for each firm a measure of strategic breadth will be calculated by accounting for all product releases and new product developments in all relevant product categories between 1992-1996. These results will also be standardized using z scores. Evidently, though challenging, the application of objective measures while studying business-level

strategy is both theoretically plausible and empirically feasible. Appendix C displays the coding and calculation of the niche strategy.

MNEs versus Domestic Firms

In this global industry, we will have to differentiate between MNEs and domestic firms. A review of the literature in Chapter II and knowledge of the industry characteristics has led us to apply the following criteria. A MNE must have at least 20% of its sales and production facilities (not sales offices) located in at least two countries. By scanning the EDGAR database and Moody's industry reports we were able to ascertain that of the 27 firms in the Standard and Poor's sample, 13 are domestic while 14 are MNEs. All firms have a heavy international presence, with international sales all above the 20% threshold. This lends further credence to the notion of this being a global industry. Appendix D provides a list of the firms used in this study.

It is important to note that though a firm may be classified as a domestic competitor it may still have a sizable international presence through its export activities and overseas sales offices. Another weakness with this approach deals with the degree of multinationality--it assumes that a firm that has only one foreign manufacturing facility will reap similar benefits as a company that has five foreign manufacturing facilities. Indeed, according to the criteria laid down in this paper, they are both MNEs.

Performance Variables

The hypotheses dictate the need for performance measures. Accounting based performance measures have been used extensively in strategic management research (e.g., Carpano et al., 1994; Miller, 1992; Morrison and Roth, 1992; Robinson and Pearce, 1988). Hence, the use of 5 year means of return on assets (ROA) and return on sales (ROS) based on the period 1992-1996 are proposed to be an acceptable measure of performance. Appendix B displays this process.

Control Variables

A number of organization level factors may influence the study's findings. Thus, relevant control measures are also included--namely the number of employees and the age of the establishment. Size and age are factors that have been shown to influence a firm's strategic actions (Young, Grimm, and Smith, 1996). Table 3.1 illustrates the measures employed in the study and provides a brief explanation on how they are used.

Data Analysis

The study is amenable to the use of nonparametric statistics due to the small sample size (i.e., 27 firms overall, 14 of these are MNEs and 13 of these are domestic competitors). Specifically, the Wilcoxon-Mann-Whitney rank sum test and Spearman's rho are techniques that are suitable for testing the hypotheses. The Wilcoxon-Mann-Whitney nonparametric procedure is appropriate to use when the data are composed of independent samples that have unknown distributions. Spearman's rho measures the

strength of the monotonic relationship between a pair of variables by using a correlation coefficient calculated on rank transformed data (Conover, 1980).

As stressed in Chapter II, Porter's three generic strategies are actually three dimensions of strategic positioning, and therefore a firm will score high or low on each dimension (Miller, 1988). Although these strategies are independent of one another they are not mutually exclusive. This means that firms can follow joint strategies, as evident in the hypotheses. Whether a firm is following a certain strategy can only be ascertained after comparing its score on each dimension in question to industry norms. In short, it is a relative measure. A firm deemed to be following a low-cost strategy according to the accounting measures used in this study might very well be considered to be the high cost producer in another industry that has different operating and structural characteristics.

The ensuing discussion describes in detail how the hypotheses are measured. Specifically, hypotheses 1a and 2a necessitate a two step approach due to the possibility of joint business-level strategies. Accordingly, the measurement of these two hypotheses are discussed in tandem. The remaining hypotheses (1b, 2b, and 3) will be tested in the same manner and thus are grouped together for presentation purposes.

Hypotheses 1a and 2a. These hypotheses are tested in a two step process. First, relative measures of the three business-level strategies must be uncovered. Second, the associations between business-level strategies stated in these hypotheses will have to be measured. This is accomplished, respectively, by utilizing the Wilcoxon-Mann-Whitney rank sum test and Spearman's rho.

In hypothesis 1a, two issues must be resolved--do domestic firms tend to follow focus strategies in their industry, and, in turn, are they also likely to adopt low-cost strategies? Resolving these issues is rather straightforward. The Wilcoxon-Mann-Whitney technique is a procedure for testing hypotheses about the difference in means of two general populations. In this case we have two independent samples from the populations of MNEs and domestic firms that operate in the semiconductor industry. Hypothesis 1a implicitly maintains that domestic firms have greater focus strategies then their multinational counterparts. Hence, we can test the null hypothesis that the means of these two populations are equal. The alternative hypothesis is a one tailed t-test as it contends that domestic firms will have greater focus strategies than MNEs. In other words, domestic firms will have a focus strategy relative to multinationals. This is represented by the following:

H_0: The score received by domestic firms on the focus strategy = The score received by MNEs on the focus strategy.

H_1: The score received by domestic firms on the focus strategy > The score received by MNEs on the focus strategy.

In contrast, the pursuit of a low-cost strategy is postulated in both hypotheses 1a and 2a. Therefore, both MNEs and domestic firms will be likely to follow a low-cost strategy. Hence, their population means should be equal. However, this is conceptually problematic since being a low-cost producer is a relative measure, but, in contrast, hypotheses 1a and 2a indicate that both populations will have equal means. To resolve this, one must remember that hypotheses 1a and 2a are based on "fit" arguments, in that

if firms do not adopt such strategies they will exhibit lower performance. Accordingly, there should be relatively high-cost producers in both populations, and they will not be as effective as low-cost producers. Successful firms in both populations will employ low-cost strategies. For the Wilcoxon-Mann-Whitney test the null hypothesis in this case is the research hypothesis--there is no difference in the low-cost strategy population means. Hence, this is a rather weak test. The alternative hypothesis is a two-sided test that states that the low-cost strategy population means are not equal. This is represented by the following:

H_0: The score received by MNEs on the low-cost strategy = The score received by domestic firms on the low-cost strategy.

H_1: The score received by MNEs on the low-cost strategy ≠ The score received by domestic firms on the low-cost strategy.

On the other hand, hypothesis 2a, along with the low-cost strategy, includes the differentiation dimension. Theory says that MNEs will follow a differentiation strategy vis-à-vis domestic firms. Hypothesis 2a implicitly supports this position. Thus, again using the Wilcoxon-Mann-Whitney test, the null hypothesis maintains that there is no difference in the means of the two general populations, while the alternative hypothesis states that the population mean of the differentiation dimension for MNEs is greater than that of domestic firms. Likewise this is represented by the following:

H_0: The score received by MNEs on the differentiation strategy = The score received by domestic firms on the differentiation strategy.

H_1: The score received by MNEs on the differentiation strategy > The score received by domestic firms on the differentiation strategy.

The sole use of the Wilcoxon-Mann-Whitney test is not sufficient, however, in testing hypotheses 1a and 2a since they are based on more than one strategy. Hypothesis 1a asserts that one should expect to find both low-cost strategies and focus strategies in domestic firms, while, likewise, Hypothesis 2a, associates the low-cost strategy with the differentiation strategy in MNEs. Accordingly, Spearman's rho--a technique that uncovers correlations--is an appropriate method to utilize. By ranking each firm based on its score on low-cost, differentiation, and focus strategies the strength of the relationships between these strategies can be uncovered. Simply, hypothesis 1a will be tested by determining the rank correlation coefficient by calculating the sample correlation coefficient on the ranks of the focus and low-cost dimensions for domestic firms. Essentially, we expect higher (lower) levels of the focus strategy to be accompanied by higher (lower) levels of the low-cost strategy for domestic firms. A similar procedure will be employed when calculating Spearman's rho for hypothesis 2a, by supplanting focus strategy with the differentiation strategy for the MNE sample. Here, the rank correlation coefficient between the ranks of the low-cost and differentiation strategies is calculated. Again, we expect higher (lower) levels of the low-cost strategy to be associated with higher (lower) levels of the differentiation strategy for MNEs. In hypothesis 1a and hypothesis 2a we look at whether the variables of interest tend to be monotonically increasing since we are expecting a positive association between the variables. Hence, we have the following:

H_0: Domestic firms that tend to score high (low) on the focus strategy do not tend to score high (low) on the low-cost strategy.

H_1: Domestic firms that tend to score high (low) on the focus strategy also tend to score high (low) on the low-cost strategy.

H_0: MNEs that tend to score high (low) on the differentiation strategy do not tend to score high (low) on the low-cost strategy.

H_1: MNEs that tend to score high (low) on the differentiation strategy also tend to score high (low) on the low-cost strategy.

Hypotheses 1b, 2b, and 3. Likewise, Hypotheses 1b and 2b dictate the use of nonparametric approaches. Essentially, domestic firms that follow focus low-cost strategies must be identified before testing hypothesis 1b. The criteria used in determining this will be whether a firm scores above the total sample median on both the focus and low-cost dimensions. Subsequently, separate Wilcoxon-Mann-Whitney tests can be conducted on domestic firms that have a focus low-cost strategy with those that do not by ranking performance data (ROA and ROS).

The null hypothesis for 1b states that there is no difference in the performance means between domestic firms which place different emphasis on these strategic dimensions. Again, domestic firms will have to be categorized according to whether they are, or are not, following focus strategies and low-cost strategies. This categorization will be based on the median of the overall sample. Thus, only domestic firms that score above the sample median on both the focus and low-cost dimensions will be following the prescribed strategic orientation. In contrast, a one sided test for the alternative

hypothesis maintains that domestic firms that have a focus low-cost strategy will have a higher level of performance. Thus, we have the following:

H_0: The performance of domestic firms following a focus low-cost strategy = the performance of domestic firms not following a focus low-cost strategy.

H_1: The performance of domestic firms following a focus low-cost strategy > the performance of domestic firms not following a focus low-cost strategy.

A similar procedure will be observed when testing hypothesis 2b. Here, MNEs will be classified as following a joint low-cost and differentiation strategy based on the median scores of the overall sample on the low-cost and differentiation dimensions. However, this approach may become problematic if only a small number of observations are classified as following a joint low-cost and differentiation strategy. If this is the case, one can also assume that firms that have either low-cost or differentiation scores above the median will outperform firms that are scoring below the median on both strategic dimensions. This is a theoretically sound approach, as the latter type of firms are "stuck in the middle" (Porter, 1980). A firm's competitive advantage is based on low-cost and/or differentiation strategies. Thus, firms that are doing neither should not exhibit a high level of performance.

Accordingly, the inherent "fit" argument in hypothesis 2b will be tested with a Wilcoxon-Mann-Whitney test by ranking the performance measures of ROA and ROS. The null hypothesis states that there is no difference in the performance means between MNEs with a low-cost differentiation strategy and those that adopt other strategic

orientations. The research hypothesis is a one sided test asserting that MNEs with joint low-cost and differentiation strategies will have a higher level of performance.

H_0: The performance of MNEs following a joint low-cost and differentiation strategy = the performance of MNEs not following a joint low-cost and differentiation strategy.

H_1: The performance of MNEs following a joint low-cost and differentiation strategy > the performance of MNEs not following a joint low-cost and differentiation strategy.

Last, hypothesis 3 is tackled in a corresponding manner. Here, simply the performance of MNEs is compared to that of domestic firms. Obviously, the Wilcoxon-Mann-Whitney test enables one to conduct this investigation. The null hypothesis states that there is no difference in the performance means of the two measures for domestic firms and MNEs, while the research hypothesis (a one sided test) contends that MNEs will exhibit a higher performance level. Again, this test will conducted for both ROA and ROS. Thus, we have the following:

H_0: The performance of MNEs = the performance of domestic firms.

H_1: The performance of MNEs > the performance of domestic firms.

Finally, the control measures of age (how many years old) and size (number of employees) will be included in the study using Spearman's rho. This technique allows us to test the association of the control measures with the strategic dimensions.

To further substantiate my findings, if the situation warrants, a brief review of trade journals, the business press, and each company's Annual Report will be conducted. This

is a method of triangulation that has been employed in other studies (e.g., Bogner, Thomas, and McGee, 1996; Mitchell et al., 1992). Uncovering the reasons why firms did not follow a proposed strategy will be of great interest, while situations where both approaches (quantitative and qualitative) lead to the same result will only add to the validity of both the theory and methods employed here.

A Note on Alternative Statistical Approaches

It is feasible for a pooled cross-sectional regression analysis to be conducted, which would increase the sample size to 135. We can readily get a measure of low-cost and differentiation strategies by accounting for each firm's results between 1992-1996. Also, although the focus measure developed in this paper is devised to capture the niche dimension over an extended time period, one can readily adapt the entropy measure used here by applying it to an annual basis (by determining the number of product releases and calculating the number of product categories that a firm competes in during the year in question). However, problems arise when a firm's activities in certain segments are not accounted for because the firm has not released products in those segments during the year in question. Much more problematic is that a pooled cross-sectional regression analysis is an atheoretical approach in this case, because it assumes that financial results represent the intended differentiation and low cost strategies for the year it is measured in. Clearly, strategies may take years to form.

Reliability

As the data used in this study is objective in nature, reliability problems should not be of much concern. The scales that compose the low-cost and differentiation strategies are calculated using simple manipulations of published accounting results. In other words, they are based on audited income statements and balance sheets. However, the coding of the focus strategy is somewhat subjective as the coder has some discretion when recording product releases, and there is always the possibility of making mistakes. Thus, a second coder will be used in order to establish a measure of inter-rater reliability.

Summary of the Chapter

This chapter reviewed the sample, methods, and statistical techniques that are used in testing the hypotheses. The sample used in this study is a convenience sample that meets the criteria of being a global industry. A detailed description of how the business-level strategies were devised and measured is given, along with a discussion on how firms are classified as being either MNEs or domestic companies. In addition, a thorough discussion of the use of the nonparametric techniques of the Wilcoxon-Mann-Whitney test and Spearman's rho is provided.

Table 3.1. Summary of the Measurement Scales.

Variables	Scales	Comments
low-cost strategy	1. Gross profit margin 2. Total sales / no. of employees 3. Total sales / fixed assets	For each firm, find the 5 year average of each measure. Then covert each of these into z scores using the 27 firm sample. Finally, sum these 3 z scores and divide by 3 to get a measure of a firm's low-cost strategy.
differentiation strategy	1. R&D / total sales 2. Marketing, general, and advertising expense / total sales 3. Inventory / total sales	For each firm, find the 5 year average of each measure. Then covert each of these into z scores using the 27 firm sample. Finally, sum these 3 z scores and divide by 3 to get a measure of a firm's differentiation strategy.
focus strategy	1. Using the Predicasts directory, determine the no. of product releases over 1992-1996 in each product category for the 27 firms. 2. A variation of the entropy measure or $(1 - \sum Sj^2) * \text{Log}$ (no. of product categories) A score closer to 0 indicates that a focus strategy is being followed.	For each firm, find the number of products released or being developed in each product category over 5 years and divide this by the total number of products released or being developed the firm. Then square this ratio and sum it for all product categories. Next, subtract this amount from 1 to get a measure of a firm's strategic breadth. Then multiply this figure by the number of product categories that the firm competes in. Last, convert this final figure into a z score.
firm status	MNE (more than 20% of revenues are from international sales and it has at least one foreign production base). Otherwise, a domestic firm.	There are 14 MNEs and 13 domestic firms in this sample.
control variables	firm age (in years) and firm size (number of employees).	
performance variables	ROA and ROS.	Find the 5 year average for ROA and ROS.

CHAPTER IV

DATA ANALYSIS AND RESULTS

Overview

This chapter reports the results that are based on the hypotheses and procedures described in Chapter III. Therefore, each hypotheses is reintroduced and subsequently analyzed in accordance with the nonparametric tools discussed in the previous chapter.

Reliability

Chapter III articulated the need to have a reliability check conducted on the focus strategy. Hence, a second coder with a MBA from an accredited institution who is currently working in the business consulting field did a product release count for 1995. The coder identified 190 out of 203 of these events, which represents a reliability of 93.6%. This is an acceptable level of reliability. Essentially, most discrepancies were due to the second coder's not remembering the names of the 27 firms and hence not accounting for some product releases.

Domestic Firms, Business-Level Strategy, and Performance

Hypotheses 1a and 1b are analyzed in this section as they deal with the strategic orientations and performance of domestic firms. These hypotheses are restated and then analyzed.

rank mean for samples X and Y. In this study X represents the domestic firm sample and Y represents the MNE sample.

$$T_R = \frac{\overline{R_X} - \overline{R_Y}}{s_p \sqrt{1/n_X + 1/n_Y}}$$

This formula requires that the pooled standard deviation of the ranks be calculated. This is accomplished with the following:

$$s_p = \left\{ \frac{(n_X - 1)s_{R_X}^2 + (n_Y - 1)s_{R_Y}^2}{n_X + n_Y - 2} \right\}^{\frac{1}{2}}.$$

The decision rule is to reject H_0 if $T_R > t$. The value t is found by looking at the $1-\alpha$ quantile of the Student's t distribution with $n_x + n_y - 2$ degrees of freedom.

Table 4.2 displays the standard deviation of the ranks for both domestic firms and MNEs, and the pooled standard deviation of the ranks along with the test statistic, the critical value at $\alpha = .05$ and the p-value. Since $T_R = 2.705$ H_0 is rejected as the critical value = 1.7081. We can say that domestic firms exhibit higher levels of the focus strategy than do MNEs. Next, a similar procedure is carried out for the low-cost strategy.

As noted in Chapter III, a statistically significant difference between domestic firms and MNEs is not expected. Hence, when using the Wilcoxon-Mann-Whitney test the null hypothesis is the research hypothesis. This, by its very nature, is a weak test. Table 4.3 shows the rankings used in the calculation of the test statistic. Firms are ranked according to the sum of the z scores for the gross profit margin, the asset utilization ratio, and the revenue per employee figure.

H_0: The score received by domestic firms on the low-cost strategy = The score received by MNEs on the low-cost strategy.

H_1: The score received by domestic firms on the low-cost strategy ≠ The score received by MNEs on the low-cost strategy

Table 4.4 contains the standard deviation of the ranks for both domestic firms and MNEs, and the pooled standard deviation of the ranks along with the test statistic, the critical value of $\alpha/2 = .025$ and the p-value. T_R is calculated to be 2.119, which is greater than the critical value of 2.056. This is a surprising result, leading to the rejection of the null (research) hypothesis. Essentially, this says that domestic firms have significantly greater low-cost strategies than do MNEs.

Finally, a Spearman's rho rank correlation coefficient is used to see if high (low) levels of focus strategies are associated with high (low) levels of low-cost strategies for domestic firms. Table 4.5 exhibits the data used in this procedure. This is the final step used to test H1a. Spearman's rho can be calculated as follows (Iman and Conover, 1989) when there are no ties in the data:

$$r_R = \frac{\sum R_{X_i} R_{Y_i} - C}{n(n^2 - 1)/12} .$$

Here, $C = n(n+1)^2/4$, while n is the sample size. Last, the test statistic for Spearman's rho is as follows:

$$T_R = r_R \sqrt{\frac{n-2}{1-r_R^2}} .$$

The decision rule is based on whether the test statistic is greater than that predicted by H_0. Simply reject H_0 if $T_R > t_{1-\alpha, n-2}$. The null and research hypothesis are as follows:

H_0: Domestic firms that tend to score high (low) on the focus strategy do not tend to score high (low) on the low-cost strategy.

H_1: Domestic firms that tend to score high (low) on the focus strategy also tend to score high (low) on the low-cost strategy.

The results for Spearman's rho (Table 4.6) indicate that, though in the right direction, one cannot conclude that focus and low-cost strategies move in the same direction for domestic firms. Here the null hypothesis is not rejected as the test statistic is less than the critical value at $\alpha = .05$ ($.183 < 1.796$). However, overall, we find that domestic firms have greater low-cost and/or focus strategies relative to MNEs.

Now, the inherent "fit" argument is tested. That is, domestic firms that follow focus low-cost strategies should have better performance than domestic firms that do not have these strategies. This leads us to the next hypothesis:

H1b: In a global industry that has a large market size, domestic firms that follow a focus low-cost strategy will have higher levels of performance than domestic firms that do not adopt this strategy.

The Wilcoxon-Mann-Whitney test is a technique that can address H1b. First, domestic firms must be classified according to whether they are following, or are not following, both low-cost and focus strategies. This is done by taking the overall sample's median score as the classification point for both strategies. Firms scoring above the

median are assumed to possess the strategy of interest. Here, the use of the overall sample is appropriate because the measurement of these strategies is based on all 27 firms. Table 4.31 illustrates this process. Firms are placed in one of the four quadrants. They either have, or do not have, the strategy in question. Then they are ranked according by their performance on the five year averages for both ROA and ROS. Tables 4.7 and 4.8 show the rankings. Essentially, domestic firms that score above the overall mean on both the focus and low-cost dimensions are expected to have higher levels of performance than those that do not. The null and research hypotheses are as follows:

H_0: ROA of domestic firms that follow both focus and low-cost strategies = ROA of domestic firms not following focus low-cost strategies.

H_1: ROA of domestic firms that follow both focus and low-cost strategies > ROA of domestic firms not following focus low-cost strategies.

H_0: ROS of domestic firms that follow both focus and low-cost strategies = ROS of domestic firms not following focus low-cost strategies.

H_1: ROS of domestic firms that follow both focus and low-cost strategies = ROS of domestic firms not following focus low-cost strategies.

The test statistic for the ROA hypothesis is 0.717 (Table 4.9), which is below the critical value at $\alpha = .05$ of 1.796. Thus, though in the right direction, the null hypothesis is not rejected. We cannot say that domestic firms that follow focus low-cost strategies will have a higher ROA than those that do not.

Similarly, the test statistic for the ROS hypothesis is also 0.717 (Table 4.10), which is below the critical value of $\alpha = .05$ of 1.796. Thus, though in the right direction, the null

hypothesis is not rejected. Like for ROA, we cannot say that domestic firms that follow focus low-cost strategies will have a higher ROS than those that do not. In short, though domestic firms with focus low-cost strategies did exhibit higher levels of performance, a statistically significant difference was not detected.

MNEs, Business-Level Strategy, and Performance

Hypotheses 2a and 2b are analyzed in this section as they deal with the strategic orientations and performance of domestic firms. These hypotheses are restated and then analyzed.

Hypothesis 2a: In a global industry that has a large market size, MNEs firms tend to have joint differentiation and low-cost strategies as compared to domestic firms.

The procedures carried out on this section mirror the analysis conducted in the previous section. Here, the MNE sample is the object of interest. Accordingly, the Wilcoxon-Mann-Whitney test and Spearman's rho are used.

From the analysis conducted above, we know that MNEs are not following a low-cost strategy relative to their domestic counterparts. However, theory says that MNEs should follow a differentiation strategy. Therefore, a Wilcoxon-Mann-Whitney test is conducted on the total sample on this dimension. Of interest is whether there are statistically significant differences in the mean score that MNEs and domestic firms receive on the differentiation strategy. The total sample is subjected to this analysis because whether a firm scores high or low on a particular strategy is a relative measure that is based on what

other firms are doing in its industry. Accordingly, the null and research hypothesis are worded as follows:

H_0: The score received by MNEs on the differentiation strategy = The score received by domestic firms on the differentiation strategy.

H_1: The score received by MNEs on the differentiation strategy > The score received by MNEs on the differentiation strategy.

Table 4.11 shows the firms' ranked scores on the differentiation dimension. Firms are ranked according to the sum of the z scores on the ratios of R&D to total sales, MG&A to total sales, and inventory turnover. The firm that receives the highest score in the sample is assigned a rank of 27 while the firm that receives the lowest score is assigned a rank of 1. In addition, a dummy variable (0 or 1) has been assigned to distinguish between MNEs (1) and domestic firms (0).

Table 4.12 provides the standard deviation of the ranks for both the MNE and domestic firm samples, and the pooled standard deviation of the ranks. In addition, it includes the test statistic, the critical value at $\alpha = .05$, and the p-value. The results indicate that there is no difference in the differentiation strategy for the two types of firms (the test statistic = -0.0476 and the critical value = 1.708). Hence, the null hypothesis is not rejected. Thus, hypothesis 2a receives virtually no support in this initial analysis as MNEs can be said to be following a high-cost strategy, and are not following a differentiation strategy relative to domestic firms. However, the last step of the analysis involves whether MNEs that score high on low-cost also exhibit more of the differentiation strategy.

A Spearman's rho rank correlation coefficient is used to see if high (low) levels of differentiation strategies are associated with high (low) levels of low-cost strategies for MNEs. Table 4.13 exhibits the data used in this procedure. This is the final step used to test H2a. The null and research hypothesis are presented below.

H_0: MNEs that tend to score high (low) on the differentiation strategy do not tend to score high (low) on the low-cost strategy.

H_1: MNEs that tend to score high (low) on the differentiation strategy also tend to score high (low) on the low-cost strategy.

The decision rule is based on whether the test statistic is greater than H_0. Simply reject H_0 if $T_R > t_{1-\alpha, n-2}$ with $\alpha = .05$. The results for Spearman's rho (Table 4.14) indicate that, though in the right direction ($r_R = .108$), one cannot conclude that differentiation and low-cost strategies move in the same direction for MNEs since $T_R = .375 < 1.7823$. In sum, we find that, overall, MNEs do not follow low-cost strategies and exhibit similar differentiation strategies relative to domestic firms.

The inherent "fit" argument is tested next. That is, MNEs that follow joint differentiation and low-cost strategies should have better performance than MNEs that do not have these strategies. This leads us to the next hypothesis:

H2b: In a global industry that has a large market size, MNEs that follow a joint differentiation and low-cost strategy will have higher levels of performance than MNEs that do not adopt this strategy.

The Wilcoxon-Mann-Whitney test is a technique that can address H1b. First, MNEs must be classified according to whether they are following or are not following both low-

cost and differentiation strategies. This is done by taking the overall sample's median score as the classification point for both strategies. Firms scoring above the median are assumed to possess the strategy of interest. Here, the use of the overall sample is appropriate because the measurement of these strategies is based on all 27 firms. Table 4.32 illustrates this process. Firms are placed in one of the four quadrants. They either have, or do not have, the strategy in question. Then they are ranked according to their performance on the five year averages for both ROA and ROS. Tables 4.15 and 4.16 show the rankings. Essentially, MNEs that score above the overall mean on both the differentiation and low-cost dimensions are expected to have higher levels of performance than those that do not.

As argued in Chapter III, firms obtain competitive advantage by employing low-cost and/or differentiation strategies. Firms that do not follow any of these orientations are "stuck-in-the-middle" (Porter, 1980) and will be at a competitive disadvantage. From the Wilcoxon-Mann-Whitney tests conducted in the previous sections it is obvious that there will not be many observations (MNEs) classified as following joint differentiation and low-cost strategies. Indeed, Table 4.32 confirms this. Thus, a theoretically plausible test is to assume that firms that follow either a joint strategy or exhibit only one of these strategies will outperform those that are "stuck in the middle." Hence, the null hypotheses and research hypotheses are slightly reworded as follows:

H_0: ROA of MNEs that follow low-cost and/or differentiation strategies = ROA of MNEs that are "stuck in the middle."

the two samples are sought. All 27 firms are classified as being either MNEs or domestic firms and subsequently ranked by performance. The highest performer receives a rank of 27, while the lowest performer receives a rank of 1. Table 4.19 looks at ROA while Table 4.20 displays ROS rankings. Hypothesis 3 is now reintroduced:

Hypothesis 3: MNEs operating in a global industry will have higher levels of performance than domestic firms.

We can reframe Hypothesis 3 in the form of null and research hypotheses as follows:

H_0: ROA of MNEs = ROA of domestic firms.

H_1: ROA of MNEs > ROA of domestic firms.

H_0: ROS of MNEs = ROS of domestic firms.

H_1: ROS of MNEs > ROS of domestic firms.

Tables 4.21 and 4.22 provide us with the test statistic and critical values at $\alpha = .05$ for the above. For ROA (Table 4.21), H_0 is not rejected as the test statistic is below the critical value (i.e., $-1.071 < 1.7081$). In fact, the results point in the opposite direction, with the performance of domestic firms being superior. If the research hypothesis had been that domestic firms have higher levels of ROA, the results almost reach statistical significance.

The findings for ROS (Table 4.22) are similar to the previous analysis. For ROS, null hypothesis is not rejected (i.e., $-.286 < 1.7081$). Again the ROS performance is better for domestic firms, though not as great as in ROA. Hence, we cannot say that MNEs have a

higher level of performance when compared to domestic firms. In contrast, domestic firms seem to be doing better from a ROA and ROS standpoint.

Control Variables

Both size and age are factors that have to be controlled for since they may have a bearing on the results. These factors may covariate with the business-level strategies. Hence, a Spearman's rho analysis will be conducted for age and size on each of the three strategies. Age is the difference between the year of establishment and 1996. Size is the average number of employees between 1992-1996. Firms are be ranked by both age (Tables 4.23, 4.24, and 4.25) and size (Tables 4.26, 4.27, and 4.28). The oldest and largest firms are assigned ranks of 27, while the newest and smallest firms are assigned ranks of 1. Essentially, we are trying to see whether there are any associations between age, size, and the strategies. The research and null hypotheses are as follows:

H_0: Age and the low-cost strategy do not tend to increase or decrease together.

H_1: Age and the low-cost strategy tend to increase or decrease together.

H_0: Age and the differentiation strategy do not tend to increase or decrease together.

H_1: Age and the differentiation strategy tend to increase or decrease together.

H_0: Age and the focus strategy do not tend to increase or decrease together.

H_1: Age and the focus strategy tend to increase or decrease together.

H_0: Size and the low-cost strategy do not tend to increase or decrease together.

H_1: Size and the low-cost strategy tend to increase or decrease together.

H_0: Size and the differentiation strategy do not tend to increase or decrease together.

H_1: Size and the differentiation strategy tend to increase or decrease together.

H_0: Size and the focus strategy do not tend to increase or decrease together.

H_1: Size and the focus strategy tend to increase or decrease together.

Tables 4.29 and 4.30 provide the results for age and size, respectively. From the test statistic and critical values at $\alpha = .05/2$ we see that the focus strategy and the low-cost strategy have statistically significant associations with both age and size. Essentially, we can say that high (low) levels of the low-cost strategy are associated with "younger" ("older") firms. Similarly, high (low) levels of the focus strategy are associated with smaller (larger) firms. The differentiation strategy does not have a statistically significant association with either size or age. However, there is a negative association between the differentiation strategy and these control variables.

In Chapter V, the findings presented here will be analyzed and interpreted in much greater detail from both a theoretical and methodological standpoint.

Summary of the Chapter

This chapter tested the hypotheses. The basic finding is that domestic firms possess more of the low-cost and/or focus strategies than MNEs. Also, MNEs are not pursuing a differentiation strategy relative to domestic firms. In addition, the "fit" arguments concerning performance did not reach statistical significance, but were in the right direction for the domestic firm and MNE samples. However, overall, MNEs do not have superior performance. In contrast, the domestic firms sampled here exhibit higher levels (though not statistically significant) of performance from both a ROS and ROA standpoint. Last, the control measures employed here indicate that they have significant associations between the low-cost and focus strategies.

In the final chapter, implications, strengths, limitations, and directions for future research associated with this dissertation are discussed.

Table 4.1. Firm Ranks on the Focus Strategy.

Firm type	Focus	Z scores	Firm	Rank
1	1.369117	2.0226642	TI	1
1	1.347069	1.9375364	Analog	2
1	1.304231	1.7721381	National	3
1	1.054278	0.8070649	AMD	4
0	1.026591	0.7001649	VLSI	5
1	0.993402	0.5720215	Atmel	6
1	0.984566	0.5379056	Intel	7
1	0.975086	0.5013031	Cypress	8
1	0.969115	0.478249	LSI	9
0	0.965934	0.4659671	IC System	10
0	0.916426	0.2748157	Dallas	11
1	0.884131	0.1501241	Zilog	12
1	0.8748	0.114097	Microchip	13
0	0.869262	0.0927146	Linear	14
1	0.86914	0.0922436	Cirrus	15
0	0.848609	0.012973	Altera	16
0	0.737434	-0.416276	Maxim	17
0	0.710464	-0.520407	S3	18
1	0.680773	-0.635045	Int. Rec.	19
0	0.679183	-0.641184	Lattice	20
0	0.674161	-0.660574	Vitesse	21
0	0.659784	-0.716084	Chips &	22
1	0.62502	-0.850308	ID Tech	23
1	0.555064	-1.12041	Xilinx	24
0	0.433483	-1.589836	Tseng	25
0	0.420833	-1.638678	Micron	26
0	0.393962	-1.742428	Cyrix	27

Table 4.2. Wilcoxon-Mann-Whitney Test for the Focus Strategy.

Average rank for domestic firm	17.846154
Average rank for MNE	10.428571
Standard deviation on the ranks (domestic)	6.618738
Standard deviation of the ranks (MNE)	7.5520174
Pooled standard deviation of the ranks	7.1193283
Test statistic	2.7050617
Critical value with 25 d.o.f.	1.7081
p-value <	0.001

Table 4.3. Firm Ranks on the Low-Cost Strategy.

Firm type	Low-cost	Firm	Rank
0	5.374515	S3	27
1	3.03636	Xilinx	26
0	2.64542	Altera	25
0	2.631876	Tseng	24
0	2.222772	Lattice	23
0	1.782239	IC System	22
0	1.387116	Cyrix	21
0	1.316492	Linear	20
1	0.524072	Intel	19
1	0.522459	Cirrus	18
0	0.190163	Maxim	17
0	0.167656	Chips &	16
1	-0.7465	Cypress	15
0	-0.8056	Dallas	14
1	-0.94995	Atmel	13
1	-1.0291	National	12
1	-1.03199	ID Tech	11
1	-1.0959	Analog	10
1	-1.15149	Microchip	9
1	-1.35479	Zilog	8
0	-1.38395	Micron	7
1	-1.45791	LSI	6
1	-1.59717	AMD	5
0	-1.8179	VLSI	4
0	-2.07887	Vitesse	3
1	-2.32875	TI	2
1	-2.92653	Int. Rec.	1

Table 4.4. Wilcoxon-Mann-Whitney Test for the Low-Cost Strategy.

Average rank for domestic firm	17.153846
Average rank for MNE	11.071429
Standard deviation on the ranks (domestic)	8.0295927
Standard deviation of the ranks (MNE)	6.8776593
Pooled standard deviation of the ranks	7.4528407
Test statistic	2.118889
Critical value with 25 d.o.f.	2.0595
p-value <	0.05

Table 4.5. Domestic Firm Ranks on Low-Cost and Focus Strategies.

FIRM	**Low-cost**	**Focus**	**Lc*Focus**
S3	13	7	91
Altera	12	5	60
Tseng	11	11	121
Lattice	10	8	80
Integrated Circuit Systems	9	2	18
Cyrix	8	13	104
Linear	7	4	28
Maxim	6	6	36
Chips &Technology	5	10	50
Dallas	4	3	12
Micron	3	12	36
VLSI	2	1	2
Vitesse	1	9	9
		Total	647

Table 4.6. Spearman's Rho for the Focus Low-Cost Strategy.

Rx*Ry	647
C	637
Spearman's rho	0.054945
Test statistic	0.1825078
Critical value with 11 d.o.f.	1.7959
p-value <	0.45

Table 4.7. ROA Ranks for the 13 Domestic Firms According to Strategy.

Low-cost and focus	**Other strategies**
13	10
12	8
11	7
9	3
6	2
5	
4	
1	

Table 4.8. ROS Ranks for the 13 Domestic Firms According to Strategy.

Low-cost and focus	**Other strategies**
13	10
12	8
11	6
9	4
7	2
5	
3	
1	

Table 4.9. Wilcoxon-Mann-Whitney Test for Domestic Firms' ROA.

Average rank for focus low-cost strategy	7.625
Average rank for other strategies	6
Standard deviation on the ranks (focus low-cost)	4.2740914
Standard deviation of the ranks (other strategy)	3.391165
Pooled standard deviation of the ranks	3.9757789
Test statistic	0.716951
Critical value with 11 d.o.f	1.7959
p value <	0.25

Table 4.10. Wilcoxon-Mann-Whitney Test for Domestic Firms' ROS.

Average rank for focus low-cost strategy	7.625
Average rank for other strategies	6
Standard deviation on the ranks (focus low-cost)	4.3732139
Standard deviation of the ranks (other strategy)	3.1622777
Pooled standard deviation of the ranks	3.9757789
Test statistic	0.716951
Critical value with 11 d.o.f.	1.7959
p-value <	0.25

Table 4.11. Firm Ranks on the Differentiation Strategy.

Firm type	Differen.	Firm	Rank
0	6.699391	Vitesse	27
1	2.842063	Analog	26
0	2.623135	Chips &	25
0	1.88823	Altera	24
1	1.307964	Cirrus	23
0	0.948805	Cyrix	22
1	0.901085	Microchip	21
1	0.776398	ID Tech	20
1	0.632769	Int. Rec.	19
0	0.529585	Dallas	18
0	0.489719	IC System	17
1	0.435012	Xilinx	16
0	0.358317	Lattice	15
0	-0.13392	VLSI	14
1	-0.2218	Cypress	13
1	-0.22871	AMD	12
1	-0.79757	National	11
1	-0.84473	Zilog	10
1	-1.18828	LSI	9
1	-1.27885	Atmel	8
0	-1.49932	Tseng	7
0	-1.59717	Maxim	6
0	-2.04963	S3	5
1	-2.29095	Intel	4
1	-2.41305	TI	3
0	-2.68863	Linear	2
0	-4.43806	Micron	1

Table 4.12. Wilcoxon-Mann-Whitney Test for the Differentiation Strategy.

Average rank for domestic firm	14.076923
Average rank for MNE	13.928571
Standard deviation on the ranks (domestic)	9.0688252
Standard deviation of the ranks (MNE)	7.0761168
Pooled standard deviation of the ranks	8.094076
Test statistic	-0.047586
Critical value with 25 d.o.f.	1.7081
p-value <	0.55

Table 4.13. MNE Ranks on Low-Cost and Differentiation Strategies.

Firm	**Low-cost**	**Differentiation**	**Lc*Diff.**
Xilinx	14	9	126
Intel	13	2	26
Cirrus	12	13	156
Cypress	11	8	88
Atmel	10	3	30
National	9	6	54
Integrated Device Technology	8	11	88
Analog	7	14	98
Microchip	6	12	72
Zilog	5	5	25
LSI	4	4	16
AMD	3	7	21
TI	2	1	2
International Rectifier	1	10	10
		Total Lc*Diff.	812

Table 4.14. Spearman's Rho for Low-Cost and Differentiation Strategies.

Rx*Ry	812
C	787.5
Spearman's rho	0.1076923
Test statistic	0.3752394
Critical value with 12 d.o.f.	1.7823
p-value <	0.35

Table 4.15. ROA Ranks for the 14 MNEs According to Strategy.

Fit	No Fit
14	11
13	10
12	8
9	3
7	1
6	
5	
4	

Table 4.16. ROS Ranks for the 14 MNEs According to Strategy.

Fit	No Fit
14	12
13	10
11	6
9	4
8	1
7	
5	
3	
2	

Table 4.17. ROA Wilcoxon-Mann-Whitney Test for MNEs.

Average rank for a "fit" strategy	8
Average rank for other strategies	6.6
Standard deviation on the ranks ("fit" strategy)	4.2426407
Standard deviation of the ranks (other strategies)	4.3931765
Pooled standard deviation of the ranks	4.2934058
Test statistic	0.5846128
Critical value with 12 d.o.f.	1.7823
p-value <	0.3

Table 4.18. ROS Wilcoxon-Mann-Whitney Test for MNEs.

Average rank for a "fit" strategy	8
Average rank for other strategies	6.6
Standard deviation on the ranks ("fit" strategy)	4.2130749
Standard deviation of the ranks (other strategies)	4.4497191
Pooled standard deviation of the ranks	4.2934058
Test statistic	0.5846128
Critical value with 12 d.o.f	1.7823
p-value <	0.3

Table 4.19. Firm Ranking Based on ROA.

Firm type	ROA	Firm	Rank
0	1.506185	Linear	27
1	1.21482	Intel	26
0	1.065566	Maxim	25
0	1.014755	Micron	24
1	0.925178	Xilinx	23
0	0.620628	S3	22
0	0.565991	Lattice	21
0	0.531139	Dallas	20
0	0.462401	IC System	19
0	0.325847	Altera	18
1	0.287413	Microchip	17
1	0.282619	Zilog	16
1	0.271902	Atmel	15
0	0.163413	Cyrix	14
1	0.061404	AMD	13
1	0.000609	National	12
1	-0.05153	Analog	11
1	-0.19789	ID Tech	10
1	-0.20579	Cirrus	9
0	-0.35314	Tseng	8
1	-0.46216	Cypress	7
1	-0.5091	TI	6
1	-0.50989	Int. Rec.	5
1	-0.58093	LSI	4
0	-1.07437	VLSI	3
0	-2.01113	Vitesse	2
0	-3.34395	Chips &	1

Table 4.20. Firm Ranking Based on ROS.

Firm type	ROS	Firm	Rank
0	2.024094	Linear	27
1	1.375701	Intel	26
0	1.06076	Lattice	25
0	0.959229	Maxim	24
1	0.824235	Xilinx	23
0	0.773845	Micron	22
0	0.645326	Altera	21
0	0.643492	Dallas	20
1	0.610014	Atmel	19
1	0.411774	Microchip	18
1	0.393002	Zilog	17
0	0.12149	S3	16
1	0.03905	AMD	15
1	-0.03584	Analog	14
0	-0.03862	IC System	13
1	-0.10593	ID Tech	12
1	-0.22604	National	11
0	-0.26902	Cyrix	10
1	-0.28409	Cypress	9
1	-0.32707	LSI	8
1	-0.47569	Cirrus	7
1	-0.42938	Int. Rec.	6
1	-0.68539	TI	5
0	-1.02529	VLSI	4
0	-1.1935	Tseng	3
0	-2.32543	Vitesse	2
0	-2.46072	Chips &	1

Table 4.21. ROA Wilcoxon-Mann-Whitney Test for Domestic Firms.

Average rank for domestic firm	15.692308
Average rank for MNE	12.428571
Standard deviation on the ranks (domestic)	9.1868077
Standard deviation of the ranks (MNE)	6.5246784
Pooled standard deviation of the ranks	7.9150434
Test statistic	-1.070571
Critical value with 25 d.o.f.	1.7081
p-value <	0.85

Table 4.22. ROS Wilcoxon-Mann-Whitney Test for Domestic Firms.

Average rank for domestic firm	14.461538
Average rank for MNE	13.571429
Standard deviation on the ranks (domestic)	9.5360315
Standard deviation of the ranks (MNE)	6.4535534
Pooled standard deviation of the ranks	8.0812359
Test statistic	-0.285969
Critical value with 25 d.o.f.	1.7081
p-value <	0.6

Table 4.23. Ranks for Low-Cost and Age.

Firm	Low-cost	Age	Lc*Age
S3	27	2	54
Xilinx	26	9	234
Altera	25	9	225
Tseng	24	13	312
Lattice	23	13	299
IC System	22	21	462
Cyrix	21	4	84
Linear	20	15.5	310
Intel	19	23	437
Cirrus	18	15.5	279
Maxim	17	13	221
Chips &	16	9	144
Cypress	15	5.5	82.5
Dallas	14	9	126
Atmel	13	9	117
National	12	25	300
ID Tech	11	17.5	192.5
Analog	10	24	240
Microchip	9	2	18
Zilog	8	2	16
Micron	7	20	140
LSI	6	17.5	105
AMD	5	22	110
VLSI	4	19	76
Vitesse	3	5.5	16.5
TI	2	27	54
Int. Rec.	1	26	26
		Total	4680.5

Table 4.24. Ranks for Differentiation and Age.

Firm	**Differentiation**	**Age**	**Diff.*Age**
Vitesse	27	5.5	148.5
Analog	26	24	624
Chips &	25	9	225
Altera	24	9	216
Cirrus	23	15.5	356.5
Cyrix	22	4	88
Microchip	21	2	42
ID Tech	20	17.5	350
Int. Rec.	19	26	494
Dallas	18	9	162
IC System	17	21	357
Xilinx	16	9	144
Lattice	15	13	195
VLSI	14	19	266
Cypress	13	5.5	71.5
AMD	12	22	264
National	11	25	275
Zilog	10	2	20
LSI	9	17.5	157.5
Atmel	8	9	72
Tseng	7	13	91
Maxim	6	13	78
S3	5	2	10
Intel	4	23	92
TI	3	27	81
Linear	2	15.5	31
Micron	1	20	20
		Total	4931

Table 4.25. Ranks for Focus and Age.

Firm	**Focus**	**Age**	**Foc.*Age**
TI	1	27	27
Analog	2	24	48
National	3	25	75
AMD	4	22	88
VLSI	5	19	95
Atmel	6	9	54
Intel	7	23	161
Cypress	8	5.5	44
LSI	9	17.5	157.5
IC System	10	21	210
Dallas	11	9	99
Zilog	12	2	24
Microchip	13	2	26
Linear	14	15.5	217
Cirrus	15	15.5	232.5
Altera	16	9	144
Maxim	17	13	221
S3	18	2	36
Int. Rec.	19	26	494
Lattice	20	13	260
Vitesse	21	5.5	115.5
Chips &	22	9	198
ID Tech	23	17.5	402.5
Xilinx	24	9	216
Tseng	25	13	325
Micron	26	20	520
Cyrix	27	4	108
		Total	4598

Table 4.26. Ranks for Low-Cost and Size.

Firm	Low-cost rank	Size Rank	Lc*Size
S3	27	4	108
Xilinx	26	9	234
Altera	25	8	200
Tseng	24	1	24
Lattice	23	7	161
IC System	22	2	44
Cyrix	21	5	105
Linear	20	12	240
Intel	19	26	494
Cirrus	18	17	306
Maxim	17	11	187
Chips &	16	6	96
Cypress	15	15	225
Dallas	14	10	140
Atmel	13	16	208
National	12	25	300
ID Tech	11	19	209
Analog	10	22	220
Microchip	9	13	117
Zilog	8	14	112
Micron	7	23	161
LSI	6	21	126
AMD	5	24	120
VLSI	4	18	72
Vitesse	3	3	9
TI	2	27	54
Int. Rec.	1	20	20
		Total	4292

Table 4.27. Ranks for Differentiation and Size.

Firm	Differen. rank	Size rank	Diff.*size
Vitesse	27	3	81
Analog	26	22	572
Chips &	25	6	150
Altera	24	8	192
Cirrus	23	17	391
Cyrix	22	5	110
Microchip	21	12	252
ID Tech	20	19	380
Int. Rec.	19	20	380
Dallas	18	10	180
IC System	17	2	34
Xilinx	16	9	144
Lattice	15	7	105
VLSI	14	18	252
Cypress	13	15	195
AMD	12	24	288
National	11	25	275
Zilog	10	14	140
LSI	9	21	189
Atmel	8	16	128
Tseng	7	1	7
Maxim	6	11	66
S3	5	4	20
Intel	4	26	104
TI	3	27	81
Linear	2	13	26
Micron	1	23	23
		Total	4765

Table 4.28. Ranks for Focus and Size.

Firm	Focus rank	Size rank	Foc.*size
TI	1	27	27
Analog	2	22	44
National	3	25	75
AMD	4	24	96
VLSI	5	18	90
Atmel	6	16	96
Intel	7	26	182
Cypress	8	15	120
LSI	9	21	189
IC System	10	2	20
Dallas	11	10	110
Zilog	12	14	168
Microchip	13	12	156
Linear	14	13	182
Cirrus	15	17	255
Altera	16	8	128
Maxim	17	11	187
S3	18	4	72
Int. Rec.	19	20	380
Lattice	20	7	140
Vitesse	21	3	63
Chips &	22	6	132
ID Tech	23	19	437
Xilinx	24	9	216
Tseng	25	1	25
Micron	26	23	598
Cyrix	27	5	135
		Total	4323

Table 4.29. Spearman's Rho for Strategies and Age.

Low-cost and age		Differentiation and age		Focus and age	
Rx*Ry	4292	Rx*Ry	4765	Rx*Ry	4323
C	5292	C	5292	C	5292
Spearman's rho	-0.61050061	Spearman's rho	-0.321734	Spearman's rho	-0.591575
Test statistic	-3.8540937	Test statistic	-1.699005	Test statistic	-3.668683
Critical value with 25 d.o.f.	2.0595	Critical value with 25 d.o.f.	2.0595	Critical value with 25 d.o.f.	2.0595
p-value <	0.001	p-value <	0.1	p-value <	0.001

Table 4.30. Spearman's Rho for Strategies and Size.

Low-cost and size		Differentiation and size		Focus and size	
Rx*Ry	4680.5	Rx*Ry	4931	Rx*Ry	4598
C	5292	C	5292	C	5292
Spearman's rho	-0.3751000	Spearman's rho	-0.221441	Spearman's rho	-0.425706
Test statistic	-2.0232277	Test statistic	-1.135392	Test statistic	-2.352329
Critical value with 25 d.o.f.	2.0595	Critical value with 25 d.o.f.	2.0595	Critical value with 25 d.o.f.	2.0595
p-value <	0.05	p-value <	0.25	p-value <	0.025

Table 4.31. Domestic Firms Classified According to Strategy.

		Focus Yes	Focus No
Low-cost	Yes	S3, Altera, Lattice, Linear, Maxim, Cyrix, Tseng, Chips & Technologies.	IC Systems, VLSI
Low-cost	No	Micron, Vitesse	Dallas

Table 4.32. MNEs Classified According to Strategy.

		Differentiation Yes	Differentiation No
Low-cost	Yes	Xilinx, Cypress, Cirrus	Intel
Low-cost	No	International Rectifier, ID Technology, Microchip, Analog	TI, AMD, National, Zilog, Atmel, LSI

CHAPTER V

CONCLUSIONS AND DISCUSSION

Overview

This chapter interprets the results generated in Chapter IV. Also, directions for future research are suggested, and, in addition, the strengths and limitations of this dissertation are discussed.

Performance in the Semiconductor Industry

Essentially, this study tries to see if the conventional wisdom that multinationals outperform other types of companies holds true in a global industry. According to theory, global industries should provide a venue that enables MNEs to fully leverage their core competencies and operational advantages, resulting in a sustainable competitive advantage. Indeed, the semiconductor industry in many ways is an "ideal case" to test this theory. The industry is characterized by a standardized product and it is associated with economies of scale. Also, in this industry differential factor costs (used in the production and distribution of this product) exist between nations, a situation that benefits firms that have global access. In short, these conditions seem to be in favor of MNEs.

Also, domestic firms are said to suffer from certain disadvantages (Barkema and Vermeulen, 1998) as "(c)ompanies that deal with relatively few competitors and customers have a narrower range of experience and narrower mental medals because

they confront a more limited range of challenges" (p. 8). Essentially, these firms develop cognitive models that are not useful when confronted with new threats and opportunities (Barr, Stimpert, and Huff, 1992). By being only exposed to the domestic market, these firms should not be able to compete effectively in the global, dynamic, and high velocity environment of semiconductor manufacturing (Eisenhardt and Schoonhoven, 1990).

However, the results suggest that this may not always be the case--domestic firms that have an international presence may be in a position to overcome their so-called disadvantages in a global industry. In the sample used in this study, one sees that on both measures of performance (ROA and ROS) domestic firms are more than holding their own with their multinational rivals. By focusing on certain niches these firms seem to have captured overall lower operating costs, leading to better financial results. As all the domestic firms used in this sample generated more than 20% of their sales in foreign markets, one can speculate that they are benefiting from having a global presence without having to deal with the extra costs associated with establishing production facilities overseas. Relatively low tariffs and trade barriers, coupled with rather low distribution and transportation costs, are quite possibly the structural reasons behind the success of the domestic firms.

The focus strategy seems to be a contributing factor to the domestic firms' fortunes, contrary to theory that suggests that only organizations that are exposed to new markets and customers will flourish (Barkema and Vermeulen, 1998). Indeed, the focus approach may lead MNEs to overlook their presence (Bartlett and Ghoshal, 1992) in the marketplace. Domestic firms may become masters of their own domain (i.e., niche) and

generate good financial returns. The large U.S. marketplace also allows them to be efficient by following low-cost strategies.

In stark contrast, the MNEs exhibit lower levels of performance (albeit not at a statistically significant level). There are many reasons why this may be the case, ranging from increased managerial complexity to cultural differences (Barkema and Vermeulen, 1997). As firms expand overseas coordination, distribution, and management costs rise (Hitt et al., 1997) and coordinating the activities of diverse geographical units may prevent them from achieving economies of scale and scope. When these costs are coupled with fluctuating exchange rates, ever changing trade and investment laws, and existing cultural differences (Kogut, 1985), MNEs are faced with multifaceted challenges that may erode financial performance, especially in the short run. In this high-tech industry, following a non-niche strategy may also be a problem, as this taxes this internal capabilities and R&D capabilities of these firms. Simply, the information processing demands offset the benefits that may accrue to MNEs operating in the global industry. This suggestion lies in stark contrast with extant theoretical arguments on the benefits of international exposure (e.g., Kobrin, 1991), that assert that exposure to numerous marketplaces enables MNEs to learn from their surroundings which, in turn, boosts their technological capabilities.

Current theoretical work also maintains that MNEs will have higher degrees of R&D and innovation (Hitt et al., 1997; Barkema and Vermeulen, 1998) than domestic competitors. Since MNEs have numerous markets which they produce and sell in, they should face lower risks and higher returns, leading to higher levels of R&D and

cannot say that domestic firms are simultaneously following low-cost and focus strategies. Accordingly, only partial support was found for Hypothesis 1a.

Hypothesis 1b's results are not statistically significant, although in the right direction. From Table 4.31, we see that although 7 of the 13 domestic firms are following the "fit" strategy, one cannot conclude that they have higher levels of ROA or ROS.

The other "fit" argument resides in Hypotheses 2a and 2b. No support, however, was found for them. Indeed, MNEs are high-cost producers relative to their domestic counterparts, and are following similar differentiation strategies. So exposure to new markets and competitors has not lead them to accelerate their level of R&D spending and marketing. There is no significant association (although Spearman's rho is in the right direction) between low-cost strategies and differentiation strategies for MNEs. The theory that large markets compel MNEs to follow joint low-cost and differentiation strategies cannot be substantiated.

Hypothesis 2b explicitly tests the "fit" argument. In Table 4.32, only 3 firms fall into the "fit" quadrant. As argued in Chapters III and IV, these small number of observations compel us to slightly change the hypothesis by including firms in the "fit" category that are classified as following only a low-cost or differentiation strategy. Here, the "fit" firms have higher levels of performance, though the difference is not statistically significant. The most successful "fit" MNE is Intel, which has a relatively low (based on the sample's median) differentiation strategy. It seems that this company is able to leverage its R&D and marketing capabilities across product lines and geographic markets. Since Intel is also following a focus strategy it may be more feasible for it to

transfer knowledge across the firm, and hence truly benefit from synergy and economies of scope. Thus, Intel has the best of both worlds--besides having low costs (i.e., economies of scale) it is able to leverage its R&D, distribution, and marketing efforts across different product lines (i.e., economies of scope), resulting in lower expenditures. So, Intel seems to be benefiting from a differentiation strategy without having to spend a lot of money. Wade (1995, 1996) identifies Intel as a firm that has pioneered one of the "dominant designs" in the microprocessor industry. This is analogous to controlling technical standards along with enabling the firm to develop a brand name. Hence, sponsoring a "dominant design" is tantamount to creating "barriers to entry" for new competitors in the microprocessor market.

In contrast, firms like Cirrus Logic and Cypress Semiconductor are following the prescribed low-cost strategies and differentiation strategies. However, their efforts at differentiation have not paid off. Simply, they have not been able to offset the higher expenses associated with the differentiation strategy by charging premium prices for their products. On the other hand, the "stuck in the middle" firms like National Semiconductor and Texas Instruments are having major problems--high costs, coupled with a weak differentiation strategy, all of which leads to low levels of ROA and ROS. It is possible that competing in too many product lines has led them to forgo economies of scale, while the costs of monitoring the internal transactions (Williamson, 1975) has precluded the transfer of competencies within these firms, ultimately negatively affecting their financial performance.

In sum, Hypotheses 1a-2b receive some support. Unfortunately, the small sample size results in statistical tests with low power. Significant differences between MNEs and domestic firms were found for the focus and low-cost strategies only. The tests of the "fit" hypotheses were in the right direction but did not approach statistical significance. Next, issues pertaining to the control variables are discussed.

Control Variables

As uncovered in Chapter IV, both age and size are associated with the focus and low-cost strategic dimensions. This, on further analysis, is not terribly surprising, since MNEs tend to be older and larger than domestic firms. Significant differences have been established for both the focus and low-cost strategies between the two groups, and this is reflected in the test for the control variables. In short, older and larger firms are less focused and have higher costs than younger and smaller firms. Next, a number of theoretical reasons are explored that help explain why this is so.

There are a number of factors that contribute to the negative associations just described. Indeed, firms are "imprinted" (Stinchcombe, 1965) with certain characteristics at their time of founding. These characteristics reflect how the organization copes with its establishment period's environmental pressures. As the environment changes, (as it has dramatically done so in the semiconductor industry) the organization fails to adapt to the new conditions, partly because of its "routines" (Nelson and Winter, 1982) that have developed over the years. Routines are easily identifiable and repetitive patterns of activity that are embodied in human and physical assets. They

can form the core competencies (Prahalad and Hamel, 1990) of a firm. However, some firms may fall into a competency trap, and these core competencies may morph into "core rigidities" (Leonard-Barton, 1992). Firms, by following their routines that were originally based on the "imprinting" phenomenon, can end up losing their competitive advantage over time. By focusing on current routines they fall victim to the competency trap as most of their activities become geared toward "exploitative" and not "exploratory" (Levinthal and March, 1993) learning. In this study, MNEs do not seem to be able to leverage the advantages linked to having a presence in numerous geographic areas and producing multiple product lines. In short, organizational inertia (Huff, Huff, and Thomas, 1992) may cause firms to resist change and single-mindedly concentrate on exploiting current capabilities, instead of exploring new technologies, procedures, and policies.

Another explanation for the negative association between age and the low-cost strategy is that past investments in plant, property, and equipment constrain the options that a firm has available to it (Ghemawat, 1991). A rapidly changing environment can lead to the quick obsolescence of both products and processes.

On the other hand, the negative association between size and the low-cost strategy can be attributed to the challenges of managing a large organization that seem to outweigh the any advantages that may accrue from economies of scale. Again, large organizations may suffer from inertia and stop learning from the environment. Their size may enable them to buffer themselves (Thompson, 1967) from the environment and directly lead to a reduction in "absorptive capacity" (Cohen and Levinthal, 1990).

Another perspective on why large organizations are inefficient comes from transaction cost economics (Williamson, 1975; 1992). This theory is based on the premise that organizations are inherently inferior (less efficient) vis-á-vis the market. Essentially, as organizations get larger they suffer from loss of incentives and deal with additional bureaucratic costs. Bureaucratic costs arise from the extra administrative effort necessary to coordinate organizational activities. A loss of incentive intensity can be attributed to internal operations being buffered from external market discipline. Indeed, large organizations may be structured in manner that encourages the formation of silos (Lessard and Zaheer, 1996)--information is not transferred and shared among organizational units, thus negating the benefits of exposure to different national environments. In high-tech environments such as the semiconductor industry the level of complexity may preclude the proper use of information (Hitt et al., 1997) in large organizations.

The focus strategy is negatively associated with age and size simply because as time passes and as they get larger, firms have more opportunity to develop new products. Firms expand their product offerings when growth in their traditional markets starts to slow down. Older firms are more likely to be confronted with this problem. Similarly, as firms get larger they may have more slack resources, leading them to develop more new products (Nohria and Gulati, 1996). Thus, they will have a wider strategic breadth than smaller firms.

Last, the differentiation strategy is not significantly associated with either the focus or the low-cost strategy and hence does not merit further discussion.

Strengths, Weaknesses, and Future Directions

Strengths

The contributions made by this dissertation are found in both the theoretical and methodological domains. From a theoretical standpoint, the hypotheses are developed using two competing and complementary approaches--IO economics and RBV of the firm. We argue that a firm's preferred business-level strategy is based on pressures emanating from the international environment and should be in line with existing internal capabilities. This resounds with McWilliams and Smart (1993), who imply that both approaches should be simultaneously considered in strategic management research. In addition, by consciously assessing the impact of globalization on firms, we are able to better capture the dynamic nature of competition that exists in the semiconductor industry. In this vein, the sample chosen to investigate the research question is appropriate, being that the semiconductor industry is an "ideal type" of a global industry. Thus, the setting provides for an arena to test whether MNEs outperform domestic firms.

Another major contribution comes from the methodological standpoint. Extant research has mostly used survey type measures to capture Porter's typology of generic strategies. Although, the scales used for the low-cost and differentiation strategies are well-established, studies have had difficulty developing the niche scale. In short, factor analyses (e.g., Dess and Davis, 1984) have not consistently produced a "niche factor," leading researchers to forgo the inclusion of this strategy in their work (e.g., Miller, 1992). On careful observation, however, the reason for a lack of findings is fairly obvious. Simply, the niche strategy can be conceptualized in three ways--by the extent of

geographic coverage, type of customers targeted, and the number of product lines offered by a firm. Obviously, these are all rather different issues, as it is quite conceivable for a firm to sell only one type of product in numerous geographic regions. Thus, in this case one of the niche items would indicate that a focus strategy is being followed, while the other item would indicate the opposite. In short, the current niche measure lacks construct validity, as its items are not tapping the same concept. This study avoids this problem by assuming that the focus strategy is based on the number of product lines that a company has.

The focus strategy measure, as developed here, thus has the potential to rekindle interest in business-level strategy. As it is an objective measure, it is relatively easy to compile data when compared to survey methods. Also, lack of replicability is not an issue with this measure. Furthermore, it is based mainly on the entropy measure, and hence utilizes an approach that many scholars in the field of strategic management are familiar with. Tentative results uncovered here suggest that the entropy measure is in need of a slight adjustment, as it truly is not measuring diversification, but is simply a providing a measure of product concentration. This study shows how a more realistic assessment of a firm's diversification level can be readily made, by simply multiplying the entropy measure by the number of SIC codes in which the firm competes in. Basically, the focus strategy devised in this study is a combination of approaches used by Barkema and Vermeulen (1998) in their study on international expansion and product diversity.

Likewise, the low-cost and differentiation strategies are composed of secondary measures. Objective indicators are "well suited for identifying realized strategy" (Snow and Hambrick, 1980, p.535) and thus do a good of controlling for perceptual and interpretive biases. They also allow for collecting data on large, heterogeneous samples. By collecting data on low-cost, differentiation, and focus strategies over a five year time span, this dissertation provides a mostly objective representation of these dimensions. This is clearly an advantage over questionnaires, which suffer from respondent recall and the tendency of respondents to recite intended and not realized strategy. A five year time period is also long enough to get a representation of the strategies being pursued by organizations.

Last, the issues being tackled here have both scholarly and practical relevance. In today's global business environment little empirical evidence exists on the costs and benefits of increasing a firm's international involvement. Most prescriptions point to the benefits of having a sizable international presence. However, as the results suggest, this condition may not be as clear-cut in the semiconductor industry.

Weaknesses

The first weakness associated with this study is the small sample size which leads to statistical tests with low power. The 27 firm sample is a convenience sample. However, these firms are profiled by Standard and Poor's and hence are representative of the semiconductor industry since they are used to guide investor decisions. Also, in exploratory research convenience samples may be used (Ferber, 1977). As noted above,

this study combines IO economics with RBV of the firm, besides developing new methods, and hence is considered to be exploratory. Nonparametric statistical techniques are employed to combat the nonnormal distribution problem arising from this small sample.

Another limitation of the study has to do with external validity. That is, can we generalize our findings to other industries and nations? We argue that a lack of external validity is not a fatal flaw for two reasons. First, the study is exploratory and our choice of the semiconductor industry was based primarily on its being an "ideal" global industry, and so the hypotheses are readily applicable to this setting. Second, Mook (1983) says that generalizability of findings may take second seat to the generalizability of theoretical conclusions.

Another problem deals with the measurement of the focus strategy. Indeed, if the Predicasts directory does not record a firm's product releases on a consistent basis the focus measure will not generate valid results. Similarly, we are assuming that this directory's product classification system represents different niches in this industry. In short, we are relying on the accuracy of the classification scheme developed by Predicasts.

There are also potential flaws with the low-cost and differentiation strategy measurement system. We are assuming that the three items used to measure each strategy contributes equally to the strategy in question. Unfortunately, there are no theoretical guidelines on establishing a "weighting system." For instance, one could say that in the low-cost strategy scale the "Gross profit margin" item should be twice as

important as the "Revenue per employee" item and so forth. Such approaches could change the results. One can also say that in the differentiation scale the "Marketing, general, and administrative expenses" item does not accurately reflect a firm's advertising intensity as it includes other costs as well. Unfortunately, publicly available accounting data tends to be coarse grained. Finally, the inventory turnover ratio may not be reflective of a differentiation strategy as it may simply indicate inefficient logistics management and/or obsolete products.

The time frame used is also important. A five-year time frame may not be long enough to truly reflect company performance. Similarly, the years 1992-1996 was a period of great industry growth, and thus the results found here may not be valid for other time periods. Also, the sampling frame included only surviving and publicly traded firms. The mortality rates (Hannan and Freeman, 1977) for smaller, domestic firms that don't have access to capital markets can be higher than that of the domestic firms profiled in our sample. Indeed, even the dichotomy of MNE versus domestic firm was based on subjective criteria. All the domestic firms have a significant international presence, generating over 20% of their sales in foreign markets. These are actually "international" firms (Bartlett and Ghoshal, 1992) and are not truly totally domestic in their orientation.

Another weakness concerns the SIC coding system. An implicit assumption behind this study is that all these firms compete in the same industry. But is a firm that produces microprocessors truly competing against a firm that produces analog transistors? Are

they really influenced by the same competitive and regulatory pressures? This is an inherent limitation existing in all studies that utilize the SIC coding system.

Last, the statistical tests here are not predictive and do not imply causality. Simply, associations between strategies, types of firms, control variables, and performance are uncovered. It would be wrong to draw conclusions that are beyond that already discussed in this chapter.

Directions for Future Research

Increasing the sample size would increase the power of the statistical tests and also provide more of a representative group of semiconductor firms. New firms that meet the following criteria can be included in this larger sample: (1) they must be publicly traded (cannot be a subsidiary) in the U.S. over a 5 year time span; (2) their primary business must be in the semiconductor industry; and (3) their actions must be covered by the Predicasts directory. A list of all semiconductor firms based in the U.S. can be obtained from Dun and Bradstreet's Million Dollar Directory.

Likewise, other industries can be investigated as well, such as pharmaceuticals, chemicals, biotechnology, and telecommunications. Indeed, if the data is collected, conducting a multi-industry study would be feasible, and would address the external validity issue. More traditional multivariate techniques (e.g., regression analysis) based on larger data sets can be employed in this setting. In addition, different time periods can be analyzed to see whether the relationships are stable. Major technological developments or international trade agreements in these industries can be used to

distinguish among time spans, as these events represent a shift in the environment (Meyer, Brooks, and Goes, 1990) that may favor some firms over others.

Last, the literature provides us with a dichotomy of industries--global and multidomestic. However, many industries are not pure types, and are found somewhere in the middle of this spectrum. Thus, classifying industries according to their degree of being global (or multidomestic) would help in theory development, as this would explicitly add more variables to the current IR framework. In the spirit of this paper, we propose a number of mostly objective indicators that could be incorporated into this framework. Indices could be developed that build on current measures of international industries that only look at intra-industry trade levels on the presence of MNEs (Morrison, 1990). Potential variables are national GDP per capita, infrastructure, education levels, cultural distances, industry growth rates, and the level of tariffs and trade barriers facing the industry.

A truly global industry (e.g., semiconductor industry) is characterized by commodity-like products and this may be why the differentiation strategy was virtually equal for MNEs and domestic firms in this study. In multidomestic industries the importance of creating a brand name is more pronounced, and this is associated with activities such as R&D and advertising, and having higher inventory levels. The research conducted to date (based on the IR framework) has been exclusively on global industries. The retailing sector is a venue that should be studied, especially in light of its growing contribution to the world's economic activity.

Conclusions

This dissertation developed measures based on secondary data to test a number of theoretically based arguments centered on determining the appropriate business-level strategies and performances of MNEs and domestic firms competing in the semiconductor industry. Some support was found for the hypotheses. Most interestingly of all, however, was a tentative finding that calls into question the assumption that MNEs will out-perform domestically oriented firms. Indeed, this relationship was not uncovered. In fact, the domestic firms are doing better on the measures of ROA and ROS, although the results do not reach statistical significance. It seems that exporting is an acceptable mode of international involvement in this global industry. The battle cry of the 1990s for U.S. businesses is "Go global". The tentative results uncovered here suggest that another battle cry might be just as appropriate--"Act local, but also think global".

REFERENCES

Abell, D. F. (1980). Defining the Business: The Starting Point of Strategic Planning. Englewood Cliffs, N.J: Prentice-Hall.

Arora, A. & Gambardella, A. (1997). Domestic markets and international competitiveness: generic and product-specific competencies in the engineering sector. Strategic Management Journal, 18 (Summer Special Issue), 53-74.

Argyris, C. (1996). Unrecognized defenses of scholars: Impact on theory and research. Organization Science, 7, 78-87.

Bain, J. (1956). Barriers to New Competition. Cambridge, MA: Harvard University Press.

Barkema, H. G. & Vermeulen, F. (1998). International expansion through start-up or acquisition: A learning perspective. Academy of Management Journal, 41, 7-26.

Barney, J. (1991). Firm resources and sustained competitive advantage. Journal of Management, 17, 99-120.

Barr, P. S., Stimpert, J. L., & Huff, A. S. (1992). Cognitive change, strategic change, and organizational renewal. Strategic Management Journal, 13, 15-36.

Bartlett, C. A. & Ghoshal, S. (1989). Managing Across Borders: The Transnational Solution. Boston, MA: Harvard University Press.

Bartlett, C. A. & Ghoshal, S. (1992). Transnational Management: Text, Cases and Readings in Cross-Border Management. Boston, MA: Irwin.

Birkinshaw, J., Morrison, A., & Hulland, J. (1995). Structural and competitive determinants of a global integration strategy. Strategic Management Journal, 16, 637-655.

Bogner, W. C., Thomas, H., & McGee, J. (1996). A longitudinal study of the competitive positions and entry paths of European firms in the U.S. pharmaceutical market. Strategic Management Journal, 17, 85-107.

Bowman, E.H. (1990). Strategy Changes: Possible Worlds and Actual Minds. In J. W. Fredrickson (ed.), Perspectives on Strategic Management, Vol. 6 New York: Harper Business, 9-37.

Buzzell, R. D., Gale, B., & Sultan, R. (1975). Market share: a key to profitability. Harvard Business Review, 51(1), 97-106.

Carpano, C., Chrisman, J. J., & Kendall, R. (1994). Strategy, environment, and performance. Journal of International Business Studies, 25, 646-656.

Carroll G. R. (1988). Density dependence in the growth of organizational populations. In G. R. Caroll (ed.) Ecological Models of Organizations. Cambridge, MA: Ballinger Publishing Company, 7-31.

Carroll G. R. & Hannan, M. T. (1995). Resource partitioning. In G.R. Caroll & M.T. Hannan (eds.) Organizations in Industry: Strategy, Structure, and Selection. New York: Oxford University Press, 215-221.

Caves, R. E. (1971). International corporations: The industrial economics of foreign investment. Economica, 38, 1-27.

Chen, M-J. (1996). Competitor analysis and interfirm rivalry: Toward a theoretical integration. Academy of Management Review, 21, 100-134.

Chrisman, J. J., Hofer, C. W. & Boulton, W.R. (1988), Toward a system for classifying business strategies. Academy of Management Review, 13, 413-428.

Cohen, W. M. & Levinthal, D.A. (1990). Absorptive capacity: A new perspective on learning and innovation. Administrative Science Quarterly, 35, 128-152.

Collis, D. J. (1991). A resource-based analysis of global competitors: The case of the ball bearings industry. Strategic Management Journal, 12, 49-68.

Conner, K. R. (1991). A historical comparison of resource-based theory and five schools of thought within industrial organization economics. Do we have a new theory of the firm? Journal of Management, 17, 171-154.

Conover, W. J. (1980). Practical Nonparametric Statistics. 2nd edition. New York: John Wiley & Sons.

Day, G. S. (1981). Strategic market analysis and definition: An integrated approach. Strategic Management Journal, 2, 281 - 299.

Daniels, J. D., & Bracker, J. (1989). Profit performance: Do foreign operations make a difference? Management International Review, 29 (1), 46-56.

D'Avenni, R. A. (1994). Hypercompetition. New York: Free Press.

Dess, G. G. & Davis, P. S. (1984). Porter's (1980) generic strategies as determinants of strategic group membership and organizational performance. Academy of Management Journal, 27, 467-488.

Dess, G .G. & Beard, D. W. (1984). Dimensions of organizational task environments. Administrative Science Quarterly, 29, 52-73.

Dess, G. G., Ireland, D. & Hitt, M. A. (1990). Industry effects and strategic management research. Journal of Management, 16, 7-27.

DiMaggio, P. & Powell, W. (1983). The iron cage revisited: Institutional isomorphism and collective rationality. American Sociological Review, 48, 147-160.

Duncan, R. B. (1972). Characteristics of organizational environments and perceived environmental uncertainty. Administrative Science Quarterly, 17, 313-327.

Dunning, J. (1988). The eclectic paradigm of international production: A restatement and some possible extensions. Journal of International Business Studies, 19, 1-32.

Eisenhardt, K. M. & Schoonhoven, C. B. (1996). Resource-based view of strategic alliance formation: Strategic and social effects in entrepreneurial firms. Organization Science, 7, 136 - 150.

Emery, F. E. & Trist, E. L. (1965). The causal texture of organizational environments. Human Relations, 18, 21-32.

Fahey, L. & Christensen, H. K. (1986). Evaluating the research on strategy content. Journal of Management, 12, 167-183.

Ferber, R. (1977). Research by convenience. Journal of Consumer Research, 3, 21-33.

Fladmoe-Lindquist, R. & Tallman, S. (1994). Resource-based strategy and competitive advantage among multinationals. In Hans B. Thorelli (ed.) Advances in Strategic Management. Vol.10, Greenwich, CT: JAI Press, 45-72.

Galbraith, C. & Schendel, D. (1983). An empirical analysis of the strategy types. Strategic Management Journal, 4, 153-173.

Geringer, J. M., Beamish, P. W., and da Costa, D. (1989). Diversification strategy and internationalization: implications for MNE performance. Strategic Management Journal, 19, 109-119.

Ghemawat, P. (1991). Commitment: The Dynamic of Strategy. New York: Free Press.

Ghoshal, S. & Bartlett, C. A. (1990). The multinational corporation as an interorganizational network. Academy of Management Review, 15, 603-625.

Grant, R. M., Jammine, A. P., & Thomas, H. (1988). Diversity, diversification, and profitability among British manufacturing companies. Academy of Management Journal, 31, 771-801.

Hall, R. H. (1990). Organizations: Structures, Processes, and Outcomes. 6th edition. Englewood Cliffs, NJ: Prentice Hall.

Hambrick, D. C. (1983). An empirical typology of mature industrial product environments. Academy of Management Journal, 26, 213-230.

Hambrick, D. C. (1989). Guest editor's introduction: putting top management back in the strategy picture. Strategic Management Journal, 10, 5-15.

Hamel, G. (1991). Competition for competence and interpartner learning within international strategic alliances. Strategic Management Journal, 12 (Summer Special Issue), 83-103.

Herbert, T.T. & Deresky, H. (1987). Generic strategies: An empirical investigation of typology validity and strategy content. Strategic Management Journal, 8, 135-147.

Hill, C. W. L. (1988). Differentiation versus low cost or differentiation and low cost. Academy of Management Review, 13, 401-412.

Hill, C. W. L. & Snell, S. A. (1989). Effects of ownership structure and control on corporate productivity. Academy of Management Journal, 32, 25-46.

Hitt, M. A., Hoskisson, R. E., & Kim, H. (1997). International diversification: Effects on innovation and firm performance in product-diversified firms. Academy of Management Journal, 40, 767-798.

Hofer, C. & Schendel, D. (1978). Strategy Formulation: Analytical Concepts. St. Paul, MN: West Publishing.

Huff, J. O., Huff, A. S. & Thomas, H. (1993). Strategic renewal and the interaction of cumulative stress and inertia. Strategic Management Journal, 13, 55-75.

Hymer, S. (1960). The International Operations of National Firms: A Study of Direct Foreign Investment. Unpublished Ph.D. dissertation, MIT

Iman, R. L. & Conover, W. J. (1989). Modern Business Statistics. 2nd edition. New York: John Wiley & Sons.

Jensen, M. C. & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs, and ownership structure. Journal of Financial Economics, 3, 370-397.

Jones, G. R. & Hill, C. W. L. (1988). A transaction cost analysis of strategy-structure choice. Strategic Management Journal, 9, 159-172.

Karnani, A. & Wernerfelt, B. (1985). Multiple point competition. Strategic Management Journal, 6, 87-96.

Katz, D. & Kahn. R. L. (1966). The Social Psychology of Organizations. Revised edition. New York: John Wiley and Sons, Inc.

Kelly, G. & Phillippatos, G. (1982). Comparative analysis of the foreign investment evaluation practices by US based manufacturing multinational companies. Journal of International Business Studies, 13, 19-42.

Kim, D-J. & Kogut, B. (1996). Technological platforms and diversification. Organization Science, 7, 283-301.

Kim, W. C., Hwang, P., & Burgers, W. P. (1989). Global diversification strategy and corporate profit performance. Strategic Management Journal, 10, 45-57.

Kim, W. C., Hwang, P., & Burgers, W. P. (1993). Multinationals' diversification and the risk-return trade-off. Strategic Management Journal, 14, 275-286.

Kindleberger, C. P. (1969). American Business Abroad: Six Lectures on Direct Investments. New Haven, CT: Yale University Press.

Kobrin, S .J. (1991). An empirical analysis of the determinants of global integration. Strategic Management Journal, 12 (Summer Special Issue), 17-31.

Kogut, B. (1991). Country capabilities and the permeability of borders. Strategic Management Journal, 12 (Summer Special Issue), 33-47.

Kogut, B. (1985). Designing global strategies: Comparative and competitive value added chains (part 1). Sloan Management Review, 27 (Summer), 15-28.

Kotha, S. & Vadlamani, B. L. (1995). Assessing generic strategies: An empirical investigation of two competing typologies in discrete manufacturing industries. Strategic Management Journal, 16, 75-83.

Lawrence, P. R., & Lorsch, J. W. (1967). Organization and Environment. Cambridge, MA: Harvard University Press.

Leftwich, R. B. (1974). U.S. multinational companies: profitability, financial leverage, and effective income tax rates. Survey of Current Business, 54(5), 27-36.

Leonard-Barton, D. (1992). Core capabilities and core rigidities: A paradox in managing product development. Strategic Management Journal, 13, 111-125.

Lessard, D. R. & Zaheer, S. (1996). Breaking the silos: Distributed knowledge and strategic responses to volatile exchange rates. Strategic Management Journal, 17, 513-533.

Levinthal, D. A. & March, J. G. (1993). The myopia of learning. Strategic Management Journal, 14, 95-112.

Lippman, S. A. & Rumelt, R. P. (1982). Uncertain imitability: An analysis of interfirm differences in efficiency under competition. Bell Journal of Economics, 13, 418-438.

Mahoney, J. T. & Pandian, J. R. (1992). The resource-based view within the conversation of strategic management. Strategic Management Journal, 13, 363-380.

Maijoor, S. & van Witteloostuijn, A. (1996). An empirical test of the resource-based theory: strategic regulation in the Dutch audit industry. Strategic Management Journal, 17, 549-569.

Markides, C. (1995). Diversification, restructuring, and economic performance. Strategic Management Journal, 16, 101-118.

McWilliams, A. & Smart, D. L. (1993). Efficiency vs. structure conduct-performance: Implications for strategy research and practice. Journal of Management, 19, 63-78.

Melin, L. (1992). Internationalization as a strategy process. Strategic Management Journal, 13, 99-118.

Meyer, A. D., Brooks, G. R. & Goes, J. B. (1990). Environmental jolts and industry revolutions: Organizational responses to discontinuous change. Strategic Management Journal, 11, 93-110.

Meyer, J. W. & Rowan, B. (1977). Institutionalized organizations: Formal structure as myth and ceremony. American Journal of Sociology, 83, 340-363.

Michel, A. & Shaked, I. (1986). Multinational corporations versus domestic corporations: financial performance and characteristics. Journal of International Business Studies, 17, 89-100.

Miles, R. & Snow, C. (1978). Organizational Strategy, Structure, and Process. New York: McGraw-Hill.

Miller, A. & Dess, G. G. (1993). Assessing Porter's (1980) model in terms of its generalizability, accuracy, and simplicity. Journal of Management Studies, 30, 553-585.

Miller, D. (1988). Relating Porter's business strategies to environment and structure: analysis and performance implication. Academy of Management Journal, 31, 280-208.

Miller, D. (1992). Generic strategies: classification, combination and context. In P. Shrivastava, A. Huff & J. Dutton (eds.), Advances in Strategic Management, Vol.8. Greenwich, CT: JAI Press, 391-408.

Mintzberg, H. (1978). Patterns in strategy formulation. Management Science, 24, 921-933.

Mintzberg, H. (1990). The design school: Reconsidering the basic premises of strategic management. Strategic Management Journal, 11, 171-195.

Mitchell, W., Shaver, J. M., & Yeung, B. (1992). Getting there in a global industry: Impacts on performance of changing international presence. Strategic Management Journal, 13, 419-432..

Mitchell, W., Shaver, J. M., & Yeung, B. (1993). Performance after changes of international presence in domestic and transition industries. Journal of International Business Studies, 24, 247-269.

Mook, D. G. (1983). In defense of external invalidity. American Psychologist, (April), 379-387.

Morrison, A. (1990). Strategies in Global Industries: How U.S. Businesses Compete. Westport, CT: Quorum Books.

Morrison, A. & Roth, K. (1992). A taxonomy of business level strategies in global industries. Strategic Management Journal, 13, 399-418.

Morrison, A. & Roth, K. (1993). Relating Porter's configuration/coordination framework to competitive strategy and structural mechanisms: Analysis and implications. Journal of Management, 19, 797-818.

Murray, A. I. (1988). A contingency view of Porter's generic strategies. Academy of Management Review, 13, 637-648.

Nelson, R. R. & Winter, S. G. (1982). An Evolutionary Theory of Economic Change. Cambridge, MA: Harvard University Press.

Nohria, N. & Gulati, R. (1996). Is slack good or bad for innovation. Academy of Management Journal, 39, 1245-1264.

Oliver, C. (1990). Determinants of interorganizational relationships: Integration and future directions. Academy of Management Review, 15, 241-265.

Oliver, C. (1991). Strategic responses to institutional processes. Academy of Review Management, 16, 145-179.

Osborne, R. N. & Hagedoorn, J. (1997). The institutionalization and evolutionary dynamics of interorganizational alliances and networks. Academy of Management Journal, 40, 261-278.

Palepu, K. (1985). Diversification strategy, profit performance, and the entropy measures. Strategic Management Journal, 6, 239-255.

Porter, M. E. (1980). Competitive Strategy. New York: Free Press.

Porter, M .E. (1986). Changing patterns of international competition. California Management Review, 28, 9-40.

Porter, M. E. (1990). The Competitive Advantage of Nations. New York: Free Press.

Prahalad, C. K. & Doz, Y. L. (1987). The Multinational Mission. New York: Free Press.

Prahalad, C. K. & Hamel, G. (1990). The core competence of the corporation. Harvard Business Review, (May-June), 79-93.

Ramaswamy, R. (1993). Multinationality and performance: an empirical examination of the moderating effects of configuration, Academy of Management Best Paper. Proceedings, 142-146.

Robins, J. & Wiersema, M. F. (1995). A resource-based approach to the multibusiness firm: Empirical analysis of portfolio interrelationships and corporate financial performance. Strategic Management Journal, 16, 277 -299.

Robinson, R. & Pearce, J. (1988). Planned patterns of strategic behavior and their relationship to business-unit performance. Strategic Management Journal, 9, 43-60.

Rosenberg, N. (1963). Technological change in the machine tool industry, 1884-1910. Journal of Economic History, 33, Reprinted in Perspectives on Technology, Cambridge, U.K.: Cambridge University Press.

Rosenzweig, P. M. & Singh, J. V. (1991). Organizational environments and the multinational enterprise. Academy of Management Review, 16, 340-361.

Roth, K. & Morrison, A. (1990). An empirical analysis of the integration-responsiveness framework in global industries. Journal of International Business Studies, 21, 541-564.

Roth, R. & Ricks, D. A. (1994). Goal configuration in a global industry context. Strategic Management Journal, 15, 103-120.

Rumelt, R. P. (1991). How much does industry matter? Strategic Management Journal, 12, 167-185.

Schendel, D. & Hofer, C. (1979). Introduction. In C. Hofer and D. Schendel (eds.), Strategic Management. Boston, MA: Little, Brown, 1-13.

Schoonhoven C. K., Eisenhardt, K. M., & Lyman, K. (1990). Speeding products to market: Waiting time to first product introductions in new firms. Administrative Science Quarterly, 35, 177- 207.

Selznick, P. (1957). Leadership in Administration. New York: Harper and Row.

Severn, A.K., and Laurence, M.M. (1974). Direct investment, research intensity, and profitability. Journal of Financial and Quantitative Analysis, 9(2), 181-190.

Snow, C. C. & Hambrick, D. C. (1980). Measuring organizational strategies: Some theoretical and methodological problems. Academy of Management Review, 5, 527-536.

Staw, B. M. & Szwajkowski, E. (1975). The scarcity-munificence component of organizational environments and the commission of illegal acts. Administrative Science Quarterly, 20, 501-524.

Stinchcombe, A. L. (1965).Social structure and organizations. In J. G. March (ed.) Handbook of Organizations. Chicago, IL: Rand McNally, 142-193.

Stopford, J. M. (1992). Preface. In J. M. Stopford (ed.) Directory of Multinationals. New York: Stockton Press, 1.

Stopford, J. M. & Wells, L. T. (1972). Managing the Multinational Enterprise. New York: Basic Books.

Suchman, M. (1995). Managing legitimacy: Strategic and institutional approaches. Academy of Management Review, 20, 571-610.

Summer, C. E., Bettis, R. A., Dunhaime, I. H., Grant, J. H., Hambrick, D. C., Snow, C. C. & Zeithaml, C. P. (1990). Doctoral education in the field of business policy and strategy. Journal of Management, 16, 361-398.

Sundaram, A. K. & Black, J. S. (1992). The environment and the internal organization of multinational enterprises. Academy of Management Review, 17, 729-757.

Tallman, S. & Li, J. (1996). Effects of international diversity and product diversity on the performance of multinational firms. Academy of Management Journal, 39, 179-196.

Thompson, J. D. (1967). Organizations in Action. New York: McGraw-Hill.

Thompson, A. A. & Strickland, A. J. (1995). Crafting and Implementing Strategy. 6th edition. Boston, MA: Irwin.

Venkatraman, N. (1989). The concept of fit in strategy research: Toward verbal and statistical correspondence. Academy of Management Review, 14, 423-444.

Wade, J. (1995). Dynamics of organizational communities and technological bandwagons: An empirical investigation of community evolution in the microprocessor market. Strategic Management Journal, 16, 111-133.

Wade, J. (1996). A community-level analysis of sources and rates of technological variation in the microprocessor market, Academy of Management Journal, 39, 1218-1244.

Walter, G. A. & Barney, J. B. (1990). Management objectives in mergers and acquisitions, Strategic Management Journal, 11, 79-86.

Wernerfelt, B. (1984). A resource-based view of the firm. Strategic Management Journal, 5, 171-180.

Wernerfelt, B. (1995). The resourc- based view of the firm: Ten years after. Strategic Management Journal, 16, 171-174

Williamson, O. E. (1975). Markets and Hierarchies: Analysis and Antitrust Implications. New York: Free Press.

Williamson, O. E. (1992). Strategizing, economizing, and economic organization. Strategic Management Journal, 12, 75-94.

Young, Y., Smith K. G., & Grimm, C. M. (1996). "Austrian" and industrial organization perspectives on firm-level competitive activity and performance. Organization Science, 7, 243-254.

Zaheer, S. & Mosakowski, E. (1997). The dynamics of the liability of foreignness: A global study of survival in financial services. Strategic Management Journal, 18, 439-464.

Zahra, S. A. & Chaples, S. S. (1993). Blind spots in competitive analysis. Academy of Management Executive, 7, 7-28.

APPENDIX A

TYPES OF CHIPS

This appendix briefly describes the four major families of semiconductors. They are analog semiconductors, microprocessors, memory chips, and logic devices.

Analog Semiconductors

These are also known a linear circuits. Essentially they measure real world phenomena instead of binary data. They are used in a number of applications. Types of analog chips include amplifiers, voltage regulators, interface circuits, and data converters.

Microprocessors

They are commonly known as central processing units (CPUs). Though mostly associated with being the "brains" of PCS, they have numerous other applications such as in telecommunications, automotive, consumer electronics, and industrial uses.

Memory

Memory chips store data and software programs. They are classified as being volatile and nonvolatile, the distinction being that nonvolatile chips keep all their stored data when power is interrupted, while volatile chips lose data when power is cut. Major types of memory chips include dynamic random access memory, static random access memory, and flash memories.

Logic Devices

Logic devices manage the interchange and the manipulation of digital interchange within a system. Many logic devices are custom made according to the customer's needs. Types of logic devices include complex programmable logic devices, field programmable gate arrays, and application specific integrated circuits.

APPENDIX B

MEASURES FOR LOW-COST,

DIFFERENTIATION, AND PERFORMANCE

Table B.1. ADVANCED MICRO DEVICES.

Low Cost	1992	1993	1994	1995	1996	Avg	z-Score
Total Sales	1514489	1648280	2155453	2468379	1953019		
CGS	746486	789564	1013589	1417007	1440828		
Fixed Assets	693283	904326	1264211	1641634	1787402		
Employees	12000	12030	11800	12730	12200		
GPM	0.507104	0.520977	0.529756	0.425936	0.262256	0.449206	-0.06828
Rev / Emp	126.2074	137.0141	182.6655	193.9025	160.0835	159.9746	-0.68165
FA Ratio	2.184518	1.822661	1.704979	1.503611	1.092658	1.661685	-0.84724
Sum of z-Scores							-1.59717

Differentiation	1992	1993	1994	1995	1996	Avg	z-Score
R & D	227860	262802	295326	416521	400703		
MG&A expenses	270198	290861	377503	412651	364798		
Inventory	86048	104050	128698	155986	154010		
R&D / TS	0.150453	0.15944	0.137013	0.168743	0.205171	0.164164	0.65421
MG&A / TS	0.178409	0.176463	0.175139	0.167175	0.186787	0.176794	0.123984
Inventory / TS	0.056817	0.063126	0.059708	0.063194	0.078857	0.06434	-1.0069
Sum of z-Scores							-0.22871

Profitability	1992	1993	1994	1995	1996	Avg	z-score
Net Income	245011	228781	305226	216316	-68950	185276.8	
Total Assets	1448095	1929231	2445702	3078467	3145283	2409356	
ROS	0.161778	0.1388	0.141606	0.087635	-0.0353	0.098903	0.03905
ROA	0.169195	0.118587	0.124801	0.070267	-0.02192	0.092186	0.061404

Table B.2. ALTERA CORP.

Low Cost	1992	1993	1994	1995	1996	Avg	z-Score
Total Sales	101470	140279	198796	401598	497306		
CGS	43994	58470	77672	158808	191958		
Fixed Assets	14284	13693	18212	54846	89804		
Employees	477	527	667	881	918		
GPM	0.566433	0.583188	0.609288	0.60456	0.614004	0.595495	1.368967
Rev / Emp	212.7254	266.1841	298.045	455.8434	541.7277	354.9051	0.288416
FA Ratio	7.103752	10.24458	10.91566	7.322284	5.537682	8.224791	0.988037
Sum of z-Scores							2.64542

Differentiation	1992	1993	1994	1995	1996	Avg	z-Score
R & D	15826	16847	45994	33849	49513		
MG&A expenses	25147	35202	45771	74658	87742		
Inventory	15573	16242	38477	55421	75798		
R&D / TS	0.155967	0.120096	0.231363	0.084286	0.099562	0.138255	0.07858
MG&A / TS	0.247827	0.250943	0.230241	0.185902	0.176435	0.21827	1.245307
Inventory / TS	0.153474	0.115784	0.19355	0.138001	0.152417	0.150645	0.564342
Sum of z-Scores							1.88823

Profitability	1992	1993	1994	1995	1996	Avg	z-score
Net Income	11500	21195	14608	86871	109135	48661.8	
Total Assets	114600	155757	213882	715554	778212	395601	
ROS	0.113334	0.151092	0.073482	0.216313	0.219452	0.154735	0.645326
ROA	0.100349	0.136077	0.068299	0.121404	0.140238	0.113274	0.325847

Table B.3. ANALOG DEVICES.

Low Cost	1992	1993	1994	1995	1996	Avg	z-Score
Total Sales	567315	666319	773474	941546	1193786		
CGS	301678	350852	394448	464571	593033		
Fixed Assets	237423	248430	281815	431962	583322		
Employees	5213	5300	5400	6000	6900		
GPM	0.468235	0.473447	0.490031	0.506587	0.503233	0.488307	0.315876
Rev / Emp	108.827	125.7206	143.2359	156.9243	173.0125	141.5441	-0.77337
FA Ratio	2.389469	2.68212	2.744616	2.179696	2.04653	2.408486	-0.6384
Sum of z-Scores							-1.0959

Differentiation	1992	1993	1994	1995	1996	Avg	z-Score
R & D	88172	94107	106869	134265	177772		
MG&A expenses	151293	158675	170341	184943	195842		
Inventory	142453	150422	130726	142962	218877		
R&D / TS	0.15542	0.141234	0.138168	0.142601	0.148914	0.145267	0.234375
MG&A / TS	0.266683	0.238137	0.220228	0.196425	0.164051	0.217105	1.213815
Inventory / TS	0.2511	0.225751	0.169011	0.151838	0.183347	0.196209	1.393873
Sum of z-Scores							2.842063

Profitability	1992	1993	1994	1995	1996	Avg	z-score
Net Income	14935	44457	74496	119270	171901	85011.8	
Total Assets	561867	678492	815871	1001648	1515698	914715.2	
ROS	0.026326	0.06672	0.096314	0.126675	0.143996	0.092006	-0.03584
ROA	0.026581	0.065523	0.091309	0.119074	0.113414	0.08318	-0.05153

Table B.4. ATMEL CORP.

Low Cost	1992	1993	1994	1995	1996	Avg	z-Score
Total Sales	139801	221724	375093	634241	1070288		
CGS	80409	121166	195955	323530	539215		
Fixed Assets	28887	90207	264800	472285	867423		
Employees	991	1282	1282	2978	3914		
GPM	0.424832	0.453528	0.477583	0.489894	0.496196	0.468407	0.120363
Rev / Emp	141.0706	172.9516	292.5842	212.9755	273.4512	218.6066	-0.38987
FA Ratio	4.839582	2.457947	1.416514	1.34292	1.233871	2.258167	-0.68044
Sum of z-Scores							-0.94995

Differentiation	1992	1993	1994	1995	1996	Avg	z-Score
R & D	18290	25583	43035	69795	110239		
MG&A expenses	22081	30875	48301	73474	115362		
Inventory	41401	33499	34975	48452	70320		
R&D / TS	0.130829	0.115382	0.114732	0.110045	0.102999	0.114797	-0.44258
MG&A / TS	0.157946	0.13925	0.128771	0.115846	0.107786	0.12992	-1.14333
Inventory / TS	0.296142	0.151084	0.093244	0.076394	0.065702	0.136513	0.307058
Sum of z-Scores							-1.27885

Profitability	1992	1993	1994	1995	1996	Avg	z-score
Net Income	13394	30017	59450	113693	201722	83655.2	
Total Assets	183450	300882	540946	919621	1455914	680162.6	
ROS	0.095808	0.13538	0.158494	0.179258	0.188475	0.151483	0.610014
ROA	0.073012	0.099763	0.1099	0.12363	0.138554	0.108972	0.271902

Table B.5. CHIPS & TECHNOLOGIES INC.

Low Cost	1992	1993	1994	1995	1996	Avg	z-Score
Total Sales	141106	97874	73444	104731	150788		
CGS	124145	73149	46864	64875	89852		
Fixed Assets	25897	13059	10325	10550	11223		
Employees	724	529	209	180	209		
GPM	0.1202	0.252621	0.361908	0.380556	0.404117	0.30388	-1.49606
Rev / Emp	194.8978	185.017	351.4067	581.8389	721.4737	406.9268	0.547301
FA Ratio	5.448739	7.494755	7.11322	9.927109	13.43562	8.683889	1.116417
Sum of z-Scores							0.167656

Differentiation	1992	1993	1994	1995	1996	Avg	z-Score
R & D	45739	22633	11793	13344	19837		
MG&A expenses	46767	31475	16136	19193	21604		
Inventory	19256	5244	5845	11667	10197		
R&D / TS	0.324146	0.231246	0.160571	0.127412	0.131556	0.194986	1.338992
MG&A / TS	0.331432	0.321587	0.219705	0.18326	0.143274	0.239851	1.828797
Inventory / TS	0.136465	0.053579	0.079584	0.1114	0.067625	0.089731	-0.54465
Sum of z-Scores							2.623135

Profitability	1992	1993	1994	1995	1996	Avg	z-score
Net Income	-63873	-49055	2714	9388	25750	-15015.2	
Total Assets	118872	64806	54620	85767	108071	86427.2	
ROS	-0.45266	-0.50121	0.036953	0.089639	0.17077	-0.1313	-2.46072
ROA	-0.53733	-0.75695	0.049689	0.109459	0.238269	-0.17937	-3.34395

Table B.6. CIRRUS LOGIC INC.

Low Cost	1992	1993	1994	1995	1996	Avg	z-Score
Total Sales	354770	557299	889022	1146945	917200		
CGS	193357	295582	512509	774350	598795		
Fixed Assets	46881	69687	100244	170248	130855		
Employees	1658	1809	2331	3151	2135		
GPM	0.454979	0.469617	0.423514	0.324859	0.347149	0.404023	-0.51218
Rev / Emp	213.9747	308.0702	381.3908	363.994	429.6019	339.4063	0.211286
FA Ratio	7.567458	7.997173	8.868581	6.736907	7.009285	7.635881	0.823357
Sum of z-Scores							0.522459

Differentiation	1992	1993	1994	1995	1996	Avg	z-Score
R & D	72671	126632	165622	238791	230786		
MG&A expenses	54063	91887	126666	165267	126722		
Inventory	48497	73123	103642	134502	127252		
R&D / TS	0.20484	0.227225	0.186297	0.208197	0.25162	0.215636	1.797763
MG&A / TS	0.152389	0.164879	0.142478	0.144093	0.138162	0.1484	-0.64368
Inventory / TS	0.1367	0.13121	0.11658	0.11727	0.13874	0.1281	0.153885
Sum of z-Scores							1.307964

Profitability	1992	1993	1994	1995	1996	Avg	z-score
Net Income	44632	45368	61402	36183	-46156	28285.8	
Total Assets	256412	502223	673535	917577	1136821	697313.6	
ROS	0.125805	0.081407	0.069067	0.031547	-0.05032	0.051501	-0.47569
ROA	0.174064	0.090334	0.091164	0.039433	-0.0406	0.070879	-0.20579

Table B.7. CYPRESS SEMICONDUCTOR CORP.

Low Cost	1992	1993	1994	1995	1996	Avg	z-Score
Total Sales	272242	304512	406359	596071	528385		
CGS	158159	179821	222620	276160	305174		
Fixed Assets	120996	133920	201590	336593	437566		
Employees	1400	1262	1423	1859	2171		
GPM	0.41905	0.409478	0.452159	0.536699	0.42244	0.447965	-0.01796
Rev / Emp	194.4586	241.2932	285.565	320.6407	243.3832	257.0681	-0.1343
FA Ratio	2.250008	2.273835	2.01577	1.770895	1.207555	1.903613	-0.59424
Sum of z-Scores							-0.7465

Differentiation	1992	1993	1994	1995	1996	Avg	z-Score
R & D	64951	49798	53188	71667	84334		
MG&A expenses	45068	46344	52759	71273	64301		
Inventory	40479	29285	28372	28978	53107		
R&D / TS	0.238578	0.163534	0.130889	0.120232	0.159607	0.162568	0.206729
MG&A / TS	0.165544	0.152191	0.129833	0.119571	0.121693	0.137767	-0.2
Inventory / TS	0.148688	0.09617	0.06982	0.048615	0.100508	0.09276	-0.22472
Sum of z-Scores							-0.21799

Profitability	1992	1993	1994	1995	1996	Avg	z-score
Net Income	-21010	8043	50472	102477	53029	38602.2	
Total Assets	320504	340648	555699	750728	794047	552325.2	
ROS	-0.07717	0.026413	0.124205	0.171921	0.100361	0.069145	-0.28409
ROA	-0.06555	0.023611	0.090826	0.136504	0.066783	0.050434	-0.46216

Table B.8. CYRIX CORP.

Low Cost	1992	1993	1994	1995	1996	Avg	z-Score
Total Sales	72898	125108	246098	228012	183825		
CGS	28003	49009	120721	142063	131453		
Fixed Assets	10819	20315	38047	98307	85585		
Employees	229	272	309	389	391		
GPM	0.615861	0.608266	0.50946	0.376949	0.284901	0.479087	0.225299
Rev / Emp	318.3319	459.9559	796.4337	586.1491	470.1407	526.2022	1.140874
FA Ratio	6.737961	6.158405	6.468263	2.319387	2.147865	4.766376	0.020943
Sum of z-Scores							1.387116

Differentiation	1992	1993	1994	1995	1996	Avg	z-Score
R & D	8322	15731	24755	29100	32400		
MG&A expenses	23384	30513	44858	39100	53100		
Inventory	2716	10161	18476	12273	24432		
R&D / TS	0.11416	0.125739	0.10059	0.127625	0.176255	0.128874	-0.12985
MG&A / TS	0.320777	0.243893	0.182277	0.171482	0.288862	0.241458	1.872237
Inventory / TS	0.037258	0.081218	0.075076	0.053826	0.132909	0.076057	-0.79359
Sum of z-Scores							0.948805

Profitability	1992	1993	1994	1995	1996	Avg	z-score
Net Income	8413	19615	37577	15612	-25862	11071	
Total Assets	50270	114728	196134	268785	299342	185851.8	
ROS	0.115408	0.156785	0.152691	0.06847	-0.14069	0.070533	-0.26902
ROA	0.167356	0.17097	0.191588	0.058084	-0.0864	0.10032	0.163413

Table B.9. DALLAS SEMICONDUCTOR CORP.

Low Cost	1992	1993	1994	1995	1996	Avg	z-Score
Total Sales	120155	156869	181432	233274	288354		
CGS	59567	78051	90289	117615	157056		
Fixed Assets	56177	70009	85391	106827	138899		
Employees	693	748	821	1078	1348		
GPM	0.504249	0.502445	0.502353	0.495808	0.455336	0.492038	0.352535
Rev / Emp	173.3838	209.7179	220.989	216.3952	213.9125	206.8797	-0.44823
FA Ratio	2.138865	2.240698	2.12472	2.183661	2.075998	2.152788	-0.70991
Sum of z-Scores							-0.8056

Differentiation	1992	1993	1994	1995	1996	Avg	z-Score
R & D	16547	19402	22651	28602	34974		
MG&A expenses	17712	19402	26584	35483	42175		
Inventory	25825	30605	40453	48290	49629		
R&D / TS	0.137714	0.123683	0.124846	0.122611	0.121288	0.126028	-0.19306
MG&A / TS	0.14741	0.123683	0.146523	0.152109	0.146261	0.143197	-0.78436
Inventory / TS	0.214931	0.195099	0.222965	0.20701	0.172111	0.202423	1.507
Sum of z-Scores							0.529585

Profitability	1992	1993	1994	1995	1996	Avg	z-score
Net Income	18552	25591	29748	36682	38663	29847.2	
Total Assets	156247	186544	221227	272425	313863	230061.2	
ROS	0.154401	0.163136	0.163962	0.157249	0.134082	0.154566	0.643492
ROA	0.118735	0.137185	0.134468	0.13465	0.123184	0.129644	0.531139

Table B.10. INTEGRATED CIRCUIT SYSTEMS.

Low Cost	1992	1993	1994	1995	1996	Avg	z-Score
Total Sales	36536	77577	93824	104385	100485		
CGS	17449	37312	45798	50530	62547		
Fixed Assets	3409	10293	12953	13358	14628		
Employees	97	216	279	233	206		
GPM	0.522416	0.519033	0.511873	0.515927	0.377549	0.48936	0.326219
Rev / Emp	376.6598	359.1528	336.2867	448.0043	487.7913	401.579	0.520688
FA Ratio	10.71751	7.53687	7.243419	7.814418	6.86936	8.036316	0.935332
Sum of z-Scores							1.782239

Differentiation	1992	1993	1994	1995	1996	Avg	z-Score
R & D	6767	9156	10647	11350	12073		
MG&A expenses	6650	12384	18269	20664	19781		
Inventory	3063	8316	14394	15504	17059		
R&D / TS	0.185215	0.118025	0.113478	0.108732	0.120147	0.129119	-0.12439
MG&A / TS	0.182012	0.159635	0.194716	0.197959	0.196855	0.186236	0.379233
Inventory / TS	0.083835	0.107197	0.153415	0.148527	0.169767	0.132548	0.234871
Sum of z-Scores							0.489719

Profitability	1992	1993	1994	1995	1996	Avg	z-score
Net Income	3822	10690	12218	4923	3915	7113.6	
Total Assets	24299	55034	73452	82182	90967	65186.8	
ROS	0.104609	0.137799	0.130223	0.047162	0.038961	0.091751	-0.03862
ROA	0.15729	0.194244	0.16634	0.059904	0.043038	0.124163	0.462401

Table B.11. INTEGRATED DEVICE TECH INC.

Low Cost	1992	1993	1994	1995	1996	Avg	z-Score
Total Sales	236263	330462	422190	679497	537213		
CGS	132285	159627	179652	293695	325668		
Fixed Assets	118837	120838	178780	415214	424217		
Employees	2052	2159	2615	2965	4236		
GPM	0.440094	0.516958	0.574476	0.567776	0.393782	0.498617	0.417174
Rev / Emp	115.1379	153.0625	161.4493	229.1727	126.8208	157.1287	-0.69582
FA Ratio	1.988127	2.734752	2.361506	1.636498	1.266364	1.997449	-0.75335
Sum of z-Scores							-1.03199

Differentiation	1992	1993	1994	1995	1996	Avg	z-Score
R & D	53461	64237	78376	133317	151420		
MG&A expenses	39511	54329	64647	88752	80812		
Inventory	27237	29855	37459	46630	47618		
R&D / TS	0.226277	0.194385	0.185642	0.1962	0.281862	0.216873	1.825257
MG&A / TS	0.167233	0.164403	0.153123	0.130614	0.150428	0.15316	-0.51499
Inventory / TS	0.115283	0.090343	0.088725	0.068624	0.088639	0.090323	-0.53387
Sum of z-Scores							0.776398

Profitability	1992	1993	1994	1995	1996	Avg	z-score
Net Income	5336	40165	78302	120170	-42272	40340.2	
Total Assets	239994	349751	561975	939434	903584	598947.6	
ROS	0.022585	0.121542	0.185466	0.176851	-0.07869	0.085551	-0.10593
ROA	0.022234	0.114839	0.139334	0.127917	-0.04678	0.071508	-0.19789

Table B.12. INTEL CORP.

Low Cost	1992	1993	1994	1995	1996	Avg	z-Score
Total Sales	5844000	8782000	1.2E+07	1.6E+07	2.1E+07		
CGS	2557000	3252000	5576000	7811000	9164000		
Fixed Assets	2816000	3996000	5367000	7471000	8487000		
Employees	24350	29500	32600	41600	48500		
GPM	0.562457	0.629697	0.516014	0.517899	0.560416	0.557297	0.993684
Rev / Emp	240	297.6949	353.4049	389.4712	429.8351	342.0812	0.224598
FA Ratio	2.075284	2.197698	2.146637	2.168652	2.456345	2.208923	-0.69421
Sum of z-Scores							0.524072

Differentiation	1992	1993	1994	1995	1996	Avg	z-Score
R & D	780000	970000	1111000	1296000	1808000		
MG&A expenses	1017000	1168000	1447000	1843000	2322000		
Inventory	535000	838000	1169000	2004000	1293000		
R&D / TS	0.13347	0.110453	0.096433	0.07999	0.086727	0.101415	-0.73991
MG&A / TS	0.174025	0.132999	0.125597	0.113751	0.111383	0.131551	-1.09922
Inventory / TS	0.091547	0.095422	0.101467	0.123688	0.062023	0.09483	-0.45182
Sum of z-Scores							-2.29095

Profitability	1992	1993	1994	1995	1996	Avg	z-score
Net Income	1067000	2295000	2288000	3566000	5157000	2874600	
Total Assets	8089000	1.1E+07	1.4E+07	1.8E+07	2.4E+07	1.5E+07	
ROS	0.18258	0.26133	0.198594	0.220096	0.247374	0.221995	1.375701
ROA	0.131908	0.20231	0.165605	0.203725	0.217274	0.184164	1.21482

Table B.13. INTERNATIONAL RECTIFIER CORP.

Low Cost	1992	1993	1994	1995	1996	Avg	z-Score
Total Sales	265495	281732	328882	429626	576489		
CGS	186437	202684	219944	278202	351046		
Fixed Assets	139283	138518	158567	245218	327978		
Employees	3000	2970	3100	3310	3915		
GPM	0.297776	0.280579	0.331237	0.352455	0.391062	0.330622	-1.2333349
Rev / Emp	88.49833	94.85926	106.091	129.7964	147.2513	113.2993	-0.913933
FA Ratio	1.906155	2.033902	2.074089	1.752017	1.757706	1.904774	-0.7792605
Sum of z-Scores							-2.9265284

Differentiation	1992	1993	1994	1995	1996	Avg	z-Score
R & D	26967	20108	16381	14083	9405		
MG&A expenses	58771	62637	69008	82328	102219		
Inventory	70224	62209	73429	73155	82852		
R&D / TS	0.101573	0.071373	0.049808	0.03278	0.016314	0.054369	-1.7851181
MG&A / TS	0.221364	0.222328	0.209826	0.191627	0.177313	0.204492	0.8728078
Inventory / TS	0.264502	0.220809	0.223269	0.170276	0.143718	0.204515	1.5450789
Sum of z-Scores							0.6327686

Profitability	1992	1993	1994	1995	1996	Avg	z-score
Net Income	9237	-3033	15714	39398	66479	25559	
Total Assets	808900	278448	330574	496184	629079	508637	
ROS	0.034792	-0.01077	0.04778	0.091703	0.115317	0.055765	-0.4293807
ROA	0.011419	-0.01089	0.047535	0.079402	0.105677	0.046628	-0.5098901

Table B.14. LSI LOGIC CORP.

Low Cost	1992	1993	1994	1995	1996	Avg	z-Score
Total Sales	617468	718812	901830	1267657	1238694		
CGS	408318	438523	520150	665673	695002		
Fixed Assets	327857	385063	495549	638282	811659		
Employees	4000	3370	3750	3870	3912		
GPM	0.338722	0.389934	0.423228	0.474879	0.438924	0.413137	-0.42264
Rev / Emp	154.367	213.2973	240.488	327.5599	316.6396	250.4704	-0.2313
FA Ratio	1.883345	1.866739	1.81986	1.986045	1.526126	1.816423	-0.80397
Sum of z-Scores							-1.45791

Differentiation	1992	1993	1994	1995	1996	Avg	z-Score
R & D	78825	78995	98978	123892	184452		
MG&A expenses	129254	117452	124936	159393	166823		
Inventory	63493	69066	107824	139857	90410		
R&D / TS	0.127658	0.109897	0.109752	0.097733	0.148908	0.11879	-0.35388
MG&A / TS	0.209329	0.163397	0.138536	0.125738	0.134677	0.154335	-0.48322
Inventory / TS	0.102828	0.096084	0.119561	0.110327	0.072988	0.100358	-0.35118
Sum of z-Scores							-1.18828

Profitability	1992	1993	1994	1995	1996	Avg	z-score
Net Income	-110208	53750	108743	241162	147184	88126.2	
Total Assets	739075	859010	1270374	1849587	1952714	1334152	
ROS	-0.17848	0.074776	0.12058	0.190242	0.118822	0.065187	-0.32707
ROA	-0.14912	0.062572	0.085599	0.130387	0.075374	0.040963	-0.58093

Table B.15. LATTICE SEMICONDUCTOR CORP.

Low Cost	1992	1993	1994	1995	1996	Avg	z-Score
Total Sales	103391	126241	144083	198167	204089		
CGS	43650	53266	59936	82216	83736		
Fixed Assets	18426	19823	20155	25471	27403		
Employees	242	398	438	500	531		
GPM	0.577816	0.578061	0.584018	0.585118	0.589708	0.582944	1.245662
Rev / Emp	427.2355	317.1884	328.9566	396.334	384.3484	370.8126	0.367579
FA Ratio	5.611147	6.36841	7.148747	7.780103	7.447688	6.871219	0.609531
Sum of z-Scores							2.222772

Differentiation	1992	1993	1994	1995	1996	Avg	z-Score
R & D	16530	20636	22859	26825	27829		
MG&A expenses	20465	22299	25020	31323	33558		
Inventory	13509	13847	14131	21761	27809		
R&D / TS	0.159879	0.163465	0.158652	0.135366	0.136357	0.150744	0.356043
MG&A / TS	0.197938	0.176638	0.17365	0.158064	0.164428	0.174144	0.052316
Inventory / TS	0.130659	0.109687	0.098075	0.109811	0.136259	0.116898	-0.05004
Sum of z-Scores							0.358317

Profitability	1992	1993	1994	1995	1996	Avg	z-score
Net Income	17399	22490	26966	41784	45005	30728.8	
Total Assets	128876	146093	192917	342935	403462	242856.6	
ROS	0.168284	0.178151	0.187156	0.210852	0.220517	0.192992	1.06076
ROA	0.135006	0.153943	0.13978	0.121842	0.111547	0.132424	0.565991

Table B.16. LINEAR TECHNOLOGY CORP.

Low Cost	1992	1993	1994	1995	1996	Avg	z-Score
Total Sales	119440	150867	200538	265023	377771		
CGS	49505	57036	67636	83263	106832		
Fixed Assets	25551	27369	37273	50802	110922		
Employees	872	1004	1350	1638	1804		
GPM	0.585524	0.621945	0.662727	0.685827	0.717204	0.654646	1.950109
Rev / Emp	136.9725	150.2659	148.5467	161.7967	209.4074	161.3978	-0.67457
FA Ratio	4.674572	5.512331	5.380248	5.216783	3.405736	4.837934	0.040953
Sum of z-Scores							1.316492

Differentiation	1992	1993	1994	1995	1996	Avg	z-Score
R & D	12344	14773	18394	23931	31058		
MG&A expenses	21996	23313	32612	37867	49127		
Inventory	7921	8376	10016	9719	12930		
R&D / TS	0.103349	0.097921	0.091723	0.090298	0.082214	0.093101	-0.92461
MG&A / TS	0.184159	0.154527	0.162623	0.142882	0.130044	0.154847	-0.46939
Inventory / TS	0.066318	0.055519	0.049946	0.036672	0.034227	0.048536	-1.29463
Sum of z-Scores							-2.68863

Profitability	1992	1993	1994	1995	1996	Avg	z-score
Net Income	25017	36435	56827	84696	133964	67387.8	
Total Assets	159799	196492	268399	367553	529802	304409	
ROS	0.209452	0.241504	0.283373	0.31958	0.354617	0.281705	2.024094
ROA	0.156553	0.185427	0.211726	0.230432	0.252857	0.207399	1.506185

Table B.17. MAXIM INTEGRATED PRODUCTS.

Low Cost	1992	1993	1994	1995	1996	Avg	z-Score
Total Sales	86954	110184	153932	250800	421626		
CGS	37835	46841	64250	103598	146258		
Fixed Assets	27016	34457	77696	87925	147068		
Employees	554	638	1016	1552	1987		
GPM	0.564885	0.574884	0.582608	0.58693	0.65311	0.592483	1.339381
Rev / Emp	156.9567	172.7022	151.5079	161.5979	212.1922	170.9914	-0.62683
FA Ratio	3.218611	3.197725	1.981209	2.852431	2.866878	2.823371	-0.52239
Sum of z-Scores							0.190163

Differentiation	1992	1993	1994	1995	1996	Avg	z-Score
R & D	13106	16426	22561	42392	47532		
MG&A expenses	15547	21469	31524	47596	41951		
Inventory	15169	15485	18330	19105	30471		
R&D / TS	0.150723	0.149078	0.146565	0.169027	0.112735	0.145626	0.242336
MG&A / TS	0.178796	0.194847	0.204792	0.189777	0.099498	0.173542	0.036046
Inventory / TS	0.174449	0.140538	0.119079	0.076176	0.07227	0.116502	-0.05726
Sum of z-Scores							-1.59717

Profitability	1992	1993	1994	1995	1996	Avg	z-score
Net Income	13673	17282	24082	38906	123345	43457.6	
Total Assets	95546	126902	178523	256133	417794	214979.6	
ROS	0.157244	0.156847	0.156446	0.155128	0.292546	0.183642	0.959229
ROA	0.143104	0.136184	0.134896	0.151898	0.295229	0.172262	1.065566

Table B.18. MICROCHIP TECHNOLOGY INC.

Low Cost	1992	1993	1994	1995	1996	Avg	z-Score
Total Sales	88652	138742	207961	285888	334252		
CGS	56552	73765	101039	137708	164448		
Fixed Assets	17164	54237	111513	197383	234058		
Employees	1044	1070	1427	1427	1615		
GPM	0.36209	0.46833	0.514144	0.518315	0.508012	0.474178	0.177066
Rev / Emp	84.91571	129.6654	145.733	200.342	206.9672	153.5247	-0.71375
FA Ratio	5.164997	2.558069	1.864904	1.448392	1.428073	2.492887	-0.6148
Sum of z-Scores							-1.15149

Differentiation	1992	1993	1994	1995	1996	Avg	z-Score
R & D	9114	13840	20746	27517	31662		
MG&A expenses	19056	28569	37045	48903	55789		
Inventory	19239	24730	40201	56127	56183		
R&D / TS	0.102806	0.099753	0.099759	0.096251	0.094725	0.098659	-0.80113
MG&A / TS	0.214953	0.205915	0.178134	0.171056	0.166907	0.187393	0.410529
Inventory / TS	0.217017	0.178245	0.19331	0.196325	0.168086	0.190597	1.291687
Sum of z-Scores							0.901085

Profitability	1992	1993	1994	1995	1996	Avg	z-score
Net Income	4218	19159	36299	43752	51100	30905.6	
Total Assets	76919	151425	249480	358187	500810	267364.2	
ROS	0.047579	0.138091	0.174547	0.153039	0.152879	0.133227	0.411774
ROA	0.054837	0.126525	0.145499	0.122148	0.102035	0.110209	0.287413

Table B.19. MICRON TECHNOLOGY INC.

Low Cost	1992	1993	1994	1995	1996	Avg	z-Score
Total Sales	506300	828270	1628600	2952700	3653800		
CGS	390300	517138	789400	1328700	2198400		
Fixed Assets	396280	437761	663500	1385600	2708100		
Employees	4300	4900	5450	8080	9900		
GPM	0.229113	0.375641	0.515289	0.550005	0.398325	0.413675	-0.41736
Rev / Emp	117.7442	169.0347	298.8257	365.4332	369.0707	264.0217	-0.16386
FA Ratio	1.277632	1.89206	2.454559	2.13099	1.349212	1.820891	-0.80272
Sum of z-Scores							-1.38395

Differentiation	1992	1993	1994	1995	1996	Avg	z-Score
R & D	47600	57323	83400	128800	191100		
MG&A expenses	54712	87863	135700	187200	289400		
Inventory	74501	83164	101100	204800	251400		
R&D / TS	0.094015	0.069208	0.05121	0.043621	0.052302	0.062071	-1.61401
MG&A / TS	0.108062	0.10608	0.083323	0.0634	0.079205	0.088014	-2.27629
Inventory / TS	0.147148	0.100407	0.062078	0.06936	0.068805	0.08956	-0.54777
Sum of z-Scores							-4.43806

Profitability	1992	1993	1994	1995	1996	Avg	z-score
Net Income	6574	104065	400500	844100	593500	389747.8	
Total Assets	724483	965656	1529700	2774900	3751500	1949248	
ROS	0.012984	0.125641	0.245917	0.285874	0.162434	0.16657	0.773845
ROA	0.009074	0.107766	0.261816	0.304191	0.158203	0.16821	1.014755

Table B.20. NATIONAL SEMICONDUCTOR CORP.

Low Cost	1992	1993	1994	1995	1996	Avg	z-Score
Total Sales	2013700	2295400	2379400	2623000	2507000		
CGS	1379600	1336300	1384500	1560900	1541100		
Fixed Assets	577400	668000	962400	125600	1263400		
Employees	23400	22300	22400	20300	12400		
GPM	0.314893	0.417836	0.418131	0.404918	0.385281	0.388212	-0.66753
Rev / Emp	86.05556	102.9327	106.2232	129.2118	202.1774	125.3201	-0.85411
FA Ratio	3.48753	3.436228	2.472361	20.88376	1.984328	6.452841	0.492538
Sum of z-Scores							-1.0291

Differentiation	1992	1993	1994	1995	1996	Avg	z-Score
R & D	202300	257800	283100	349900	372100		
MG&A expenses	284800	411300	402700	486600	395700		
Inventory	189600	212700	263000	325400	181400		
R&D / TS	0.100462	0.112312	0.11898	0.133397	0.148424	0.122715	-0.26668
MG&A / TS	0.141431	0.179184	0.169244	0.185513	0.157838	0.166642	-0.15049
Inventory / TS	0.094155	0.092664	0.110532	0.124056	0.072357	0.098753	-0.3804
Sum of z-Scores							-0.79757

Profitability	1992	1993	1994	1995	1996	Avg	z-score
Net Income	130300	264000	264200	185000	28000	174300	
Total Assets	1476500	1747700	2235700	2658000	2914000	2206380	
ROS	0.064707	0.115013	0.111036	0.07053	0.011169	0.074491	-0.22604
ROA	0.088249	0.151056	0.118173	0.069601	0.009609	0.087338	0.000609

Table B.21. S3 INCORPORTED.

Low Cost	1992	1993	1994	1995	1996	Avg	z-Score
Total Sales	30621	112969	140309	316309	465378		
CGS	15289	65660	97975	189767	281013		
Fixed Assets	1602	6178	9866	20678	34047		
Employees	68	68	217	449	636		
GPM	0.500702	0.418779	0.30172	0.400058	0.396162	0.403484	-0.51748
Rev / Emp	450.3088	1661.309	646.5853	704.4744	731.7264	838.8807	2.696915
FA Ratio	19.11423	18.28569	14.22147	15.29689	13.66869	16.11739	3.195084
Sum of z-Scores							5.374515

Differentiation	1992	1993	1994	1995	1996	Avg	z-Score
R & D	4512	11539	17913	42080	63382		
MG&A expenses	6066	12500	18310	33510	48800		
Inventory	768	5259	8204	43291	53466		
R&D / TS	0.14735	0.102143	0.127668	0.133034	0.136195	0.129278	-0.12086
MG&A / TS	0.198099	0.11065	0.130498	0.105941	0.104861	0.13001	-1.14089
Inventory / TS	0.025081	0.046553	0.058471	0.136863	0.114887	0.076371	-0.78788
Sum of z-Scores							-2.04963

Profitability	1992	1993	1994	1995	1996	Avg	z-score
Net Income	4400	15100	5500	35400	48400	21760	
Total Assets	15600	81660	895460	321640	480462	358964.4	
ROS	0.143692	0.133665	0.039199	0.111916	0.104001	0.106495	0.12149
ROA	0.282051	0.184913	0.006142	0.110061	0.100736	0.136781	0.620628

Table B.22. TEXAS INSTRUMENTS INC.

Low Cost	1992	1993	1994	1995	1996	Avg	z-Score
Total Sales	7440000	8523000	1E+07	1.1E+07	9940000		
CGS	5250000	5684000	6782000	7401000	7146000		
Fixed Assets	2133000	2203000	2568000	2894000	4162000		
Employees	60577	59048	56333	59574	59927		
GPM	0.294355	0.333099	0.342511	0.351302	0.281087	0.320471	-1.33307
Rev / Emp	122.8189	144.3402	183.1076	191.5097	165.8685	161.529	-0.67392
FA Ratio	3.488045	3.868815	4.016745	3.942294	2.388275	3.540835	-0.32176
Sum of z-Scores							-2.32875

Differentiation	1992	1993	1994	1995	1996	Avg	z-Score
R & D	470000	590000	689000	842000	1181000		
MG&A expenses	1170000	1247000	1393000	1727000	1639000		
Inventory	734000	822000	882000	978000	703000		
R&D / TS	0.063172	0.069224	0.066796	0.073801	0.118813	0.078361	-1.25209
MG&A / TS	0.157258	0.14631	0.135046	0.151372	0.164889	0.150975	-0.57407
Inventory / TS	0.098656	0.096445	0.085507	0.085722	0.070724	0.087411	-0.58689
Sum of z-Scores							-2.41305

Profitability	1992	1993	1994	1995	1996	Avg	z-score
Net Income	247000	476000	691000	108800	-46000	295360	
Total Assets	5185000	5993000	6989000	8748000	9360000	7255000	
ROS	0.033199	0.055849	0.06699	0.009536	-0.00463	0.032189	-0.68539
ROA	0.047637	0.079426	0.09887	0.012437	-0.00491	0.046691	-0.5091

Table B.23. TSENG LABORATORIES INC.

Low Cost	1992	1993	1994	1995	1996	Avg	z-Score
Total Sales	75346	75526	79418	37115	26231		
CGS	46459	53209	57541	28930	25255		
Fixed Assets	4037	5309	6565	7696	9333		
Employees	59	54	63	95	96		
GPM	0.383391	0.295488	0.275467	0.220531	0.037208	0.242417	-2.09993
Rev / Emp	1277.051	1398.63	1260.603	390.6842	273.2396	920.0415	3.100811
FA Ratio	18.66386	14.22603	12.09718	4.822635	2.810565	10.52405	1.630991
Sum of z-Scores							2.631876

Differentiation	1992	1993	1994	1995	1996	Avg	z-Score
R & D	783	1011	1922	3440	14561		
MG&A expenses	5877	5824	6761	6328	9239		
Inventory	1749	3930	3786	3408	2369		
R&D / TS	0.010392	0.013386	0.024201	0.092685	0.555107	0.139154	0.098558
MG&A / TS	0.078	0.077113	0.085132	0.170497	0.352217	0.152592	-0.53036
Inventory / TS	0.023213	0.052035	0.047672	0.091823	0.090313	0.061011	-1.06751
Sum of z-Scores							-1.49932

Profitability	1992	1993	1994	1995	1996	Avg	z-score
Net Income	14100	10800	9300	500	-14000	4140	
Total Assets	56256	64434	65819	64671	51539	60543.8	
ROS	0.187137	0.142997	0.117102	0.013472	-0.53372	-0.0146	-1.1935
ROA	0.25064	0.167613	0.141297	0.007731	-0.27164	0.059128	-0.35314

Table B.24. VLSI TECHNOLOGY INC.

Low Cost	1992	1993	1994	1995	1996	Avg	z-Score
Total Sales	428498	515946	587091	719919	716770		
CGS	293392	327774	356858	431342	433197		
Fixed Assets	160805	183926	219130	352041	427264		
Employees	2288	2415	2415	3000	3000		
GPM	0.315301	0.364713	0.392159	0.400846	0.395626	0.373729	-0.80982
Rev / Emp	187.2806	213.6422	243.1019	239.973	238.9233	224.5842	-0.36012
FA Ratio	2.664706	2.805183	2.67919	2.044986	1.677581	2.374329	-0.64796
Sum of z-Scores							-1.8179

Differentiation	1992	1993	1994	1995	1996	Avg	z-Score
R & D	50442	65341	78889	89682	105185		
MG&A expenses	81446	94651	104595	123513	138179		
Inventory	52836	62112	59696	60848	56361		
R&D / TS	0.117718	0.126643	0.134373	0.124572	0.146749	0.130011	-0.10458
MG&A / TS	0.190073	0.183451	0.178158	0.171565	0.19278	0.183206	0.297316
Inventory / TS	0.123305	0.120385	0.101681	0.084521	0.078632	0.101705	-0.32666
Sum of z-Scores							-0.13392

Profitability	1992	1993	1994	1995	1996	Avg	z-score
Net Income	-32217	15883	31697	45968	-49457	2374.8	
Total Assets	368208	412223	490216	959887	890942	624295.2	
ROS	-0.07519	0.030784	0.05399	0.063852	-0.069	0.000888	-1.02529
ROA	-0.0875	0.03853	0.064659	0.047889	-0.05551	0.001614	-1.07437

Table B.25. VITESSE SEMICONDUCTOR CORP.

Low Cost	1992	1993	1994	1995	1996	Avg	z-Score
Total Sales	37310	26364	35581	42882	66046		
CGS	19738	27153	22226	22565	31792		
Fixed Assets	15893	16088	11940	11862	17892		
Employees	313	242	201	201	293		
GPM	0.470973	-0.02993	0.375341	0.473789	0.518639	0.361763	-0.92738
Rev / Emp	119.2013	108.9421	177.0199	213.3433	225.413	168.7839	-0.63781
FA Ratio	2.347574	1.638737	2.979983	3.615073	3.69137	2.854548	-0.51367
Sum of z-Scores							-2.07887

Differentiation	1992	1993	1994	1995	1996	Avg	z-Score
R & D	9301	9632	8794	8689	11045		
MG&A expenses	7273	7817	7794	8900	9777		
Inventory	12435	8823	8958	9895	19959		
R&D / TS	0.24929	0.365347	0.247154	0.202626	0.167232	0.24633	2.479697
MG&A / TS	0.194934	0.296503	0.219049	0.207546	0.148033	0.213213	1.108604
Inventory / TS	0.333289	0.334661	0.251764	0.230749	0.302198	0.290532	3.11109
Sum of z-Scores							6.699391

Profitability	1992	1993	1994	1995	1996	Avg	z-score
Net Income	704	-19069	-4141	1507	12645	-1670.8	
Total Assets	62140	43975	39496	42111	100416	57627.6	
ROS	0.018869	-0.7233	-0.11638	0.035143	0.191457	-0.11884	-2.32543
ROA	0.011329	-0.43363	-0.10485	0.035786	0.125926	-0.07309	-2.01113

Table B.26. XILINX INC.

Low Cost	1992	1993	1994	1995	1996	Avg	z-Score
Total Sales	177998	256448	355130	560802	568143		
CGS	69299	98835	138492	203192	214337		
Fixed Assets	20512	23806	39240	82638	86580		
Employees	482	544	868	1201	1277		
GPM	0.610675	0.6146	0.610024	0.637676	0.622741	0.619143	1.60131
Rev / Emp	369.2905	471.4118	409.1359	466.9459	444.9045	432.3377	0.673758
FA Ratio	8.67775	10.77241	9.050204	6.786248	6.562058	8.369734	1.028568
Sum of z-Scores							3.303636

Differentiation	1992	1993	1994	1995	1996	Avg	z-Score
R & D	24326	34334	45318	64600	71075		
MG&A expenses	42787	58111	76772	107888	118670		
Inventory	13061	26597	25586	39238	62367		
R&D / TS	0.136664	0.133883	0.12761	0.115192	0.125101	0.12769	-0.15614
MG&A / TS	0.240379	0.2266	0.21618	0.192382	0.208873	0.216883	1.207814
Inventory / TS	0.073377	0.103713	0.072047	0.069968	0.109773	0.085776	-0.61666
Sum of z-Scores							0.435012

Profitability	1992	1993	1994	1995	1996	Avg	z-score
Net Income	27231	41279	59278	101454	110376	67923.6	
Total Assets	162899	226156	320940	720880	847693	455713.6	
ROS	0.152985	0.160964	0.166919	0.180909	0.194275	0.17121	0.824235
ROA	0.167165	0.182524	0.184701	0.140736	0.130208	0.161067	0.925178

Table B.27. ZILOG INC.

Low Cost	1992	1993	1994	1995	1996	Avg	z-Score
Total Sales	145666	202727	223316	265122	298425		
CGS	76492	105727	111288	135066	175319		
Fixed Assets	55230	78789	126651	179340	248711		
Employees	1449	1500	1429	1575	1601		
GPM	0.474881	0.478476	0.501657	0.490552	0.412519	0.471617	0.151902
Rev / Emp	100.5286	135.1513	156.2743	168.3314	186.3991	149.337	-0.73459
FA Ratio	2.637443	2.573037	1.763239	1.478321	1.199887	1.930385	-0.7721
Sum of z-Scores							-1.35479

Differentiation	1992	1993	1994	1995	1996	Avg	z-Score
R & D	16257	20833	23048	24546	30548		
MG&A expenses	29798	37619	37790	41943	47934		
Inventory	14058	25382	20981	28152	34469		
R&D / TS	0.111605	0.102764	0.103208	0.092584	0.102364	0.102505	-0.71569
MG&A / TS	0.204564	0.185565	0.169222	0.158203	0.160623	0.175635	0.092647
Inventory / TS	0.096508	0.125203	0.093952	0.106185	0.115503	0.10747	-0.22169
Sum of z-Scores							-0.84473

Profitability	1992	1993	1994	1995	1996	Avg	z-score
Net Income	15795	26767	34909	42465	30001	29987.4	
Total Assets	148404	212470	286691	353430	401066	280412.2	
ROS	0.108433	0.132035	0.156321	0.160172	0.100531	0.131498	0.393002
ROA	0.106432	0.12598	0.121765	0.120151	0.074803	0.109826	0.282619

APPENDIX C

FOCUS STRATEGY

Table C.1. Focus Strategy for Multinational Firms.

Product Category	AMD	ANALOG	ATMEL	CIRRUS	CYPRES	ID TECH	INTEL
36740	17	2	1	0	5	0	45
3674002	0	0	0	0	0	0	1
367410	5	2	1	10	1	1	4
3674103	0	0	0	0	0	0	1
3674110	2	5	0	0	1	0	0
3674111	0	1	0	1	0	0	0
3674112	2	1	5	0	1	0	5
3674115	0	0	0	0	0	0	0
3674119	0	0	1	0	0	0	0
3674120	6	2	6	2	1	0	7
3674124	33	1	4	4	7	9	117
3674125	3	0	3	0	4	7	3
3674126	12	0	11	0	8	4	12
3674127	0	0	0	0	0	0	0
3674128	0	1	0	0	0	0	1
3674129	3	3	2	1	2	0	4
3674130	0	1	0	0	0	0	0
3674131	0	0	0	0	0	0	0
3674140	0	1	0	0	0	0	0
3674141	2	2	0	0	3	0	2
3674148	0	0	1	0	0	0	0
3674150	0	1	0	0	0	0	0
3674154	0	3	0	0	0	0	0
3674156	0	0	0	0	0	0	0
3674163	1	0	0	0	0	0	0
3674166	0	5	0	0	0	0	0
3674169	1	0	0	0	0	0	0
3674170	0	1	0	0	0	0	1
3674171	0	1	0	0	0	0	0
3674177	0	0	0	0	0	0	0
3674178	2	1	0	1	0	0	1
3674180	4	4	2	4	2	1	6
3674181	0	3	0	0	0	0	0
3674182	0	0	0	0	0	0	1
3674184	0	1	1	0	0	0	0
3674185	0	0	0	0	0	0	0
3674187	0	1	0	0	0	0	0
3674191	11	6	0	5	2	1	4
3674192	2	0	0	4	0	0	3
3674199	6	7	2	13	0	1	17
367420	0	0	0	0	0	0	0
3674201	0	0	0	0	0	0	0
3674202	0	0	0	0	0	0	0
3674221	0	0	0	0	0	0	0
3674222	0	0	0	0	0	0	0
367430	0	0	0	0	0	0	0
3674303	0	0	0	0	0	0	0
3674319	0	0	0	0	0	0	0
3674324	0	0	0	0	0	0	0
3674430	0	0	0	0	0	0	0
3674433	0	0	0	0	0	0	0
3674440	0	0	0	0	0	0	0
367450	0	0	0	0	0	0	1
3677790	0	0	0	0	0	0	0
3674530	0	1	0	0	0	0	0
3674532	0	1	0	0	0	0	0
3674830	0	0	0	0	0	0	1
367490	0	0	0	0	0	0	0
3674910	0	0	0	0	1	0	2
3674990	0	0	0	1	0	0	4
3674996	0	1	1	0	0	0	0
3674999	0	0	0	0	0	0	0
Total Releases	112	59	41	46	38	24	243
Sum of Squares	0.14318	0.06004	0.13385	0.16541	0.12465	0.26042	0.27697
Entropy measure	0.85682	0.93996	0.86615	0.83459	0.87535	0.73958	0.72303
Focus Strategy	1.05428	1.34542	0.99272	0.86914	0.97509	0.62502	0.98457

Table C.1. Focus Strategy for Multinational Firms (continued).

Product Category	INT REC	LSI	MIC TEC	NATSEM	TI	XILINX	ZILOG
36740	0	10	0	9	5	0	2
3674002	0	0	0	0	1	1	0
367410	1	0	4	5	6	1	0
3674103	0	1	0	0	0	0	0
3674110	0	3	0	3	4	2	0
3674111	0	1	0	0	0	0	0
3674112	0	0	0	1	5	14	0
3674115	0	0	0	0	0	0	0
3674119	0	0	1	1	2	0	0
3674120	0	3	1	4	3	5	1
3674124	0	17	1	7	44	0	8
3674125	0	0	1	0	9	0	0
3674126	0	1	6	4	5	0	0
3674127	0	1	0	0	0	0	0
3674128	0	0	0	0	2	0	0
3674129	0	0	0	3	12	2	3
3674130	0	0	0	2	1	0	0
3674131	0	0	0	1	1	0	0
3674140	2	0	0	0	0	0	0
3674141	0	0	0	4	5	1	1
3674148	0	0	0	0	0	0	0
3674150	0	0	0	2	0	0	0
3674154	0	0	0	5	0	0	0
3674156	0	0	1	3	1	0	0
3674163	0	0	0	0	0	0	0
3674166	0	1	0	3	1	0	0
3674169	0	0	0	0	0	0	0
3674170	0	0	0	0	1	0	0
3674171	0	0	0	0	0	0	0
3674177	0	0	1	0	1	0	0
3674178	0	0	0	0	2	0	0
3674180	0	9	0	6	11	0	4
3674181	0	0	0	1	0	0	0
3674182	0	0	0	0	0	0	0
3674184	0	0	0	5	2	0	0
3674185	0	0	0	1	0	0	0
3674187	0	0	0	0	0	0	1
3674191	0	6	0	12	14	0	2
3674192	0	0	0	1	0	0	1
3674199	0	5	2	13	17	0	5
367420	1	0	0	0	0	0	0
3674201	2	0	0	0	0	0	0
3674202	4	0	0	2	0	0	0
3674221	0	0	0	1	0	0	0
3674222	1	0	0	0	0	0	0
367430	0	0	0	0	1	0	0
3674303	1	0	0	0	0	0	0
3674319	0	0	0	0	0	0	0
3674324	0	0	0	0	0	0	0
3674430	0	0	0	0	3	0	0
3674433	0	0	0	0	1	0	0
3674440	0	0	0	0	4	0	0
367450	0	0	0	0	0	0	0
3677790	0	0	0	0	1	0	0
3674530	0	0	0	0	1	0	0
3674532	0	0	0	0	0	0	0
3674830	0	0	0	0	0	0	0
367490	0	1	0	0	0	0	0
3674910	0	0	1	0	1	0	0
3674990	0	0	1	0	4	0	1
3674996	0	1	0	0	4	0	0
3674999	0	0	0	0	0	0	0
Total Releases	12	60	20	99	175	26	29
Sum of Squares	0.19444	0.15444	0.16	0.06703	0.09838	0.3432	0.15101
Entropy measure	0.80556	0.84556	0.84	0.93297	0.90162	0.6568	0.84899
Focus Strategy	0.68077	0.96911	0.87477	1.30423	1.36912	0.55506	0.88413

Table C.2. Focus Strategy for Domestic Firms.

Product Category	ALTERA	CHIPS	CYRIX	DALLAS	IC SYS	LATTICE	LINEAR
36740	0	1	0	3	3	0	1
3674002	1	0	1	0	0	0	0
367410	2	0	7	2	0	1	0
3674103	0	0	0	0	0	0	0
3674110	1	0	0	0	3	1	0
3674111	0	0	0	0	0	1	0
3674112	8	0	0	0	0	0	0
3674115	0	0	1	0	0	0	0
3674119	0	0	0	0	0	0	0
3674120	11	2	0	1	0	9	1
3674124	1	6	32	3	2	0	7
3674125	1	0	0	4	1	0	0
3674126	2	0	0	1	0	0	0
3674127	0	0	0	0	0	0	0
3674128	0	0	0	0	0	1	0
3674129	3	1	0	1	0	5	0
3674130	0	0	0	0	0	0	0
3674131	0	0	0	0	0	0	0
3674140	0	0	0	0	0	0	0
3674141	0	0	0	0	1	3	0
3674148	2	0	0	0	0	0	0
3674150	0	0	0	0	0	0	0
3674154	0	0	0	0	0	0	0
3674156	0	0	0	0	0	0	4
3674163	0	0	0	0	0	0	0
3674166	0	0	0	0	0	0	1
3674169	0	0	0	0	0	0	0
3674170	0	0	1	0	0	0	0
3674171	0	0	0	0	0	0	0
3674177	0	0	0	0	0	0	0
3674178	0	0	0	0	0	0	0
3674180	2	5	1	1	2	0	2
3674181	0	0	0	0	0	0	0
3674182	0	0	0	0	0	0	0
3674184	0	0	0	0	0	0	1
3674185	0	0	0	0	1	0	0
3674187	0	0	0	0	1	0	0
3674191	0	1	0	1	1	0	1
3674192	0	0	0	0	0	0	0
3674199	0	7	2	2	1	1	2
367420	0	0	0	0	0	0	0
3674201	0	0	0	0	0	0	0
3674202	0	0	0	0	0	0	0
3674221	0	0	0	0	0	0	0
3674222	0	0	0	0	0	0	0
367430	0	0	0	0	0	0	0
3674303	0	0	0	0	0	0	0
3674319	0	0	0	0	0	0	0
3674324	0	0	0	0	0	0	1
3674430	0	0	0	0	0	0	0
3674433	0	0	0	0	0	0	0
3674440	0	0	0	0	0	0	0
367450	0	0	0	0	0	0	0
3677790	0	0	0	0	0	0	0
3674530	0	0	0	0	0	0	0
3674532	0	0	0	0	0	0	0
3674830	0	0	0	0	0	0	0
367490	0	0	0	0	1	0	0
3674910	0	0	0	0	0	0	0
3674990	0	0	0	1	1	0	0
3674996	0	0	0	0	0	0	0
3674999	0	0	0	0	0	0	1
Total Releases	34	23	45	20	18	22	22
Sum of Squares	0.185121	0.221172	0.533827	0.12	0.104938	0.247934	0.165289
Entropy measure	0.814879	0.778828	0.466173	0.88	0.895062	0.752066	0.834711
Focus Strategy	0.848609	0.658186	0.393962	0.916426	0.965934	0.679183	0 869262

Table C.2. Focus Strategy for Domestic Firms (continued).

Product Category	MAXIM IN	MICRON	S3	TSENG	VLSI	VITESSE
36740	0	0	0	1	0	0
3674002	0	0	0	0	0	0
367410	0	2	2	0	4	2
3674103	0	0	0	0	4	0
3674110	0	0	0	0	1	4
3674111	0	0	0	0	0	0
3674112	0	0	0	0	2	3
3674115	0	0	0	0	0	8
3674119	0	0	0	0	1	0
3674120	0	0	1	0	0	0
3674124	0	0	2	0	13	0
3674125	0	10	1	0	0	0
3674126	0	3	0	0	0	0
3674127	0	0	0	0	0	0
3674128	0	0	0	0	0	0
3674129	0	0	0	0	1	0
3674130	0	0	0	0	0	0
3674131	0	0	0	0	0	0
3674140	0	0	0	0	0	0
3674141	0	0	0	0	0	0
3674148	0	0	0	0	0	0
3674150	1	0	0	0	0	0
3674154	0	0	0	0	0	1
3674156	0	0	0	0	1	0
3674163	0	0	0	0	0	0
3674166	1	0	0	0	0	0
3674169	0	0	0	0	0	0
3674170	0	0	0	0	0	0
3674171	0	0	0	0	0	0
3674177	0	0	0	0	0	0
3674178	0	0	0	0	2	0
3674180	0	1	4	1	4	0
3674181	0	0	0	0	0	0
3674182	0	0	0	0	3	0
3674184	4	0	0	0	2	0
3674185	1	0	0	0	0	0
3674187	0	0	0	0	0	0
3674191	1	0	0	0	7	3
3674192	0	0	0	0	0	0
3674199	3	1	7	2	11	2
367420	0	0	0	0	0	0
3674201	0	0	0	0	0	0
3674202	0	0	0	0	0	0
3674221	0	0	0	0	0	0
3674222	0	0	0	0	0	0
367430	0	0	0	0	0	0
3674303	0	0	0	0	0	0
3674319	1	0	0	0	0	0
3674324	0	0	0	0	0	0
3674430	0	0	0	0	0	0
3674433	0	0	0	0	0	0
3674440	0	0	0	0	0	0
367450	0	0	0	0	0	0
3677790	0	0	0	0	0	0
3674530	0	0	0	0	0	0
3674532	0	0	0	0	0	0
3674830	0	0	0	0	0	0
367490	0	0	1	0	0	0
3674910	0	0	0	0	1	0
3674990	1	0	1	1	0	0
3674996	0	0	0	0	0	0
3674999	0	0	0	0	0	0
Total Releases	13	17	19	5	57	23
Sum of Squares	0.183432	0.397924	0.213296	0.28	0.127116	0.202268
Entropy measure	0.816568	0.602076	0.786704	0.72	0.872884	0.797732
Focus Strategy	0.737434	0.420833	0.710464	0.433483	1.026591	0.674161

APPENDIX D

LIST OF FIRMS

The 27 firms included in this study are listed below.

1. Advanced Micro Devices
2. Altera Corporation
3. Analog Devices
4. Atmel Corporation
5. Chips & Technologies Inc.
6. Cirrus Logic Inc.
7. Cypress Semiconductor Corporation
8. Cyrix Corporation
9. Dallas Semiconductor Corporation
10. Integrated Circuit Systems
11. Integrated Device Technologies Inc.
12. Intel Corporation
13. International Rectifier Corporation
14. LSI Logic Corporation
15. Lattice Semiconductor Corporation
16. Linear Technology Corporation
17. Maxim Integrated Products
18. Microchip Technology Inc.
19. Micron Technology Inc.
20. National Semiconductor Inc.
21. S3 Inc.
22. Texas Instruments Inc.
23. Tseng Laboratories Inc.
24. VLSI Technology Inc.
25. Vitesse Semiconductor Corporation
26. Xilinx Inc.
27. Zilog Inc.