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IMPORT COMPETITION AND DOMESTIC BANKRUPTCY; THE IMPACT OF INDUSTRY STRUCTURE

BY

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B. Com., University of Mysore, 1974
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THESIS

Submitted in partial fulfillment of the requirements
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IMPORT COMPETITION AND DOMESTIC BANKRUPTCY; THE IMPACT OF INDUSTRY STRUCTURE

Vijaya Lakshmi Narapareddy, Ph.D.
Department of Business Administration
University of Illinois at Urbana-Champaign, 1987
Gerald R. Salancik, Advisor

Business is becoming increasingly more international. From a narrow, domestic perspective, increasing internationalization is not always appreciated. Trade deficits and declining domestic industries are often attributed to foreign competition.

Import competition fundamentally differs from domestic competition in several ways. Imports induce an additional stress on domestic units as foreign producers compete with domestic units for resources in the domestic market. This research views the impact of foreign competition from two perspectives--the Selection perspective and the Adaptation perspective.

In the Selection perspective, the relationship between import competition and domestic bankruptcy is hypothesized to be moderated by the structural characteristics of the industry Literature from Industrial Organization and International Economics is used to identify four system characteristics. They are capital intensity, advertising intensity, R&D intensity, and the level of competition.

In the Adaptation perspective, it is proposed that though bankruptcy is a negative outcome at the firm level, at the industry level it may be construed as a positive outcome. The weeding out of inefficient units frees critical resources and offers the opportunity for their redeployment into more fruitful avenues

A time-series and cross-sectional design was used to empirically investigate the hypothesized relationships. Data were collected for a sample of 32 U.S. manufacturing industries over a period of 11 years, from 1972-1982.

To my parents,
Zinnoury, Bhanoumathy and Sidambareswara Rao.

To my professor,
Dr. Louis R. Pondy

To my family,
Shreeram, Shilpa, and Kiran

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Chapter 1
Introduction

After a long period of growth and dominance in international markets following World War I, U.S. is now facing persistently low rates of economic growth and a decline in productivity relative to other advanced countries (Ballance and Sinclair, 1983; Tyson and Zysman, 1983) *Deindustrialization* and *competitive revitalization* of domestic industry have come to be the buzzwords of this decade. Writers on the subject of the competitive decline experienced by major economies such as the U.K. and the U.S. (Bluestone and Harrison, 1982; Ballance and Sinclair, 1983) link the problem faced by these nations to foreign competition. The decline in the manufacturing industry of Corporate America has also been directly attributed to the effects of foreign competition by Kanter (1983), Lawrence and Dyer (1983), Thurow (1984) and even to the lack of strong support to domestic industry from Washington (Thurow, 1980)

Foreign competition has often been blamed for a number of evils plaguing the domestic economy, including a huge trade deficit, loss of jobs, and ultimately the decline of the manufacturing industry (Lawrence and Dyer, 1983; Thurow, 1984). Stories of how the American manufacturing industry is aggrieved by and succumbing to pressures of international competition abound in the business press As one daily puts it: ".. the time has come to say goodbye to floppy disks made in USA" (USA Today, July 31, 1985). Furthermore, sectoral studies of industries facing decline such as Zammuto (1982) and Hunker (1983) among others in the auto industry; Arpan, de la Torre and Toyne (1982) in the apparel industry, the OECD (1980) symposium in the steel industry identify international competition as the major cause for decline of the domestic industry.

The organizational bankruptcy literature, however, has omitted the role of international trade in affecting domestic bankruptcy. Instead, organizational bankruptcy and decline has been attributed to specific effects endogenous to organizations. The ability of key financial

factors to warn impending bankruptcy has been studied by researchers in Finance and Accounting (Beaver, 1966; Altman, 1968, 1983a&b; and Gentry et al., 1984). Behavioral causes of organizational failures were examined in case studies of failed organizations (Richards, 1973; Argenti, 1976; Bibeault, 1982). And organizational strategies that affect decline and turnaround were highlighted by studies in the field of business policy and strategy (Hambrick, 1983; Schendel et al., 1976).

Consequences of this oversight caused in the omission of this important international influence cannot be overstated for organizations operating in an open economy. For researchers studying these organizations, the omission leads to the neglect of theoretical implications of the dynamics of global interdependence.

A. *Importance of Import Competition*

The study of import competition in the realm of organizational bankruptcy becomes important as it differs from domestic competition in several ways.

Firstly, foreign competitors sending imports into the domestic market are not affected by the traditional entry barriers erected by incumbents in the form of tangible assets (e.g., investments in fixed assets) and intangible assets (e.g., investments in research and development) to discourage potential entry of *de novo* firms. Imports, therefore, embody the true spirit of *contestability* (Baumol *et al.*, 1982) and *ultrafree* competition (Shepherd, 1984).

Secondly, imports render the entry-prevention games played by incumbents, particularly oligopolists, useless (White, 1974). In fact, imports introduce the element of uncertainty into the picture which makes models such as the limit pricing model aimed at stalling potential entry counterproductive for the oligopolist (Scherer, 1970). Thus, the presence of import competition necessitates the modification of traditional competitive games which otherwise may be effective in a purely domestic context.

Finally, imports are proven to depress domestic prices and constrain the profitability of domestic producers (Esposito and Esposito, 1971; Pugel, 1978; Turner, 1980). This competitive pressure coupled with the uncertainty that imports are associated with induce a strong resource tension among domestic producers. GM's loss of its dominant market leadership status in the post-World War II period due to import competition bears testimony to the fact that even oligopolists are vulnerable to the competitive forces originating from foreign markets.

So, it is the objective of this thesis to offer this important competitive force, that is import competition, as an alternative explanation to domestic bankruptcy. This thesis also posits that the net impact of import competition on domestic bankruptcy is conditional upon the structural characteristics of the domestic industry. Four industry structural characteristics are adopted to arrive at industry classification. They are: level of competition, capital intensity, R&D intensity, and advertising intensity. Rationale for selecting them are presented in Chapter three of the thesis. These industry structural characteristics will be used to examine the extent to which they mediate the import competition-bankruptcy relationship.

The thesis also posits that import competition facilitates industry adaptation as it creates pressure on domestic firms strongly enough that firms have to take recourse to exit through bankruptcy. Thus, while certain structural industry characteristics impede exit and trap inefficient firms in the industry, import competition eliminates inefficiencies and provides opportunity for industry adaptation.

B. *Statement of Objectives*

Accordingly, the objectives of this research are two-fold:

1. To examine the nature of the relationship between import competition and domestic bankruptcies in the (U.S.) manufacturing industries.

2. To examine if this relationship varies by types of industry.

C. *Outline of the Thesis*:

Chapter Two of the thesis contains a review of the literature. The first part of this chapter will start with an overview of the different perspectives held by researchers who have studied organizational decline followed by a critique of the different streams of research surveyed. The second section will focus on the impact of foreign competition and will survey the literature that will identify the stated effects of such competition and the moderating effects of industry structural variables.

Chapter Three presents the conceptual framework of the thesis research. The international selection model is introduced. The concepts are stated and the underlying relationships discussed. This chapter concludes with the hypotheses that guide the research along with their theoretical rationale.

Chapter Four outlines the method. It contains details of the research design, variables and their measurement, data sources and samples.

Chapter Five presents results of the statistical analysis done and tests of hypotheses performed by utilizing data defined at the SIC four-digit level. Tables of pertinent results are presented and discussed.

Chapter Six discusses in detail the results contained in Chapter Five. Implications of such results are discussed in light of existing theory as well as applications to the manufacturing industry. This section concludes with the identification of directions for future research.

Chapter 2
Literature Review

A. *Organizational Decline and Bankruptcy*

The growing interest of researchers in the study of organizational decline and bankruptcy may in part be due to the rise in the organizational failures evidenced in recent years. The decline in the economic performance of the United States and the sharp rise in the rates of organizational failures are well-publicized phenomena.

Bankruptcy, failure, and decline are synonyms that are used to describe the state of an organization which experienced consistent deterioration in its performance and acute financial distress over the years to the point where it had to take recourse to a legal form of exit by filing for bankruptcy.

Though the bibliographic lists compiled by Whetten (1981) and Zammuto (1983) lead researchers of decline to an impressive number of references on the subject, much remains to be done in understanding this phenomenon that causes a debilitation of human, capital, and entrepreneurial resources.

A.1. Research-to-date:

Literature on *decline* encompasses a wide array of definitions, from situations of crisis, decline in performance, to organizational death. The analyses center around business as well as non-business situations.

Crisis in non-business contexts was analyzed by Hermann (1963), Fink et al. (1971), and Janis (1972). They offered descriptive models of decision-making under distress. Research on organizational decline and bankruptcy offer diverse explanations and insights into why organizations experience decline and fail.

The relevant streams of literature include financial models of bankruptcy (e.g., Beaver, 1966, 1968; Altman, 1968, 1971, 1983a&b; Altman et al., 1977; and Gentry et al., 1984),

behavioral models of organizational failures (e.g., Richards, 1973; Argenti, 1976; Miller, 1977; and Bibeault, 1982), and strategic models of decline and turnaround (e.g., Hambrick and Scheter, 1983; Schendel and Patton, 1976; Schendel et al., 1976; O'Neill, 1982; Datta, 1979; and Willard and Cooper, 1985).

Each of these models offer explanations based on their respective theoretical perspectives. Financial models highlight key financial ratios such as working capital to assets, earnings ratio, debt-equity ratio, and sales to assets ratios crucial to the avoidance of cashflow crisis that may lead to bankruptcy. Behavioral models emphasize attributes of decision makers such as impulsive decision making and propensity to assume high risks and organizational processes (e.g., poor information processing) that lead to the overextension of organizational resources. Strategic models identify product/market strategies that differentiate successful firms from less successful ones.

Despite the divergent viewpoints offered by the different strands of inquiry, the literary streams complement one another in providing a comprehensive explanation of organizational bankruptcy.

These models offer explanations based on predominantly *endogenous* variables. Exogenous influences in the environment are neglected. However, Altman (1983b) examines domestic macro-economic effects (such as economic growth activity, money market activity, capital market activity, and business population characteristics) that explained variations in the aggregate rate of business failures in the U.S. Harrigan (1980), by definition, offers an explanation to industry decline in the form of a decline in the domestic demand for the product induced by technological obsolescence.

Whether bankruptcy has been studied from a micro-perspective or a macro-perspective, the influence of international competition on domestic organizations has been omitted in the literature.

The following section will review selective works of research in the field of international trade and economics which have relevance to the impact of import competition on domestic producers.

B. *Impact of Foreign Competition*

This section will review literature in the field of international trade and economics which has dealt with the impact of forcing competition on the domestic producers. Although the growth of international trade has eclipsed the growth in the production of goods and services in the advanced countries of the world, it appears that research incorporating the effects of foreign competition has lagged behind. This may, in part, be due to the complexities and methodological difficulties that confront researchers interested in empirically examining such effects.

This section will review selective works of empirical research that are relevant to understanding the competitive effects of foreign producers on the domestic industry.

B.1. Review of Literature

Imports have long been recognized as a "source of competitive discipline" evident from the literary works published in the 1960s and 1970s (Krause, 1962; Esposito and Esposito, 1971; White, 1974; Caves and Khalilzadeh-Shirazi, 1977; Pagoulatos and Sorensen, 1976; Pugel, 1978). Research in the 1980s further continues to view import competition from a *disciplining* perspective (Pugel, 1980; Marvel, 1980; Jacquemin et al., 1980; Saunders, 1980; Tuner, 1980; DeRosa and Goldstein, 1980).

Esposito and Esposito (1971), in their cross-sectional study of 77 industries (43 consumer goods and 34 producer goods), examined the impact of foreign competition on industry profitability. Foreign competition was measured as the ratio of imports to domestic shipments averaged over a period of three years, from 1963 to 1965. The outcome observed was industry profitability. From the results of the analysis, they concluded that imports had a negative

effect on the industry profitability with no significant differences between producer goods and consumer goods industries. In addition to the import competition variable, other structural variables such as seller concentration product differentiation and capital requirements were included as independent variables in the study. The effects of concentration were found to be most significant in the producer goods industries while product differentiation was found crucial to consumer goods industries.

Pagoulatos and Sorensen (1976) also employed a cross-sectional design of industries defined at the three-digit level of the Standard Industrial Classification (SIC). In addition to the import competition variable, they employed foreign direct investment as a measure of foreign competition. The outcome measure adopted was price-cost margins, a variant of industry profitability. Data observed were for one year (1967) and from the results they conclude that while imports have a depressing effect on the price-cost margins of the industry, foreign direct investment improved domestic profitability.

Though both studies confirm the constraining effect of *foreign* competition on domestic producers, the major criticism advanced against these two studies was concerning the inept treatment of the influence of imports.

Caves asserts that these studies

> "... treated the market share of imports as an additive influence on profitability, not conditional upon the competitive structure of domestic sellers. That was clearly inappropriate: foreign and domestic sellers together represent the supply side of the market, and the problem is how to formulate and test hypotheses about their joint influence." (1983:2)

This deficiency was addressed in later research. Pugel (1978) in his analysis of 71 industries added an interactive term of imports and concentration in his model. Imports were measured as the share of imports in the domestic market, expressed as the ratio of imports divided by shipments and imports, excluding exports. It was again confirmed that imports exerted a significant negative effect on domestic profitability. Pugel also found a strong and

significant interactive effect of imports with concentration implying that the constraining ability of imports was contingent upon the level of concentration of market power among domestic producers.

Pugel came to similar conclusions in his second study (1980) with 112 industries defined at the four-digit SIC level. He found that the negative effect of import competition was more pronounced in less competitive industries than the competitive sectors. Domestic producer concentration also moderated the influence of exports in enhancing domestic industry profitability though only a weak support was found for the latter effect.

Jacquemin et al. (1980), in their study of 32 Belgian manufacturing industries for 1973, came to the same conclusions of a negative and significant singular as well as joint effects of import competition on domestic industry profitability although their data indicated the absence of a significant impact of concentration taken individually on industry profitability.

Tuner (1980), on the other hand, observed that his analysis based on a sample of 32 industries in the U.K. manufacturing sector was marked by the lack of a uniform effect of imports across all industries. He found that imports had a negative effect only in concentrated industries. Comparing the two measures of import competition adopted, he concluded that the change variable--change in the import share--provided a better measure of import competition. Domestic structural variables such as capital intensity and advertising-to-sales ratio were not entered interactively with imports though their impact on industry profitability was examined independently.

The cross-sectional study of Saunders (1980) was examined in the domain of the Canadian manufacturing industry. His sample includes 84 industries defined at the three-digit level. This study differs in several ways from some of the empirical research presented earlier. Firstly, he employed a different measure of foreign competition in his study--percentage shipments accounted for by foreign-controlled firms--in addition to the imports to shipments ratio used in the other studies. The outcome variable observed by him is *productivity* of the

Canadian industry relative to U.S. producers. He employed an interactive measure that captured the joint effects of growth in the market and existing levels of concentration. His findings also confirm a significant negative association between productivity and foreign ownership of domestic industry implying that, contrary to popular belief, foreign firms in the domestic industry are not always associated with superior performance.

DeRosa and Goldstein (1980) in their study of 86 four-digit SIC industries also confirm the disciplining effect of imports on domestic prices and conclude that such an effect is greater in industries with high levels of concentration. Previous studies have sought to examine the competitive effect of foreign competition within a static framework of cross-sectional analysis of industries, as they have employed data for either one year or have taken the average for about three years. In contrast, DeRosa and Goldstein pool cross-sectional data for four years from 1973-76, thus, allowing for the examination of short-run time effects within a framework of a cross-sectional design of industries.

B.2. Summary

The research reviewed points to the definite conclusion of a negative effect of foreign competition on domestic producers. Empirical research of Esposito and Esposito (1971), Pagoulatos and Sorensen (1976), Pugel (1978, 1980), Marvel (1980), Jacquemin et al. (1980) and Turner (1980) examine the effect of imports on the profitability of domestic industry. The disciplining effect of imports is revealed to be significant with respect to profitability, whether defined in terms of price-cost margins or profitability of sales. Turner (1980) reaches similar conclusions when he analyzes the effect of foreign competition in light of the productivity of the Canadian manufacturing industry relative to its American counterpart.

The additional contribution made by Pugel (1978), Jacquemin et al. (1980) and Turner (1980) lies in highlighting the additional and significant influence of import competition as captured in its (imports) interaction with the concentration variable. In other words, the net effect of imports on individual industries is best explained with the inclusion of the joint

effect it brings about in conjunction with levels of competition in the industry. The impact of foreign competition is, therefore, contingent upon the market power of domestic producers. So an analysis that excludes the interactive effect from an international perspective is incomplete, while an analysis of the market power of domestic firms in the absence of an explicit examination of international influences would, at best, be misleading.

B.3. Criticism

Though the international economic models presented above bring the importance of the influence of international competition to the forefront, they have predominantly pursued implications of interactive effects solely in the context of one single structural variable, that is, domestic concentration. Though Saunders (1980) suggests an interaction effect of growth in the market with levels of concentration found in the industry, the interaction effect of import competition with other structural variables is largely ignored in these studies.

Research hitherto examined suggests only implications leading to allocative efficiency outcomes that dominate economic thought. Imports are seen as providing potentially effective checks on the undesirable behavior of the oligopolist in the domestic market. These results grounded in rigorous methodology enable the identification of specific competitive influences of foreign firms that are generalizable across industries, but provide little insight into the dynamic effects of foreign competitive forces. In other words, as the overwhelming focus of the data observed is one year or a few years, the analysis is static and short-term in orientation. Extending the analysis to incorporate long-term trends in the variables will be helpful in not only testing the stability of coefficients over time,[1] but in bringing the more dynamic effects into focus. The use of time series data within the framework of a cross-sectional design may, thus, be useful in obtaining results that are generalizable across industries and will be meaningful in deriving long-term implications for organizations in the industry as well.

1. This suggestion was also made by Caves, (1983).

Chapter 3
The International Selection Model

Studies on the causes of organizational bankruptcy and decline ignored the influence of foreign competition. They tried to explain bankruptcy or decline from endogenous or internal influences such as financial ratios (Altman, 1968), marketing (Datta, 1979), and strategic choices (Schendel *et al.*, 1976; Willard and Cooper, 1985).

On the other hand, international economists examined the impact of foreign competition on the domestic industry from a *disciplining* perspective. They are DeRosa and Goldstein (1981), Esposito and Esposito (1971), Jacquemin et al. (1980), Pugel (1980), Marvel (1980) and Turner (1980). The outcomes observed were mainly short-term in nature, such as effects on domestic prices and on the price-cost margins of domestic producers.

Both streams of research lacked a long-term analysis of the stated predictor and criterion variable relationships. And neither stream looked at the impact of foreign competition on the long-term decline of the domestic industry in keeping with the current problems facing domestic industry.

The inclusion of import competition as an explanatory variable to predicting bankruptcy is important because of its unique characteristics and the powerful changes it brings about in the domestic industry.

A. *Imports and Domestic Rivals*

Though import competition may be viewed as an off-shore or external form of competition, it fundamentally differs from domestic competition.

Firstly, a foreign competitor sending his goods to a foreign market is not affected by the classical entry barriers that would effectively hinder the entry of potential domestic competitors or even foreign investors.

The theory of entry barriers suggests that incumbent firms in an industry try to maximize their profit potential by eliminating new competition (Bain, 1956). They try to erect barriers to new competition by influencing cost structures in two ways--by making investments in durable and tangible assets or by making investments in intangible assets. These investments are intended to raise the cost structures in the industry high enough that the new firm will, at the outset, be at a disadvantage compared to existing firms.

These entry barriers are not effective in preventing the entry of imports in the domestic market because these foreign producers (exporters) are not setting up production facilities in the export market. Therefore, they do not incur any production-related costs and are not deterred by the entry barriers put up by the domestic competitors. The major barriers that actually impede the entry of imports are mainly in the form of tariff and non-tariff barriers imposed by the State (Bergsten, 1978). In an open economy, assuming that the artificial intervention by the State is not brought into the picture, import competition has the ability to enter and exit at will, thus embodying the concept of contestability[2] or ultra-free competition[3] in industries that are oligopolistic.

Secondly, imports render the competitive games played by incumbents useless (White, 1974). One of such games that has received prominence in the Industrial Organization literature is presented in the "limit pricing" theory. The theory suggests that oligopolists faced with the threat of entry would choose to follow a pricing strategy that would inhibit or preclude entry instead of changing their current levels of output. The "limit price" is defined as the maximum price that the dominant sellers can set without encouraging new entrants into the industry (Bain, 1949). The strategy of limit pricing, however, can only be effective under the condition that incumbents have a thorough knowledge of the cost structures new entrants are

2. The concept of contestability was introduced by Baumol et al. (1982) in the domestic context. The authors make no mention of import competition in referring to this concept.

3. Shepherd (1984) in his criticism of "contestability" and its applicability to the domestic competition suggests that the term is more relevant to explaining the behavior of imports.

faced with. In the case of imports, then, such strategies not only fail to be effective but may become counterproductive (Scherer, 1970). This is because imports are associated with a great deal of uncertainty for domestic incumbents who have perfect knowledge of the cost structures that foreign competitors face in their home markets. The uncertainty is also compounded by fluctuations in exchange rates, freight duty and other incidental costs incurred by the foreign exporter. Faced with this great deal of uncertainty, incumbents may fail to determine the optimal level of such an entry-deterring price. And as DeRosa and Goldstein assert, they may actually prefer to allow their market shares eroded by imports rather than reduce prices (1981:607). Or they may end up choosing a smaller quantity of output as well as a higher price, thus losing on both ends (White, 1974). Thus, dominant firms in the industry are not only ineffective in blocking imports, but they also suffer losses in market share and profitability as a consequence of import competition.

B. *Industry Structure and Domestic Firms*

On the domestic front, in keeping with the existing body of knowledge developed around the Structure-Conduct-Performance paradigm[4] in the industrial organization literature, we find that structural characteristics such as concentration and barriers to entry and exit exert a significant impact on firm conduct (Scherer, 1970; Caves, 1982).

Concentration which is one of the main elements of market structure has received the most attention among empirical researchers applying concepts developed in industrial organizational analysis because most of the market behavior and market performance linkages depicted center around seller concentration. Thus, studies in the international field reviewed in the previous chapter of the thesis also have mostly been interested in examining the influence of this structural variable in the international context; only domestic concentration (Pugel, 1980; DeRosa and Goldstein, 1980; Jacquemin et al., 1980; Turner, 1980) and industry growth (Saunders, 1980) are seen as interacting with import competition.

4. For a detailed discussion of this paradigm, see Scherer (1970: 3-7).

Concentration is an important structural dimension that represents the market power of the leading firm group, which has a considerable impact on the structure and levels of competition that exist in the industry. The extent to which the leading group controls the industry output defines the rules of the competitive games that others follow. The group's dominance also influences potential competition in the industry. In summary, it "affects the average profitability of all its members" (Shepherd, 1972:26).

C. *Exit Barriers and Domestic Firms*

In addition to concentration, structural characteristics that raise barriers to exit for domestic competitors are important to this thesis. Barriers to exit are structural traits of an industry that discourage incumbents to leave the industry even when they are no longer profitable (e.g., when prices are lower than costs) (Caves and Porter, 1976). Such barriers trap participants, induce price warfare (Harrigan, 1981:308), and inflict subnormal profits (Caves and Porter, 1976:40). Thus, the presence of high exit barriers decreases the likelihood of an early exit of distressed firms.

All exit barriers in some way arise from entry barriers. Among the structural sources of barriers to exit, the role of fixed and durable assets (e.g., investments in capital requirements) in preventing exit is well examined. Some other forms of exit barriers are share assets in joint production, managerial barriers to exit (Caves, 1987), investments in technological requirements, and product differentiation barriers (Porter, 1976; Harrigan, 1981).

Industry structural characteristics such as investments in technological requirements and product differentiation barriers (e.g., advertising intensity) are investments that create intangible assets (e.g., goodwill). These intangible assets are firm specific and industry specific with little expected salvage value at the time of exit (Caves and Porter, 1976:45).

It may be argued that some part of the intangible asset, say goodwill generated by the exiting firm during the course of its operations, may be transferred to the firm purchasing the enterprise as a whole (as opposed to purchasing fixed assets alone in the form of machinery

and equipment for alternative uses). But, in reality, the additional price the potential buyer would be willing to pay for this goodwill asset is, most often, directly proportional to the success of the exiting firm. Consequently, an unsuccessful firm has the least profitability of earning a minimum acceptable rate of return on its investments in intangible assets. Therefore, such assets attach an element of a high risk (of losses) at the time of exit. The specificity of intangible as well as tangible assets heightens the exit barriers (Caves and Porter, 1976). Harrigan (1981) found that in addition to investments in tangible durable assets, investments in intangible non-durable assets constitute significant exit barriers (p. 322).

D. *The International Selection Model*

In recognizing the presence of structural characteristics that block exit of firms in the domestic industry, the international selection model presented in the thesis proposes that imports induce or exacerbate resource tension among domestic organizations and facilitate the exit of distressed firms via bankruptcy. Thus, the entry of imports in the domestic market leads to the release of critical resources trapped among inefficient units and allows the industry to adapt and redeploy scarce resources into more productive channels. In short, import competition eliminates inefficiences and promotes industry adaptation. The higher rates of bankruptcy should not be taken as indicators of industry decline, but should be construed as indicators of the extent of adaptation taking place in the industry.

Four structural characteristics will be used in the study to examine industry influences on the import competition-domestic bankruptcy relationship.

Level of competition as reflected in the levels of concentration has been thoroughly tested in the domestic as well as international contexts. But this structural dimension will be re-examined in the context of the new framework of relationships stated in the thesis, that is, in conjunction with imports and organizational bankruptcy. Including this industry characteristic is also crucial to examine if there exists a true difference between import competition and domestic competition, as suggested by the thesis.

Capital intensity is a structural trait that represents investments in durable assets made by firms in the industry. As this industry trait is proven to erect high barriers to exit, it will be used as a structural dimension to classify industries.

R&D intensity is included in the study as technological requirements are also shown to constitute significant exit barriers.

The fourth exit barrier adopted in the study is advertising intensity. This structural trait represents a measure that is most often used to indicate the product differentiation effort in the industry. It constitutes a significant barrier to early exit as the goodwill generated is short-lived, the investment required is recurring, and the salvage value at the time of exit is dismal unless the exiting firm is a successful one.

Capital intensity, R&D intensity and advertising intensity are all important structural elements as well from a strategic point of view.

The following section includes hypotheses stating the moderating effect of each of the four structural characteristics the import competition-domestic bankruptcy relationship.

E. *The Research Framework*

E.1. Research Questions

The two research questions that will be addressed in the thesis are as follows:

1. What is the relationship between foreign competition and domestic bankruptcies?
2. Does this relationship vary by types of industry?

E.2. Question one

What is the nature of the relationship between import competition and domestic bankruptcy?

Empirical studies in the field of international trade and economics concur that "prices as well as margins are affected by the competitive force of imports" (Caves, 1983: 4). Research

by Esposito and Esposito (1971) shows that imports exert a significant *negative* effect on an industry's profit rates. Marvel (1980) and Pugel (1978, 1980) show that price-cost margins exhibit a negative relationship with imports, expressed as a ratio of domestic sales.

Therefore, import competition may be viewed as a stress imposed on the industry from external sources. This additional stress creates resource tension among domestic firms as they compete for resources in the market, causing marginal firms to be driven out of business. Exposing the industry to greater competition from imports would tend to cause the most inefficient firms to be eliminated. Thus, *inefficient* firms are selected out of the industrial population. Inefficiences may arise from sub-optimal cost structures or maladaptive organizational strategies or both. White (1974) shows that even a monopolist is vulnerable to import competition as he exposes himself more frequently to import competition by choosing a smaller quantity and a higher implied domestic price. Hence, the higher the import competition, the higher the resource tension imposed on the domestic firms, and the higher the rate of organizational bankruptcy.

Hypothesis 1a: Import competition is expected to exhibit a positive correlation with organizational bankruptcy in the domestic manufacturing industry.

On the contrary, imports may have no significant impact on domestic producers. This may be true in industries where in imports form a small and perhaps a negligible part of the total supply in the domestic market. Thus, imports which do not impinge upon the market share of domestic producers strongly enough to cause acute financial distress will have no effect on the domestic firms. Secondly, industries dominated by foreign firms or by multinational firms would also remain immune to the competitive influence of imports since the source of potential imports would in most cases be the parent firms. Foreign firms engage in foreign direct investment (i.e., invest in production facilities in foreign markets) in response to the protectionism (potential or actual) in foreign markets or to gain proximity to the markets they serve. In either case, imports do not pose a threat to the production units of foreign

firms. Parent firms would, therefore, be unwilling to sacrifice their investments in these facilities abroad merely due to the levels of imports present in the industry. So, the following hypothesis may be formulated.

Hypothesis 1b: Import competition is expected to exhibit no correlation with organizational bankruptcy in the domestic manufacturing industry.

A third type of relationship between import and domestic organizational bankruptcy may be deduced from the following explanations.

In industries where firms actively seek markets beyond domestic boundaries, that is, in export-oriented industries, losses in the domestic market may be compensated by gains in the market share abroad. An export strategy may serve not only to alleviate the distress experienced in home markets but may serve to increase profits by allowing domestic firms to spread fixed costs over a larger volume and thereby reap economies of scale. Therefore, the presence of imports may actually be beneficial to domestic industry if it serves to enhance the efficiency of domestic firms and to induce an adaptive strategy that improves their potential profitability. So, such industries when faced with import competition may become more efficient and subsequently have a decrease in the rate of bankruptcy among domestic units. Hence, a negative relationship between import competition and domestic bankruptcy.

Hypothesis 1: Import competition is expected to exhibit a negative correlation with organizational bankruptcy in the domestic manufacturing industry.

E.3. Question two

Does the relationship between import competition and domestic bankruptcy vary by types of industry?

The simple model of the structuralist approach pioneered by Joe Bain (1959), otherwise known as the Bain/Mason paradigm, depicts the theory that the structure (S) of the market influences performance (P) (Scherer, 1970). Structural dimensions such as barriers to entry,

concentration ratios, and regulatory pressures are each recognized to have an impact on the inter-firm rivalry in the industry and, ultimately, the organizational performance (Scherer, 1970). And "industry-wide structural traits affect the profit potential of an industry, as a whole" (Porter 1979: 215). Therefore, "market structure elements are 'ex ante' determinants of market conduct and, thereby, performance" (Caves & Porter, 1976: 39).

Hypotheses indicating the differential impact of each of the four industry structural characteristics on the impact of import competition on domestic bankruptcy are stated in the following sections.

E.3a. Effect of Domestic Competition

America has always remained a champion of the *free enterprise* system among the major economies of the world. Though some Americans in business, labor and government believe that "United States policy toward industrial competitiveness is constrained by an outmoded *laissez-faire* philosophy unsuited to actual world conditions" (McCullough, 1985: 144-45), the United States still largely depends on market mechanisms to channel its resources of plant, equipment, and labor into productive use. Competition still remains a much favored tool in the hands of economists interested in the long-term revitalization of American industry.

Competition has been one of the most popular structural variables used by researchers in the domestic as well as international context. Concentrated or non-competitive industries are known to respond to disturbances than their competitive counterparts (Caves, 1983). In concentrated industries, such as oligopolistic industries, the market leaders set the prices and also controls the majority of output produced in the industry. Therefore, the extent to which adjustments in prices and quantities of output take place in response to market conditions depends on the objectives of the oligopolists.

Oligopolists are known to enter into collusive agreements (co-opt) and engage in a strategy of *limit pricing*. The limit-price is the highest price that incumbents can set without inducing new entry (Bain, 1949). The objective is to maximize profits by preventing potential

competition. Therefore, firms in oligopolistic industries would tend to have higher price-cost margins than firms in competitive industries.

In competitive industries, since the output is distributed over a large number of producers, no single firm would have the market power to influence powers. Prices would, consequently, be set by market forces of demand and supply and would tend to move to an equilibrium point, which theoretically would lie close to the industry cost curve. As the margins are already slim in competitive industries, imports in the long-run would have a negligible effect on these prices and also on the margins of domestic producers. The "X-efficiency" concept put forth by Leibstein (1966) also suggests that firms operating in competitive conditions are more efficient than firms operating in less competitive environments. On the contrary, import competition will have a greater effect on the oligopolists' prices and margins. Thus, the impact that import competition will have on domestic producers depends on the extent of competition that exists among domestic firms.

Pugel (1980) and Turner (1980) demonstrate that imports have the greatest effect on prices and margins in highly concentrated industries. Pugel (1980) also shows that import competition interacts with seller concentration in affecting domestic price-cost margins. Jacquemin, de Ghellinck and Huveneers (1980) confirm the presence of an interaction effect between imports and seller concentration in their study of Belgian manufacturing industries.

In accordance with existing evidence, it will be hypothesized that the culling effect of import competition will be felt more strongly in industries with potentially low competitive conditions (and, therefore, prone to higher levels of inefficiency) than in fragmented industries.

Hypothesis 2a: The relationship of import competition with domestic bankruptcy is expected to be positive and greater in industries with low domestic competition than in industries with high domestic competition.

Furthermore, it it hypothesized that:

Hypothesis 2b: The interaction effect of import competition with domestic competition is expected to be positive.

Yet, a contrast to this hypothesis may be formulated suggesting that industries with high competitive conditions may actually be more vulnerable to import competition than their less competitive counterparts. The underlying rationale includes a two-pronged explanation.

Firstly, oligopolistic industries with low competitive conditions may be dominated by large firms--domestic or multinational or both. Such firms:

i may have the ability to withstand a decline in performance for longer periods of time than smaller firms due to built-in buffers of slack;

ii. may resort to risk-minimizing strategies (e.g., diversification as evidenced in the steel and chemical industries);

iii. may take recourse to finding external sources of support to avoid impending bankruptcy (e.g., Chrysler bail-out);

iv. may resort to a merger strategy (e.g., formation of U.S. Steel, now called USX)

v. may engage in cooperation strategies (such as joint-venture formation, lobbying for import quotas and voluntary restrictions as seen in the auto industry);

vi. may even be able to divest troubled units as they have the slack (financial), consequently, the capability of "waiting" for a buyer.

vii. may, due to their marketing strength, promotion and product differentiation skills, survive in the face of inefficiencies.

Secondly, firms in competitive industries may be akin to *lean* organizations with no built-in buffers of slack prices which are kept close to costs. Hazledine's study (1980) shows that relative costs are most important in unconcentrated industries. The constant pressure to

remain competitive may make them more vulnerable to additional competition coming from overseas. Studies of the semiconductor industry suggest that despite a growing market, the domestic industry in the semiconductor and electronic goods is on the decline (Millstein, 1983; Tyson and Zysman, 1983).

Hypothesis 2c: The relationship of import competition with domestic bankruptcy is expected to be less in industries with low domestic competition than in industries with high domestic competition.

E.3b. Effect of Capital Intensity

In recent years, the United States has moved from the position of "being a principal supplier of capital goods to being a net importer of capital goods," and the capital goods sector is the hardest-hit by the import shock (Subcommittee on Oversight and Investigations, 1985: vii) The concern expressed by the Subcommittee, by implication, suggests that capital intensity does not act as a natural *barrier to entry* for imports, as would be expected in the case of domestic producers. This is evidenced by the dramatic increase in the imports of capital intensive goods in recent years. High capital intensity may discourage potential entry of foreign firms which seek to engage in foreign direct investment in the domestic market. Potential foreign entrants who send exports do not face these barriers as, first of all, they do not set up production facilities in the domestic market. Secondly, they may be faced with different or lower cost structures than domestic producers. In addition, exporting abroad allows such foreign competitors to spread their costs over the output they sell at home and in world markets. Hence, the above structural barrier is ineffective in blocking the entry of imports in the domestic market.

The presence of the dual advantages for potential foreign exporters confers on them a third and more powerful benefit. Imports introduce the notion of *contestability* in the market. Contestability implies the possibility of free entry and (almost instantaneous) exit with the added ability of entrants to influence prices in the market (Baumol, Panzar and Willig, 1982).

Imports are cost competitive and are proven to induce price warfare (Pugel, 1978; Shepherd, 1972a). Imports are a source of competitive *discipline* as they affect prices as well as profit margins in the domestic market (Caves, 1983: 2-4). Esposito and Esposito (1971) found that imports exert a significant negative effect on the profits of the consumer as well as producer goods industries (p. 343). Pugel (1978; 1980) and Marvel (1980) among others also demonstrate that a negative relationship exists between import competition and domestic price-cost margins. Hence, import competition is akin to *guerrilla* competition with the ability to "hit and run"; industries with high capital cost structures also remain vulnerable to this type of competition. As high capital intensity also hinders exit (Caves & Porter, 1976; Harrigan, 1981, 1982, 1985), the incumbents are subjected to an increased rivalry and resource tension. Thus, it may result in a high rate of domestic bankruptcies.

Hypothesis 3a: The relationship between import competition and domestic bankruptcies expected to be positive and greater in industries with high capital intensity than in industries with low capital industry.

The interaction effect between the key independent variable and the moderating structural variable is assumed to exert a significant positive influence on the dependent variable.

Hypothesis 3b: The interaction effect of import competition and capital intensity on domestic bankruptcy is expected to be positive.

On the other hand, industrial organization literature suggests that the presence of capital intensive production technologies reduces competition among domestic firms and enables the presence of "untransformed rents" for incumbents. The resulting scenario is one in which there is less rivalry and resource tension among existing domestic competitors in capital intensive industries. Therefore, domestic firms in such industries may be *less* vulnerable to import competitive shocks in the domestic market than firms in less capital intensive industries.

At the same time, diseconomies of small scale, tariffs, and other barriers to entry may combine to preserve a tail of small-scale production firms (Saunders, 1980; Caves, Porter, and Spence, 1980, chaps. 3 and 10) thriving on specialized niches not served by the large dominant firms in the industry. Therefore, a deeper examination of industry trends in performance over time may show a decline in performance by a low or zero bankruptcy among its firms. Grønhaug & Narapareddy (1987), in their analysis of the Farm Machinery & Equipment industry (SIC 3523) and the Motor Vehicles and Car Bodies (SIC 3711) industries over a seven-year period (1976 through 1982), find a substantial reduction in performance in terms of value added in both the industries. Therefore, the relationship depicted in Hypothesis 3a may be reversed to show that capital intensive industries are less sensitive to import competition than their less-capital intensive counterparts.

Hypothesis 3c: The relationship between import competition and domestic bankruptcy is expected to less in industries with high capital intensity than in industries with low capital intensity.

E.3c. Effect of R&D Intensity

Prior research in the field of international trade suggests that the less-developed countries (LDCs) have their strongest advantages in labor-intensive, and standardized products (Katrak, 1973; Tharakan et al., 1978). The older industrialized countries of the West such as the U.S., and U.K. have traditionally maintained a comparative advantage in the production of technology-intensive, skill-intensive, and differentiated products, particularly in industries which are in the earlier stages of their product life cycle (Grant, 1986: 198-199). Exceptions to this would be in the case of exports by the so-called "competitive fringe," that is, imports from other advanced countries (e.g., Japan) or exports to foreign markets to multinational companies and other dominant foreign firms.

In the case of "high-tech" industries which are R&D intensive, the U.S. has traditionally maintained supremacy over the rest of the world. Growing evidence suggests that there is a

dramatic reversal in the role that America has traditionally played. From being a dominant leader in the production and exports of high technology goods, U.S. has now become a net importer of such goods and capital. As the report of the Subcommittee on Oversight and Investigations states: "now we import and borrow like some struggling pre-industrial economy" (1985: vii). The report further suggests that the high-tech producers are the hardest hit group among domestic producers by the "import shock."

Some understanding of this phenomenon may be derived from explanations based on concepts such as costs and uncertainty. Investments in research and development outlays require heavy expenditures and serve to produce assets that are intangible, uncertain and risky. The risk and uncertainty of profitable returns are compounded by the absence of legal methods of protection (e.g., patent protection) offered in the industry. Firms incurring heavy R&D outlays may have to resort to other forms of control to ensure equitable appropriability of potential returns of new innovations generated, such as the "control of co-specialized assets" (Teece, 1986: 301) for long-run survival. Otherwise, profits may be lost to competitor firms or imitators in the market. Thus, these investments may be "risky" and result in lower profits in the short run and increase the probability of "ruinous losses" in the long run (Caves and Porter, 1976) for firms undertaking such investment projects. Therefore, the following hypothesis suggests an upward moderating effect of R&D intensity.

Hypothesis 4a: The relationship between import competition and domestic bankruptcy is expected to be positive and greater in industries with high R&D intensity than in industries with low R&D intensity.

The interaction effect again is hypothesized to be central to the prediction of bankruptcy.

Hypothesis 4b: The interaction effect of import competition and R&D intensity on domestic bankruptcies is expected to be positive.

On the other hand, the *de-maturity* and *industrial rejuvenation* arguments call for reversing industry declines through a strategy based on R&D. Real improvements in industry productivity and output gains can only be secured through replacing obsolete productivity equipment and outdated production technologies with computer-controlled production and automation systems. Productivity may depend on the rate of adoption of innovations. Firms which carry out a relatively large R&D effort are more likely to be using state-of-the-art technology. Saunders found that among Canadian firms, relative R&D intensity was positively related to their productivity (1980: 177).

Process innovations may (also) serve to extend the life cycle of the product and de-emphasize the volume-based strategies embedded in the product life-cycle theory. Jones and Womack (1986) argue that "rapid innovations make differentiation-based competition more important than a cost-based competition, thereby opening up a host of strategic choices that were hitherto not available for organizations" (p. 262). These arguments lead us to a hypothesis that is a contrast to hypothesis 4a.

Hypothesis 4c: The relationship between import competition and domestic bankruptcy is expected to be less in industries with high R&D intensity than in industries with low R&D intensity.

E.3d. Effect of Advertising Intensity

Product differentiation may be achieved through advertising (Bass, Cattin & Wittink, 1978: 4) and other sales promotion expenditures; some product-related R&D expenditures may also relate to the product differentiation effort of firms (Caves & Porter, 1977: 246). In industries which require heavy expenditures in creating product differentiation (such as automobiles, cigarettes and soft drinks), firms producing such goods typically engage in "image advertising," which provides the consumer with little product information, but which is aimed at sending "social signals" associated with the product in an attempt to persuade the consumer into purchasing the product (Lane, 1982: 1-3). As advertising intensity offers a good measure

of the product differentiation effort at the supplier level, it will be used a surrogate for the degree of product differentiation effort that exists in the industry.

Investments aimed at achieving product differentiation are as risky as R&D expenditures as they serve only to create *intangible assets.* Product differentiation reduces the cross-elasticity between substitutes (existing and new) and forces new entrants to resort to other promotion or price reduction strategies (Caves and Porter, 1977: 245). In summary, heavy investments in advertising are assumed to discourage new entry, erect barriers to mobility for established firms from other markets as well as restrict the intergroup mobility of incumbent firms. Among incumbents, they promote rivalry and create resource tension. Hence, the possibility of a high rate of organizational failures in the industry.

Hypothesis 5a: The relationship between import competition and domestic bankruptcy is expected to be positive and greater in industries with high advertising intensity than in industries with low advertising intensity.

The interaction effects are once again hypothesized to wield a positive relationship with the dependent variable.

Hypothesis 5b: The interaction effect between import competition and advertising intensity is expected to be positive.

Unlike the case of production-based barriers to entry, imports are assumed to be vulnerable to entry barriers arising from sales promotion and distribution (Caves, 1983: 5). De la Torre (1972) observes that exporters from developing countries face difficulty exporting product that face product differentiation barriers. First of all, in the case of industries requiring heavy advertising, foreign competitors possess the disadvantage of unfamiliarity with the market and are, thereby, subjected to a high degree of uncertainty (Lawrence 1981; Lawrence and Dyer 1983). The domestic competitor in this situation actually has an edge over the foreign competitor unless the foreign product being exported possesses "superior" or "snob"

appeal over domestic goods. Therefore, high advertising intensity becomes a structural characteristic favorable to domestic producers. Consequently, industries with low advertising intensity may be more vulnerable to import competition. Accordingly, we have the following hypothesis.

Hypothesis 5c: The relationship between import competition and domestic bankruptcy is expected to be less in industries with high advertising intensity than in industries with low advertising intensity.

Chapter 4
Method

A. *Design*

The research employs a combination of a cross-sectional and time-series design. The unit of analysis is the *industry*, as defined at the four-digit SIC-level. A four-digit classification was chosen instead of a two-digit one as it allows for a higher degree of homogeneity among organizations represented in the industry class. This conforms well with the principle of "homogeneity" urged by McKelvey and Aldrich for conducting valid research (1983: 118). Further, a final of thirty industries were chosen based on the level of import competition they encountered on the domestic front. Thus, the primary independent variable, import competition, is emphasized in guiding the sample selection. This procedure, in turn, is in concordance with the "strategic sampling" proposed by Glaser and Strauss (1967).

Data for the industries chosen were collected for a period of 11 years, from 1972 through 1982, for each of the variables in the study. Although originally I planned to examine the industries over a period of 14 years (1972 through 1985), I was forced to limit the observation to eleven years as published bankruptcy statistics were not available beyond 1982 at the time of data collection. Yet, a span of eleven years may be considered adequate in capturing fundamental changes that occur in a population of organizations.

B. *Samples*

An initial list of 54 industries (four-digit) was drawn from all major groups of two-digit manufacturing industries. These industries were based on the levels of import competition they encountered on the domestic front. The objective was to obtain the broadest possible representation of all manufacturing industries in the sample that were facing different levels of import competition. During the data collection, however, industries were eliminated due to non-availability of data on the structural characteristic dimensions. The screening at different stages resulted in the elimination of a total of twenty-two industries. Thus, the final list of

industries that entered the data analysis contained thirty-two industries, all defined at the four-digit SIC grouping. The list of samples is given in Appendix A.

C. *Variables*

1. *Bankruptcy* (BKRATE)

Measurement. This variable is measured as the annual rate of firms bankrupt per 1,000 going firms in the industry.

The rate of bankruptcy so calculated at the three-digit SIC level is used, as a proxy for the rate of bankruptcy at the four-digit industry. The three-digit annual rate of bankruptcy was adopted instead of its four-digit counterpart due to problems encountered in the compilation of bankruptcy statistics at the four-digit industry classification.

At the outset, organizational failure data was compiled from the failure of firms reported in the F&S Predicast Index of Corporate change, an annual publication of the Dun and Bradstreet Corporation. Each firm reported in the Bankruptcy section was matched with the respective four-digit SIC number reported in the index section of the publication. The data so recorded was tabulated to arrive at the annual number of failures reported at the four-digit industry. These numbers were also aggregated to arrive at the three-digit and two-digit industrial failures. These numbers when cross-checked against the aggregated annual figures of failures reported in the Quarterly Failure Reports indicated a great deal of disparity though both documents are published by the same organization, the Dun and Bradstreet Corporation, NY. It appeared that the number of failures reported in the Quarterly Failure Reports were more comprehensive than the data painstakingly compiled from the F&S Predicasts Index. Therefore, a three-digit rate of bankruptcy was chosen to represent the rate of bankruptcy at the four-digit industry. An exception was made for industries SIC 3942 (Dolls) and SIC 3944 (Games and Toys) for which the two-digit bankruptcy was used for lack of data at the three-digit level.

2. *Import competition* (IMPCOMP)

Measurement. Import competition is measured in two ways, one representing the absolute values of imports, and the second one representing imports in relation to the domestic supply in the industry.

a. DIMP is measured as the dollar values of imports in the industry in year *t* deflated by the implicit price index of imports in year *t*.

b. Import penetration ratio (IMPRS) is expressed as a ratio of imports in year *t* to new supply in year *t*, where new supply = domestic shipments + imports.

This measure, IMPRS, is a supply-side concept. It represents a construct different from DIMP. Whereas DIMP is a measure of the real value of imports in an industry, IMPRS is a measure relative to the supply in the domestic industry.

Both DIMP and IMPRS are collected at the four-digit SIC level.

3. *Capital intensity* (CAPINT)

Measurement. Capital intensity is measured as new capital expenditures in the industry reported in year *t* expressed as a percentage of shipments in year *t*.

This measure represents the concept of "re-investment requirements" alluded to by Porter (1976) and Harrigan (1981). This annual measure was chosen instead of the traditional asset-based measure for the study for the following reasons.

The classical asset-based measure is indicated by the ratio of capital assets (adjusted for depreciation) to sales. There are several drawbacks to this. Firstly, the value of assets reported in the books of accounts of firms contains distortions arising from the depreciation method(s) used by the reporting firms. Further discrepancies in the book value of assets may occur due to changes in the reporting requirements of the FASB (Financial Accounting Standards Board). Secondly, as it is a cumulative measure, it fails to capture the changes in the levels of capital intensity induced by technological changes in production processes in the

industry. Finally, while the sales (denominator) are measured in current values, the capital assets (nominator) are taken at historical costs. This mismatch in the time periods used in the measurement may not reflect the concept being measured accurately. A better measure may be found in using the replacement value of capital assets, expressed as a ratio of current sales, but trying to compute replacement values of assets at an industry level would be an impossible task.

On the other hand, the annual measure of new capital expenditures to shipments adopted in the study measures the actual new capital expenditures undertaken each year expressed as a ratio of shipments for that year. It, therefore, reflects the changes in the levels of capital intensity that may have occurred during the period of the study and also eliminates some of the deficiencies outlined above. Therefore, this measure was selected over the traditional asset-based measure of capital intensity.

As sales data were not available from the same source of publication that was used to compile new capital expenditures data, annual shipments were used as a proxy of sales.

This variable is measured at the four-digit SIC level.

4. *Advertising intensity* (ADVINT)

Measurement: Advertising intensity is expressed as the ratio of advertising expenditures in the industry in year t to the industry sales in year t expressed as a percentage.

The average rate of advertising intensity for the largest firms (market leaders) in the industry was used to represent the advertising intensity of the industry at the four-digit.

5. *R&D intensity* (RNDINT)

Measurement: The R&D intensity of the industry was measured in terms of the R&D expenditures in year t expressed as a percentage of sales in year t for the industry.

The average R&D intensity for industry market leaders reported in the published data was chosen as a proxy for the R&D intensity at the four-digit industry.

6. *Level of competition* (COMP4F)

Measurement: The level of competition in the industry in year t is measured as the inverse of the four-firm concentration reported in the industry for year t. The four-firm concentration ratio represents the percentage value of shipments accounted for by the four largest companies in the industry. Concentration ratios represent the leading-firm group's share of the total industrial output. This market share concept is often taken as an indicator of the level of competitive conditions prevalent in the industry.

A second measure of competition (COMP8F) was obtained from the eight-firm concentration ratios reported in the industry.

Four-firm and eight-firm concentration ratios were obtained from the statistics published at the four-digit SIC industry. Data for both measures was available only every five years

A list of variables along with their measurement is given in Appendix A.

D. *Data*

D.1. Nature of Data

Data for the study was collected from archival sources. The decision to use secondary sources of data was made due to the availability of appropriate data at the industry level from a variety of sources, both private and public. First-hand collection of data at the industry level would be impractical, if not impossible, given the time and financial resources available for the thesis research.

D.2. Sources of Data

Import statistics for 1972 through 1982 were collected from the historical data tables of various issues of the U.S. Industrial Outlook, an annual publication of the Department of Commerce. For almost all industries historical data tables for the 11 years under observations were available from a single publication--the 1985 U.S. Industrial Outlook.

Bankruptcy statistics were compiled from the Quarterly Failure Reports of the Dun's Statistical Review published by the Business Economics Division of the Dun & Bradstreet Corporation.

The number of firms in the industry was taken from the annual publications of the Internal Revenue Service, titled "Corporation Income Tax Returns." The total number of returns filed with the Interval Revenue Service for the particular industry at the "minor" level of aggregation was taken as a proxy for the total firms in the industry at the three-digit level. I chose this publication as a source for collecting the number of firms as I found a high degree of concordance in the industry classification between this document and the industry classification at the "minor" level of aggregation used in the Quarterly Failure Reports. Industries that did not match well in the two documents were eliminated in the initial screening of sample selection.

Capital expenditures and shipments used to calculate the level of capital intensity in the industry were obtained from the various issues of the Annual Survey of Manufactures. Four-firm and eight-firm concentration ratios necessary to compute levels of competitive conditions in the industry were obtained from the Census of Manufacturers published every five years. Both the Annual Survey of Manufacturers and the Census of Manufacturers are publications of the U.S. Department of Commerce.

Data for advertising intensity and R&D intensity were compiled from the Financial Services-Industry Composite published by the Standard & Poor's Compustat Services, Inc. For industries with no data published in the Financial Dynamics, the R&D intensity data were obtained from the sectoral industry studies published. For example, R&D data for SIC 3693, 3841, 3842 and SIC 3843 were taken from the "Federal Policies and the Medical Devices Industry," published by the office of Technology Assessment, Congress of the United States (October, 1984). Deflators for imports are taken from the Economic Report of the President.

D.3. Limitations of the Data

The main limitation of using secondary data is that such data may involve some overlaps and mask subtle changes. For instance, the SIC classification is based on establishments rather than individual organizations. So, organizations that are diversified will be counted in more than one industry. Secondly, data for the various measures are compiled from different sources instead of one single source. Therefore, due to these and other problems inherent in secondary data, meticulous care was taken to understand the basic definitions used by the original author(s) in computing the data and to ensure uniformity in the industry definitions.

E. *Data Reduction*

Step 1: the correlation matrix for the pooled sample was used to examine the simple correlations between the dependent variable bankruptcy (BKRATE) and the key independent variables, import competition (DIMP and IMPRS, respectively). Inspection of the two correlation matrices revealed that while the correlations of the deflated values of imports (DIMP), with bankruptcy across different time lags were significant correlations for IMPRS were not. Based on this initial result the import penetration ratio measure of import competition (IMPRS) was dropped from subsequent analysis and hypothesis testing.

Step 2: The following basic model was used to estimate parameters that will allow tests of the hypotheses formulated in Chapter Three of the thesis.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_1 X_2 + \epsilon$$

where

Y = rate of bankruptcy (BKRATE);

X_1 = import competition (DIMP);

X_2 = structural characteristic of the industry or the intervening variable;

$X_1 X_2$ = interaction term (TEMPH); and

ϵ = error term.

As research question #2 of the thesis relates to examining whether the industry structural characteristics differentially impact the import competition-bankruptcy relationship, the respective structural characteristics were entered as binary variables in the analysis. This facilitates classifying industry samples into two disjoint subgroups to capture the maximum variance between the groups. A dummy variable of 1 was used to represent the *high* group and 0 to represent the *low* group. When binary values (0 or 1) are used for X_2, the above equation can be reframed as follows:

If $X_2 = 0$, the equation for the *low* group is:

$$\hat{Y} = \beta_0 + \beta_1 X_1 + \epsilon$$

If $X_2 = 1$, the equation for the *high* group is:

$$\begin{aligned} \hat{Y} &= \beta_0 + \beta_1 X_1 + \beta_2 + \beta_3 X_1 + \epsilon \\ &= \beta_0 + (\beta_1 + \beta_3) X_1 + \beta_2 + \epsilon \end{aligned}$$

Thus, for the *low* group the coefficient of X_1 is β_1, while for the *high* group the coefficient of X_1 is $(\beta_1 + \beta_3)$. While β_1 reflects the individual impact of X_1 on Y, β_3 reflects an additional joint impact. Therefore, β_1 and β_3 together represent the total impact of import competition on domestic bankruptcy. Hence, the tests of hypotheses center around testing for the significance of β_1 and β_3 and examining if the signs of the respective coefficients conform to the directions stated in the hypotheses.

F. *Statistical Techniques*

The Pearson correlation matrices were generated with the PROC CORR statement in the CORR Procedure of the SAS User's Guide: Basics (1985).

As the data used were a compilation of 32 cross-sections (i.e., industries) with 11 years time-series observations for each variable, it was necessary to choose a statistical program appropriate for the analytic design. The Time Series Cross Sectional Regression program (TSCSReg Procedure) of the SUGI Supplemental Library User's Guide (version 5.0) was

found suitable for the analysis. Among the three models in the TSCS Reg procedure, the Parks method which is a first-order autoregressive model was chosen for data reduction as the data for the sample of industries had a significant (α = .05) first-order autocorrelation in the dependent variable. Therefore, the coefficients necessary to test hypotheses three through five were estimated with the Parks method with a first-order autoregressive model.

However, hypothesis two, which examined the effects of levels of domestic competition did not require an autoregressive model to estimate the parameters as data for domestic competition was available only for three years. Given this constraint, data had to be analyzed within a static framework. Estimates were generated using a three-year pooled model in step one and three year-by-year models in step two. The statistical procedure used here was the SAS Regression procedure.

Chapter 5
Results and Discussion

This chapter presents results of the statistical analysis performed on the data and tests of hypotheses conducted in light of the estimated results.

A. *Hypothesis One*

Hypothesis 1a: ***Import competition is expected to exhibit a positive correlation with organizational bankruptcy in the domestic manufacturing industry.***

Hypothesis 1b: ***Import competition is expected to exhibit no correlation with organizational bankruptcy in the domestic manufacturing industry.***

Hypothesis 1: ***Import competition is expected to exhibit a negative correlation with organizational bankruptcy in the domestic manufacturing industry.***

A.1. Method

Correlations between the dependent variable, bankruptcy (BKRATE), and the key independent variable, import competition, were computed using a lag structure in imports for three time periods. The three lags include a one-year, a two-year, and a three-year lag in the import competition variable.

Most of the studies in international trade and economics reviewed earlier assume a one-year lag effect only. But in light of the theory of exit barriers, it would be necessary to assume that the lag effect or response time will vary based on differences in structural characteristics. For example, the effect of import competition in capital intensive industries may accumulate over a period beyond one year and this effect may not surface in the bankruptcy rates until after a few years. On the other hand, the response time will be shorter and the interaction effect with respect to advertising intensity may surface earlier. Therefore, a one-year lag may be sufficient to capture the cumulative effect of import competition in advertising intensive industries while a one-year lag effect will only be partial in the case of capital intensive industries.

Measure #1 of import competition, deflated values of imports (DIMP), was used to compute correlations with bankruptcy (BKRATE).

r_0: correlation of $BKRATE_t$ with $DIMP_t$

r_1: correlation of $BKRATE_t$ with $DIMP_{t-1}$

r_2: correlation of $BKRATE_t$ with $DIMP_{t-2}$

r_3: correlation of $BKRATE_t$ with $DIMP_{t-3}$

A second set of correlations were computed using the import penetration ratio, the second measure of import competition (IMPRS).

r_0: correlation of $BKRATE_t$ with $IMPRS_t$

r_1: correlation of $BKRATE_t$ with $IMPRS_{t-1}$

r_2: correlation of $BKRATE_t$ with $IMPRS_{t-2}$

r_3: correlation of $BKRATE_t$ with $IMPRS_{t-3}$

A.2. Results

Table 5.A.1 presents the Pearson coefficients of BKRATE with DIMP for the four time periods discussed earlier. The respective levels of significance are presented *in parentheses* below each correlation coefficient.

Table 5.A.2 presents the Pearson correlation coefficients of the second measure of import competition, that is IMPRS, with BKRATE.

A.3. Discussion

A.3a. Direction of Relationship

The correlation coefficients in Table 5.A.1 all exhibit a level of statistical significance beyond the .001 level of probability. Therefore, statistically, they exhibit equal levels of significance.

Table 5.A.1

PEARSON CORRELATION COEFFICIENTS OF DIMP WITH BKRATE

	BKRATE	DIMP (r_0)	DIMP1 (r_1)	DIMP2 (r_2)	DIMP3 (r_3)
BKRATE	1.00 (0.00)	0.446 (0.0001)	0.566 (0.0001)	0.585 (0.0001)	0.558 (0.0001)
DIMP (r_0)		1.00 (0.00)	0.986 (0.0001)	0.968 (0.0001)	0.953 (0.0001)
DIMP1 (r_1)			1.00 (0.00)	0.984 (0.0001)	0.963 (0.0001)
DIMP2 (r_2)				1.00 (0.00)	0.982 (0.0001)
DIMP3 (r_3)					1.00 (0.00)

Table 5.A.2

PEARSON CORRELATION COEFFICIENTS OF IMPRS WITH BKRATE

	BKRATE	IMPRS (r_0)	IMPRS1 (r_1)	IMPRS2 (r_2)	IMPRS3 (r_3)
BKRATE	1.00 (0.00)	0.035 (0.51)	0.028 (0.62)	0.032 (0.59)	0.037 (0.56)
IMPRS (r_0)		1.00 (0.00)	0.988 (0.0001)	0.973 (0.0001)	0.956 (0.0001)
IMPRS1 (r_1)			1.00 (0.00)	0.987 (0.0001)	0.969 (0.0001)
IMPRS2 (r_2)				1.00 (0.00)	0.986 (0.0001)
IMPRS3 (r_3)					1.00 (0.00)

An examination of the direction of the relationship as captured in the sign of the coefficient shows that all the four correlation coefficients (r_0, r_1, r_2, r_3) have a positive sign indicating that DIMP correlates positively with BKRATE, irrespective of the time lag of DIMP, the import competition variable, thus lending support to hypothesis 1a.

Table 5.A.2 wherein the import penetration ratio (IMPRS) is correlated with bankruptcy (BKRATE) have nonsignificant results. None of the correlation coefficients are statistically significant.

From the above results, I conclude that import competition strongly correlates, positively, with domestic bankruptcy.[5] Therefore, I reject hypotheses 1b and 1c, and do not reject hypotheses 1a.

A.3b. Establishing the Significant Lag

An examination of table 5.A.1 shows that the correlation of BKRATE with DIMP (r_0) is about 0.45 whereas r_1, r_2, and r_3 have values ranging from 0.558 to 0.585. This establishes the presence and importance of a lag effect. In other words, the effect of imports entering the country in the same year on domestic bankruptcy is considerably less than the effect of imports that have entered the country in the previous years. This indicates that the effect of import competition becomes even more disastrous to domestic industry in subsequent years. Whether a one-year lag is stronger than a two-year or three-year lag is difficult to establish since the differences among the correlation coefficients, r_1, r_2, and r_3 are only marginal in terms of the size of the coefficient. Though a two-year lag effect appears to be the strongest, the results suggest that the effect of import competition on domestic bankruptcy may last from one year to three years.

As the second measure of import competition, IMPRS, failed to exhibit any significant relationship with the domestic bankruptcy, it (IMPRS) was eliminated from subsequent analysis. Therefore, the remainder of the data analysis is based on the real values of imports (DIMP) specified as the import competition variable.

B. *Hypothesis Two: Effect of Domestic Competition*

5. The robustness of the results were tested for by sequentially deleting each of the 32 industries and by re-estimating values of the coefficients at each step. The results were found to be consistent in terms of the direction, size, and levels of significance of the coefficients across all the runs.

With respect to the level of domestic competition in the domestic industry, the following hypotheses are to be tested.

Hypothesis 2a: *The relationship of import competition with domestic bankruptcy is expected to be positive and greater in industries with low domestic competition than in industries with high domestic competition.*

Hypothesis 2b: *The interaction effect of import competition with domestic competition is expected to be positive.*

Hypothesis 2c: *The relationship of import competition with domestic bankruptcy is expected to be less in industries with low domestic competition than in industries with high domestic competition.*

B.1. Method

Estimates of coefficients necessary to test hypotheses 2a, 2b, and 2c were generated with the following statistical model.

$$Y_t = \beta_0 + \beta_1 X_{1,t} + \beta_2 X_2 + \beta_3 X_{1,t} X_2 + \epsilon$$

where

Y_t = BKRATE in year t;

$X_{1,t}$ = DIMP in year t;

X_2 = COMP4FH (1 = high; 0 = low); and

$X_{1,t}X_2$ = TEMPH (interaction term)

ϵ = error term

Data on four-firm and eight-firm concentration ratios are published only every five years. Therefore, the levels of domestic competition were computed only for 1972, 1977, and 1982.

Step 1: Data for the three years (1972, 1977, and 1982) was pooled together and analyzed with import competition (DIMP) and domestic competition (COMP4FH) specified as independent variables in the first equation. COMP4F represents the level of competition computed from 4-firm concentration ratios. The domestic competition variable was entered as

a binary variable with values of either 1 or 0 based on its median value. This median value represents the median of the data pooled for 1972, 1977, and 1982. A value of 1 was assigned if the actual value of COMP4F was equal to or more than the median value. The code 1 represented the *high* group. A value of 0 was assigned to all values of COMP4F less than the median value. Thus, the code 0 represents the *low* group of industries.

A second model was estimated where COMP8FH was substituted for COMP4FH. COMP8F represents the levels of competition computed from domestic 8-firm concentration ratios. This was done to check if there were any differences between the two measures of domestic competition. The results of the two models estimated with the pooled data set (for three years) are given in table 5.B.1.

Step 2: Here, data for each year was entered separately. Therefore, three models were estimated for each of the two measures of competition. Medians for each of the two domestic competition variables were computed separately for each year and used for recoding the respective variables. A total of six regression equations were estimated from the data.

The model specified in this part of the data analysis did not include any lagged variables because the period of observation was either three years together or each entered separately. Regression coefficients were estimated with the Ordinary Least Squares method in the SAS Regression Procedure.

Although separate models were estimated with COMP4FH and COMP8FH, specified as the respective domestic competition variables, the overall results along with the estimates of parameters are found to be similar. So, only results for the COMP8FH variable will be included and discussed in detail in this section. However, results of analysis with the COMP4FH variable are attached in Appendix B of the thesis.

Table 5.B.2 gives the results of the regression analysis done with COMP8FH for 1972, 1977, and 1982 shown separately.

Step 3: At this stage, three lagged models were estimated, one each for 1973, 1977, and 1983, respectively. The import competition variable (DIMP) was lagged by one year in each of the three models. The competition variable (COMP8FH) was entered as a dummy variable as in Step 2. As data for 1973 were not available for the competition variable, values for 1972 were taken to represent levels of domestic competition in 1973 under the assumption that the probability of observing significant changes in the levels of competition in an industry in one year's time would be little. The interaction term TEMPH was specified as the product of the respective import competition and domestic competition values.

Results of estimated values for the three regression models are given in Table 5.B.3.

B.2. Results

Table 5.B.1 contains results of the regression analysis performed on the data pooled for three years with the domestic competition variable specified as COMP4FH and COMP8FH, respectively. As results of both the models are non-significant they will not be used in testing the hypotheses.

Table 5.B.2. shows the estimated values for the regression equations derived from data for 1972, 1977, and 1982 entered separately. Import competition (DIMP), and domestic competition (COMP8FH), together with the interaction term (TEMPH) were specified as independent variables whereas domestic bankruptcy (BKRATE) was specified as the dependent variable for the respective years.

Table 5.B.3 gives the estimated regression coefficients for three models. Import competition (DIMP) was lagged by one year in each of the equations. The domestic competition variable (COMP8FH) was entered as a dummy variable, and the interaction term was entered as in the previous steps.

B.3. Discussion

As similar results were obtained when domestic competition was measured in terms of the 4-firm concentration ratio (COMP4F), I conclude that there exists no statistical difference between the two domestic competition measures COMP4F and COMP8F. Therefore, results for COMP4F are not presented here.

Model #1 in table 5.B.2 refers to the values estimated for 1972. Results of model #1 (for 1972) are statistically non-significant. Values for model #2 are estimates derived from data for 1977. These results are found to be highly significant. The unadjusted R^2 value is 0.46 and is highly significant ($p < .01$). As model #3 (for year 1982) was non-significant, it will be dropped from the discussion. Therefore, hypotheses 2a, 2b, and 2c will be tested in light of the results obtained in model #2.

The import competition variable, DIMP, in model #2 exhibits a positive relationship with the dependent variable, bankruptcy. The coefficient of DIMP is highly significant ($p <$ 01).

The domestic competition variable, COMP8FH, is statistically non-significant.

The interaction term, TEMPH, is also statistically not significant. The basic equation used to generate the estimates was:

$$Y_t = \beta_0 + \beta_1 X_{1,t} + \beta_2 X_2 + \beta_3 X_{1,t} X_2 + \epsilon$$

where

Y_t = BKRATE in year t;

$X_{1,t}$ = DIMP in year t;

X_2 = COMP4FH (1 = high; 0 = low);

$X_{1,t} X_2$ = TEMPH (interaction term); and

ϵ = error term.

Based on the median value of 2.04 for 1977, COMP8F was entered as a dummy variable. When a binary coding for COMP8FH is used ($X_2 = 0$ for low and $X_2 = 1$ for high), the equa-

tion for the *low* competitive group of industries may be restated as:

$$\hat{Y}_{low} = \beta_0 + \beta_1 X_1$$

For the *high* competition group of industries, $X_2 = 1$, and the equation becomes:

$$\hat{Y}_{high} = \beta_0 + (\beta_1 + \beta_3)X_1 + \beta_2$$

As the interaction term in model #2 is statistically insignificant, the coefficients for import competition in the two groups is the same.

$$\beta_{1,low} = \beta_{1,high} = 0.20$$

In other words, there is no difference between two groups in their vulnerability to import competition. Therefore, I reject hypotheses 2a, 2b, and 2c, and conclude that the vulnerability to import competition that domestic organizations face is not conditional upon competitive conditions in the domestic industry. As the coefficient of the import competition variable is positive, it suggests that higher the import competition higher the domestic bankruptcy.

Table 5.B.3 which gives estimates of lagged models shows that model #1 estimated for 1973, and model #2 estimated for 1977 are highly significant whereas estimates generated in model #3 for 1982 are non-significant.

Both model #1 and model #2 show similar results. The intercepts in both the models are highly significant. The coefficients of the import competition in both the models are highly significant and have a positive sign. The only difference lies in the size of the coefficients; the coefficient for DIMP in 1973 is +0.58, double the size of the coefficient for 1977, which is +0.23. The respective coefficients for the domestic competition variable and the interaction term in both models, however, are insignificant.

The consistency in the results shown in table 5.B.3 in comparison with those in table 5.B.2 confirms the robustness of the findings. They also lend strong support to the tests of hypotheses conducted and conclusions derived.

With the lagged models as well, I reject hypotheses 2a, 2b, and 2c, and conclude that levels of domestic competition have no influence on the dyadic relationship of import competition and domestic bankruptcy.

C. *Hypothesis Three: Effect of Capital Intensity*

The following hypotheses are tested in this section to examine the extent to which capital intensity moderates the relationship of import competition with bankruptcy.

Hypothesis 3a: The relationship between import competition and domestic bankruptcy is expected to be positive and greater in industries with high capital intensity than in industries with low capital industry.

Hypothesis 3b: The interaction effect of import competition and capital intensity on domestic bankruptcy is expected to be positive.

Hypothesis 3c: The relationship between import competition and domestic bankruptcy is expected to be less in industries with high capital intensity than in industries with low capital intensity.

C.1. Method.

The basic equation tested is as follows:

$$Y_t = \beta_0 + \beta_1 X_{1,t-1} + \beta_2 X_2 + \beta_3 X_{1,t-1} * X_2 + \epsilon$$

where

Y_t = BKRATE in year t;

$X_{1,t-1}$ = DIMP1;

X_2 = CAPINTH (1 = high; 0 = low);

$X_{1,t-1} * X_2$ = TEMPH1

ϵ = error term

A total of three models were run with one-year, two-year, and three-year lags in the import competition variable (DIMP), represented by DIMP1, DIMP2, and DIMP3, respectively. The respective interaction terms of the lagged import variables with capital intensity were specified as TEMPH1, TEMPH2, and TEMPH3.

C.2. Results

Table 5.C.1 shows results obtained with DIMP as the key independent variable. It shows the estimated parameters, along with the corresponding levels of significance. The Parks method[6] of the TSCS Reg program, which is an autoregressive cross-sectional and time series model was used to estimate the regression coefficients to be used for hypothesis testing.

Parks method, as in other time-series and cross-section models, does not generate the R^2 values for the models estimated. Only values of the mean square error are given in the output generated from the statistical analysis. The regression mean square error (M.S.E.) is also included to facilitate the comparison of the explanatory power of the three models. Table 5.C.2 gives the coefficients for the variables in each of the three models.

C.3. Discussion

Table 5.C.1 includes the estimated results of the regression models. They were used to test the moderating effects of capital intensity on the import competition-bankruptcy relationship.

At a glance, we find that the signs of the coefficients of each variable are consistent across the three models. The key independent variable, DIMP, is positively correlated with the dependent variable, bankruptcy. This relationship is highly significant.

The capital intensity variable, CAPINTH, is negatively related with the dependent variable suggesting that capital intensive industries are less prone to exhibit high rates of bankruptcy. The direction of the coefficient is stable across the three models are is found to be significant beyond the .01 level of significance.

The interaction term, TEMPH, exhibits a positive and a highly significant relationship with the dependent variable, as well in all the three models.

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6. For documentration on the statistical details of this method, refer Kmenta (1971: 512-514).

The estimated coefficients appear to be generally quite stable as there are few appreciable changes in the sign and levels of significance of the coefficients.

The explanatory power of a model is inversely related to its M.S.E. value. The objective should be to minimize the error term. A comparison of the mean square error term of the three models shows that the third model with DIMP3, that is, imports lagged for three years, has the smallest value for M.S.E. (0.29). Therefore, I select model #3 as the best explanatory model among the three, and will test hypotheses 3a, 3b and 3c based on the results derived from this model.

According to model #3, the equation for the *low* capital intensive industries group is as follows:

$$\begin{aligned}\hat{Y}_{low} &= \beta_0 + \beta_1 \text{ DIMP3} \\ &= 8.09 + (0.11) \text{ DIMP3}\end{aligned}$$

Similarly, the equation for the *high* capital intensive industries group may be stated as:

$$\begin{aligned}\hat{Y}_{high} &= \beta_0 + (\beta_1 + \beta_3) \text{ DIMP3} + \beta_2 \\ &= 8.09 + (0.11 + 0.08) \text{ DIMP3} + (-0.60) \\ &= 7.49 + 0.19 \text{ DIMP3}\end{aligned}$$

As both the intercepts are significant and β_1, β_2 and β_3 are also highly significant, I conclude that there is a statistically significant difference between the *low* and the *high* groups

As both β_1 and β_3 are highly significant. I conclude that the coefficients of import competition (DIMP3) of the two groups are statistically different from each other.

Accordingly, the result indicates that the coefficient of DIMP3 is greater for the *high* capital intensity group than the *low* capital intensity group of industries implying that highly capital intensive industries are more vulnerable to import competition than their less capital-intensive counterparts. Therefore, I reject hypothesis 3c, but do not reject hypotheses 3a and 3b.

D. *Hypothesis Four: Effect of R&D Intensity*

Hypotheses 4a, 4b and 4c are tested to evaluate the effect of R&D intensity on the relationship of import competition with domestic organizational bankruptcy. The hypotheses are restated below.

Hypothesis 4a: ***The relationship between import competition and domestic bankruptcy is expected to be positive and greater in industries with high R&D intensity than in industries with low R&D intensity.***

Hypothesis 4b: ***The interaction effect of import competition and R&D intensity on domestic bankruptcies is expected to be positive.***

Hypothesis 4c: ***The relationship between import competition and domestic bankruptcy is expected to be less in industries with high R&D intensity than in industries with low R&D intensity.***

D.1. Method

The equation used to test the three hypotheses stated above is as follows.

$$Y_t = \beta_0 + \beta_1 X_{1,t-1} + \beta_2 X_2 + \beta_3 X_{1,t-1} * X_2 + \epsilon$$

where

Y_t = BKRATE in year t,

$X_{1,t-1}$ = DIMP1,

X_2 = RNDINTH (1 = high; 0 = low)

$X_1 * X_2$ = TEMPH1

ϵ = error term

A total of three models were generated with one-year, two-year, and three-year lags in DIMP, labelled DIMP1, DIMP2 and DIMP3, respectively. The corresponding interaction terms are TEMPH1, TEMPH2, and TEMPH3.

D.2. Results

Table 5.D.1 shows results of the three models estimated with DIMP specified as the measure of import competition. The estimated coefficients along with their corresponding

levels of significance are included in the table. The mean square error (M.S.E.) of the regression equation is also shown. In the absence of an R^2, the explanatory power of different models can be compared with the M.S.E. (as was done earlier). The correlation coefficients of the variables in each of the three models is given in Table 5.D.2.

D.3. Discussion

Table 5.D.1 gives values of the coefficients estimated in the regression models. Hypotheses related to the moderating effect of R&D intensity will be tested with the best model chosen among them.

A cursory examination of table 5.D.1 reveals that the signs of the coefficients for each variable are the same across the three models. Imports in each model is positively related with BKRATE, the dependent variable. This relationship is significant beyond the .01 level of probability. The binary variable RNDINTH is also positively related with the dependent variable and highly significant ($p < .01$). This indicates that R&D intensive industries are prone to have higher rates of bankruptcy than their less intensive counterparts.

The interaction term is also positive and highly significant. The consistency in the direction of relationships observed across the three models may be taken as indication of the stability of the coefficients estimated.

The explanatory power, as observed in the M.S.E. value, suggests that model #1 with a one-year lagged import competition variable DIMP1 has the best explanatory power among the three models assumed. This is because the M.S.E. of model #1 at 0.26 is the smallest of all.

Substituting parameter estimates obtained from model #1, the equations for industries in the *low* intensive group is:

$$\hat{Y}_{low} = \beta_0 + \beta_1 \text{ DIMP1}$$
$$= 7.85 + (0.14) \text{ DIMP1}$$

The equation for the *high* R&D intensity group will then be:

$$\hat{Y}_{high} = \beta_0 + (\beta_1 + \beta_3)\,\text{DIMP1} + \beta_2$$
$$= 7.85 + (0.14 + 0.068)\,\text{DIMP1} + 0.54$$
$$= 8.49 + (0.208)\,\text{DIMP1}$$

As both the intercepts and coefficients are highly significant and different from both groups, I conclude that the two models are significantly different from each other. Also, as both β_1 and β_3 are significant, it may be concluded that the coefficient of DIMP1 in the *low* group is statistically different from the coefficients of DIMP1 in the *high* group.

Hence, the coefficient of DIMP1 is greater for the *high* R&D intensive group than the coefficient of DIMP1 in the *low* R&D intensive group of industries. Accordingly, I reject the contrast hypothesis 4c, and do not reject hypothesis 4a and 4b.

E. *Hypothesis Five: Effect of Advertising Intensity*

Hypotheses 5a, 5b, and 5c are tested to evaluate the effect of advertising intensity or the import competition-bankruptcy relationship.

Hypothesis 5a: The relationship between import competition and domestic bankruptcy is expected to be positive and greater in industries with high advertising intensity than in industries with low advertising intensity.

Hypothesis 5b: The interaction effect between import competition and advertising intensity is expected to be positive.

Hypothesis 5c: The relationship between import competition and domestic bankruptcy is expected to be less in industries with high advertising intensity than in industries with low advertising intensity.

E.1. Method

The basic equation is used to test the three hypotheses.

$$Y_t = \beta_0 + \beta_1 X_{1,t-1} + \beta_2 X_2 + \beta_3 X_{1,t-1} * X_2 + \epsilon$$

where

Y_t = BKRATE in time t;

$X_{1,t-1}$ = DIMP1;

X_2 = ADVINTH (1 = high; 0 = low)

$X_1 * X_2$ = TEMPH1

ϵ = error terms

Three models were estimated with one-year, two-year, and three-year lags in DIMP; DIMP1, DIMP2, and DIMP3, respectively. The corresponding interaction terms are TEMPH1, TEMPH2, and TEMPH3.

E.2. Results

Table 5.E.1 depicts estimated results of the three models. The table shows estimated coefficients along with the corresponding levels of significance, and the mean square error (M.S.E.) for each model. The correlation coefficients of the variables entered in each of the three models is given in table 5.E.2.

E.3. Discussion

A brief examination of table 5.E.1 reveals that the signs of the coefficients for all the variables entered remain the same across the three lagged models. DIMP in each model is positively related with the dependent variable, BKRATE. This relationship is significant beyond the .01 level of probability. The binary variable ADVINTH also has a positive sign for its coefficient. This coefficient is also significant beyond the .01 level of significance. On the other hand, the interaction term TEMPH has a negative coefficient, which is also highly significant ($p < .01$).

The explanatory power of each model as is reflected in the M.S.E. values appears to be same for model #2 and model #3 (M.S.E. = 0.34). The M.S.E. value for model #1 is, however, different, and at 0.28 is the lowest value. Therefore, I conclude that model #1 with a one-year lagged import competition term (DIMP1) has the highest explanatory power among the three models examined. In the remaining analysis and discussion, I will use parameter estimates generated in a model #1 to test hypotheses 5a, 5b, and 5c.

Substituting coefficient values estimated in model #1, the equation for the *low* advertising intensive industries group is as follows:

$$\hat{Y}_{low} = \beta_0 + \beta_1 \text{ DIMP1}$$
$$= 6.86 + (0.10) \text{ DIMP1}$$

The equation for the *high* advertising intensive industries group, then, is:

$$\hat{Y}_{high} = \beta_0 + (\beta_1 + \beta_3) \text{ DIMP1} + \beta_2$$
$$6.86 + (0.10 - 1.99) \text{ DIMP1} + 1.68$$
$$= 8.54 - 1.89 \text{ DIMP1}$$

Both the intercepts and coefficients for group 1 and group 2 are different and statistically highly significant. So, I conclude that the two equations are statistically different from each other. And as both β_1 and β_3 are significant, I also conclude that the coefficient of DIMP1 for the *low* group is statistically different from the coefficient of DIMP1 for the *high* group.

The import competition variable has a positive direction in the *low* group suggesting that organizations with low advertising intensity are vulnerable to import competition. Higher the import competition in this group higher the bankruptcy.

In the *high* group, import competition has a negative sign, suggesting that the higher the import competition, the lower the bankruptcy. This means that highly advertising intensive are less vulnerable to import competition.

So, I reject hypothesis 4a, 4b, and 4c.

Chapter 6
Implications

A. *Summary of Findings*

1. Imports have a significant positive effect on domestic bankruptcy.
2. The interaction effect of imports and the level of domestic competition was statistically non-significant.
3. The interaction of effect of imports with capital intensity was highly significant and positive. A three-year lag in imports seems to capture the highest total impact of imports on domestic bankruptcies.
4. With respect to the third structural variable, R&D intensity, the interaction term was positive and highly significant. A one-year lagged model seems to be sufficient in capturing the total impact of imports.
5. With respect to advertising intensity, the interaction term was negative and highly significant. A one-year lagged model appears to best capture the total impact of import competition or domestic bankruptcy.

B. *Discussion*

B.1. Hypothesis One

The positive and highly significant correlation coefficient of imports with bankruptcy supports the *resource tension* arguments that were put forth in the theoretical sections. Further, it complements the *disciplinary* perspective taken by international economists who maintain that import competition leads to improved allocative efficiency among organizations. It is the argument of the thesis that though bankruptcy is a negative outcome from an organizational point of view, it becomes a positive outcome from an industry perspective. Bankruptcy at the level of an industry facilitates adaptation as it frees critical resources that can

be channeled into more productive outlets.

B.2. Hypothesis Two

Results here indicate the absence of an interaction effect between import and domestic competition suggesting that the effect of import competition on domestic bankruptcy is not conditional upon potentially competitive conditions in the domestic industry. While previous empirical research by Pugel (1980), De Rosa & Goldstein (1980), Jacquemin et al. (1980), and Turner (1980) found a significant interaction effect, this study found the absence of a significant effect. Among the three years (1972, 1977, and 1982) examined, results for 1977 indicate that the domestic competition variable has no significant impact on domestic bankruptcy. Similar results were found in the lagged models, as well. This is defensible under the assumption that under competitive conditions, inefficient firms can take recourse to an early exit through divestment or liquidation and sale of assets. The *shakeouts* that characterize industries in the growth stage also lend support to this argument. Therefore, in unconcentrated industries the interaction effect of import and domestic competition will be absent as was confirmed by Jacquemin et al. (1980) and Turner (1980). Our results do not lend support to the findings of previous research with respect to the presence of an interaction, yet they confirm the presence of a significant effect of import competition on domestic bankruptcy. More importantly, they lend support to the central point of the thesis that import competition is different from domestic competition.

B.3. Hypothesis Three

Results confirm that the structural variable, capital intensity, moderates the import competition-bankruptcy relationship. The presence of a significant positive interaction effect implies that highly capital intensive industries are more vulnerable to import competition than their less capital intensive counterparts. This complements the rationale provided by the theory of exit barriers and our thesis that due to the presence of high exit barriers, import

competition will lead to a higher rate of bankruptcy; whereas barriers to exit constrain adaptation, import competition facilitates adaptation.

The three-year lagged effect of import competition also confirms the presence of constraints and rigidities imposed by capital intensive structures. Investments in durable and specific assets lower the ability of organizations to respond to changes in the environment. So, the resource tension accumulates over a three-year period before bankruptcy occurs.

B.4. Hypothesis Four

With respect to the structural characteristic of R&D intensity, the interaction effect is positive and significant. This suggests that industries with high levels of R&D intensity are more vulnerable to import competition than less R&D intensive industries. Further, the propensity of organizations to go bankrupt seems to be inherent to R&D intensive industries as the main effect of the R&D intensity is positive and significant, in itself. These two findings support previous theory and research which suggest that investments in non-durable assets such as R&D are associated with an element of extra risk for the firm undertaking such investments. The degree of risk inherent to organizations that are R&D intensive as opposed to capital intensive appears to triple as the one-year lagged model has the best explanatory power. This short response time within which the full impact of import seems to take place underscores the necessity for organizations to be more responsive to the environment. From an industry's point of view, it may be suggested that, by implication, R&D intensity promotes adaptation faster than capital intensity.

B.5. Hypothesis Five

The implications that may be derived from results of hypothesis testing with respect to advertising intensity are slightly different from those presented earlier. Tests of hypotheses indicate the presence of a significant moderating effect of advertising intensity on the import competition bankruptcy relationship. But results show a differential impact of this structural

characteristic on the two groups. Firms in the low advertising intensity group are highly vulnerable to import competition. In other words, in this group, higher import competition is associated with a higher rate of bankruptcy. On the contrary, high advertising intensity seems to favor firms in this group as their vulnerability is reduced in the face of import competition. This result confirms the theory found in international marketing that product differentiation through advertising, promotion and distribution by domestic firms is their strongest vantage point. Advertising intensity acts a strong barrier to entry for imports (De la Torre, 1975; Scherer, 1970) due to the socio-cultural uncertainties faced by exporters in foreign markets.

C. *Conclusions*

Results of this thesis research confirm:

i. that import competition relates positively with domestic bankruptcy; and

ii. that industry structural characteristics differentially mediate the impact of import competition.

D. *Implications for Population Ecology Arguments*

Implications may also be derived from the empirical results of the thesis for the Population Ecology theory and research (Hannan and Freeman, 1977; Aldrich, 1979; Briltain and Freeman, 1980; Freeman and Hannah, 1983; Carroll, 1985).

The population ecology model has its roots in the natural selection arguments of the biological sciences. It explains organizational population changes by examining the nature and distribution of resources in the organizations' environments. Thus, the model relates changes in a population of organizations with the changes in the environment surrounding such organizations (Aldrich 1979: 27).

The model in identifying the environment as the main force behind the election of organizations suggests that environments determine *survival paths* for the organizations (McKelvey and Aldrich, 1983).

> "... Findings pertaining to environmental causes of function and form will lead to explanations of organization success or failure that are recognizable across all members of a population, and explanations of population growth or decline that are recognizable across populations." (McKelvey and Aldrich, 1983: 118).

Drawing parallels from the population ecology theory, we find that import competition is akin to a competitive force that brings about changes in the environment of domestic organizational populations (that is, industries). This change in the competitive environment leads to a change in the distribution of resources as foreign producers compete with domestic firms in the industry.

The results also indicate that a mere change in the environment, that is, an increase in import competition, is not an adequate explanation for the selection that takes place in the organizational population. The strength of the forces of *selection* is contingent upon the structural characteristics of the population. In other words, the aggregate impact of the environmental change on an organizational population is a sum of the individual and joint effects such changes produce in conjunction with the structural characteristics. Zammuto and Cameron (1985) also demonstrate how changes in the size and changes in the shape of ecological niches can create potential conditions of decline for organizations.

Results of this thesis research offer explanations of decline at an aggregate or organizational population level. The theoretical implications of the findings suggest that the external forces that bring about a change in the domestic environment *interact* with the structural characteristics of the industry in affecting domestic organizations. So, the strength of this external environmental change is contingent upon the type of industry itself as different types of industries exhibit different levels of sensitivity to the change in the environments. Armed with this knowledge, organizations need to adopt strategies that can reduce the risk inherent to the industry they inhabit for improving their chances of success.

E. *Contributions of the Research*

1. The research makes a contribution to the bankruptcy and decline literature by providing an alternative explanation to decline in the form of foreign competition.

2. At a theoretical level, this thesis research contributes to understanding the impact of import competition on domestic bankruptcy. It complements literature in international trade and economics by offering an alternative outcome of the impact of foreign competition. Furthermore, the research takes the issue of the interaction effect one step further by examining such effects with other structural variables such as capital intensity, advertising intensity, and R&D intensity in addition to the already thoroughly researched measure of domestic competition.

3. The thesis contributes to enriching our understanding of the population ecology model by introducing foreign competition as the source of change in the environment and by including industry structural characteristics as moderating the ultimate outcome of the change observed in the organizational population.

4. At an empirical level, the design of the research has tried to eliminate some deficiencies observed in previous research by including time-series and cross-sectional design. The results obtained are more suited for drawing generalizations across industries as well as across time.

F. *Future Research Directions*

This thesis research in offering an explanation into the complex relationship between import competition and domestic organizational bankruptcy has only touched the tip of the iceberg. It serves to offer some explanations of the effects of foreign competition, but it opens up vast avenues for future research.

At an industry level, further research is needed addressing the following issues.

i. The *potential* threat dimension of foreign competition and its effects are not incorporated in this research. Due to methodological difficulties, this research has only addressed the

research questions from the angle of *actual* or *after-the-fact* competition. Identifying the theoretical dimensions of potential foreign competition at a global scale and incorporating them in an empirical framework to understand the causes and effects of such a threat on the domestic sector is an area that will contribute to removing our deficiency in understanding the complex web of international competition.

ii. At an organizational level, the research has served only the purpose of suggesting implications. The research should be extended to an organizational level analysis to test if organizational bankruptcy can be explained better in the domain of foreign competition.

iii. The methodology in future research should be aimed at estimating coefficients based on a longer time period than the eleven years examined in this research. That will be helpful in testing the stability of such coefficients in a more rigorous manner.

Table 5.B.1

Estimated Regression Coefficients of Models with Observations Pooled for 1972, 1977, and 1982

VARIABLES FOR MODEL #1	b	Prob. <	VARIABLES FOR MODEL #2	b	Prob. <
Intercept	+4.57	0.20	Intercept	+4.58	0.20
DIMP	+0.14	0.51	DIMP	+0.14	0.51
COMP4FH	+5.15	0.36	COMP8FH	+5.15	0.36
TEMPH	-0.54	0.79	TEMPH	-0.54	0.79
R^2 (unadjusted)	0.03	0.77	R^2 (unadjusted)	0.03	0.78

Table 5.B 2

Estimated Regression Coefficients of Models
Based on Annual Data Observations

MODEL #1 (t = 1972)	b	Prob. <	MODEL #2 (t = 1977)	b	Prob. <	MODEL #3 (t = 1982)	b	Prob. <
Intercept	+3.71	0.37	Intercept	+3.34***	0.00	Intercept	+8.86***	0.00
DIMP1	+0.52	0.17	DIMP2	+0.20***	0.00	DIMP3	+0.07	0.55
COMP8FH	+4.22	0.45	COMP8FH	-0.59	0.50	COMP8FH	-1.25	0.67
TEMPH1	-0.37	0.73	TEMPH2	+0.30	0.20	TEMPH3	+0.93	0.16
R^2(unadjusted)	0.08	0.56	R^2(unadjusted)	0.46***	0.00	R^2 (unadjusted)	0.10	0.43
R^2(adjusted)			R^2(adjusted)	0.40				

*** p < .01

Table 5 B.3

Estimated Regression Coefficients of Lagged Models Incorporating the Effect of Domestic Competition (COMP8FH)

MODEL #1 (t = 1973)	b	Prob. <	MODEL #2 (t = 1977)	b	Prob. <	MODEL #3 (t = 1982)	b	Prob. <
Intercept	+3.88***	0.066	Intercept	+3.34***	0.000	Intercept	+8.83***	0.000
$DIMP_{t-1}$	+0.58***	0.000	$DIMP_{t-1}$	+0.23***	0.000	$DIMP_{t-1}$	+0.08***	0.54
COMP8FH	-0.50	0.78	COMP8FH	-0.63	0.45	COMP8FH	-0.75	0.80
TEMPH	-0.39	0.29	TEMPH	+0.15	0.42	TEMPH	1.03	0.14
R^2(unadjusted)	0.50***	0.000	R^2(unadjusted)	0.45***	0.000	R^2 (unadjusted)	0.10	0.37
R^2(adjusted)	0.44		R^2(adjusted)	0.40		R^2 (adjusted)	0.009	

*** p < .01

Table 5.C.1

Estimated Regression Coefficients[1] of Lagged Models
Incorporating the Effect of Capital Intensity

MODEL #1 (lag=1)	b	Prob. <	MODEL #2 (lag=2)	b	Prob. <	MODEL #3 (lag=3)	b	Prob. <
Intercept	+8.02***	0.00	Intercept	+7.68***	0.00	Intercept	+8.09***	0.00
DIMP1	+0.12***	0.00	DIMP2	+0.19***	0.00	DIMP3	+0.11***	0.00
CAPINTH	-0.64***	0.00	CAPINTH	-0.66***	0.00	CAPINTH	-0.60***	0.00
TEMPH1	+0.08***	0.00	TEMPH2	+0.08***	0.00	TEMPH3	+0.08***	0.00
M.S.E. (348 d.f.)	0.34	---	M.S.E. (348 d.f.)	0.63	---	M.S.E. (348 d.f.)	0.29	---

[1] Parks method (Autoregressive model) estimates
d f. degrees of freedom

*** $p < .01$

Table 5.C.2

Correlation Matrices of Parks Parameter Estimates of the Models Incorporating the Effect of Capital Intensity

	INTERCEPT	DIMP1	CAPINTH	TEMPH1
INTERCEPT	1.0000	-0.16709	-0.47200	0.47607
DIMP1	-0.16079	1.0000	-0.36312	0.16162
CAPINTH	-0.47200	-0.36312	1.0000	-0.37932
TEMPH1	0.47607	0.16162	-0.37932	1.0000

	INTERCEPT	DIMP2	CAPINTH	TEMPH2
INTERCEPT	1.0000	0.28493	-0.92124	0.055018
DIMP2	0.28493	1.0000	-0.32090	-0.70743
CAPINTH	-0.92124	-0.32090	1.0000	-0.15213
TEMPH2	0.055018	-0.70743	-0.15213	1.0000

	INTERCEPT	DIMP3	CAPINTH	TEMPH3
INTERCEPT	1.0000	-0.18606	0.13714	0.49799
DIMP3	-0.18606	1.0000	-0.44421	-0.78180
CAPINTH	0.13714	-0.44421	1.0000	0.28131
TEMPH3	0.49799	-0.78180	0.28131	1.0000

Table 5.D.1

Estimated Regression Coefficients[1] of Lagged Models Incorporating the Effect of R&D Intensity

MODEL #1 (lag=1)	b	Prob. <	MODEL #2 (lag=2)	b	Prob. <	MODEL #3 (lag=3)	b	Prob. <
Intercept	+7.85***	0.00	Intercept	+7.50***	0.00	Intercept	+7.82***	0.00
DIMP1	+0.14***	0.00	DIMP2	+0.18***	0.00	DIMP3	+0.08***	0.00
RNDINTH	+0.54***	0.00	RNDINTH	+0.59***	0.00	RNDINTH	+0.54***	0.00
TEPH1	0.68***	0.00	TEMPH1	+0.074***	0.00	TEMPH3	+0.12***	0.00
M.S.E. (348 d.f.)	0.26	---	M.S.E. (348 d.f.)	0.35	---	M.S.E. (348 d.f.)	0.52	---

[1] Parks method (Autoregressive model) estimates
d.f. degrees of freedom

*** p < .01

Table 5.D.2

Correlation Matrices of Parks Parameter Estimates of the Models Incorporating the Effect of R&D Intensity

	INTERCEPT	DIMP1	RNDINTH	TEMPH1
INTERCEPT	1.0000	0.72866	0.24498	0.69792
DIMP1	0.72866	1.0000	0.50263	0.69568
RNDINTH	0.24498	0.50263	1.0000	0.33907
TEMPH1	0.69792	0.69568	0.33907	1.0000

	INTERCEPT	DIMP2	RNDINTH	TEMPH2
INTERCEPT	1.0000	0.28388	0.66116	0.56680
DIMP2	0.28388	1.0000	0.62259	0.37626
RNDINTH	0.66116	0.62259	1.0000	0.13017
TEMPH2	0.56680	0.37626	0.13017	1.0000

	INTERCEPT	DIMP3	RNDINTH	TEMPH3
INTERCEPT	1.0000	-0.32156	0.63061	-0.54933
DIMP3	-0.32156	1.0000	-0.24500	0.95309
RNDINTH	0.63061	-0.24500	1.0000	-0.37389
TEMPH3	0.54933	0.95309	-0.37389	1.0000

Table 5 E.1

Estimated Regression Coefficients[1] of Lagged Models
Incorporating the Effect of Advertising Intensity

MODEL #1 (lag=1)	b	Prob. <	MODEL #2 (lag=2)	b	Prob. <	MODEL #3 (lag=3)	b	Prob. <
Intercept	+6.86***	0.00	Intercept	+6.35***	0.00	Intercept	+6.91***	0.00
DIMP1	+0.10***	0.00	DIMP2	+0.29***	0.00	DIMP3	+0.20***	0.00
ADVINTH	+1.68***	0.00	ADVINTH	+2.83***	0.00	ADVINTH	+2.37***	0.00
TEMPH1	-1.99***	0.00	TEMPH2	-3.45***	0.00	TEMPH3	-3.19***	0.00
M.S.E. (348 d.f.)	0.28	---	M.S.E. (348 d.f.)	0.34	---	M.S.E. (348 d.f.)	0.34	---

[1] Parks method (Autoregressive model) estimates
d.f. degrees of freedom

*** p < .01

Table 5.E.2

Correlation Matrices of Parks Parameter Estimates of the Models Incorporating the Effect of Advertising Intensity

	INTERCEPT	DIMP1	ADVINTH	TEMPH1
INTERCEP	1.0000	-0.64729	-0.19835	0.20589
DIMP1	-0.64729	1.0000	0.66620	-0.53742
ADVINTH	-0.19835	0.66620	1.0000	-0.87412
TEMPH1	0.20589	-0.53742	-0.87412	1.0000

	INTERCEPT	DIMP2	ADVINTH	TEMPH2
INTERCEPT	1.0000	-0.80235	-0.54695	0.080543
DIMP2	-0.80235	1.0000	0.12549	-0.18693
ADVINTH	-0.54695	0.12549	1.0000	-0.10177
TEMPH2	0.080543	-0.18693	-0.10177	1.0000

	INTERCEPT	DIMP3	ADVINTH	TEMPH3
INTERCEPT	1.0000	-0.82803	0.4617	-0.26195
DIMP3	-0.82803	1.0000	-0.44619	-0.00047681
ADVINTH	0.46177	-0.44619	1.0000	-0.29021
TEMPH3	-0.26195	-0.00047681	-0.29021	1.0000

Appendix A

Appendix B

Table A.1

List of Industrial Samples

SIC No.	Industry
2051	Bakery Products
2052	Cookies and Crackers
2062	Cane Sugar Refining
2065	Confectionery Products
2011	Meat Products
2016	Poultry Products
2831	Biological Products
2833	Medicinals and Botanicals
2834	Pharmaceuticals Preparations
2841	Soaps and Other Detergents
2842	Polishes/Sanitation Goods
2843	Surface Active Agents
2844	Toilet Preparations
2869	Inorganic Chemicals, not Elsewhere Classifie
3523	Farm Machinery and Equipment
3524	Lawn and Garden Equipment
3541	Metal-Cutting Machine Tools
3542	Metal-Forming Machine Tools
3546	Power-Driven Hand Tools
3544	Tools, Dies, Jigs, and Fixtures
3573	Electronic Computing Equipment
3661	Telephone and Telegraph Equipment
3662	Radio and TV Communication Equipment
3674	Semiconductors and Related Devices
3711	Motor Vehicles and Car Bodies
3714	Motor Vehicle Parts and Stampings
3841	Surgical and Medical Instruments
3842	Surgical Appliances and Supplies
3843	Dental Equipment and Supplies
3693	X-ray Apparatus and Tubes
3861	Photographic Equipment and Supplies
3942	Dolls
3944	Games and Toys

Table A.2

List of Variables and their Measurement

	Variable	Measurement
1.	Bankruptcy ($BKRATE_t$)	$\frac{\#\text{ of failures in the industry in year } t}{\#\text{ of firms in the industry in year } t} \times 1000$ (This rate of bankruptcy is computed at the three-digit SIC level.)
2.	Import Competition ($IMPCOMP_t$)	$DIMP_t = \frac{\$\text{value of imports in year } t}{\text{implicit price index of imports in year } t}$ $IMPRS_t = \frac{\$\text{value of imports in year } t}{\$\text{value of new supply in year } t}$, where new supply = domestic shipments + imports
3.	Capital intensity ($CAPINT_t$)	$\frac{\text{new capital expenditures in the industry in year } t}{\text{shipments in year } t} \times 100$
4.	R&D intensity $RNDINT_t$	$\frac{\text{R\&D expenditures in year } t}{\text{sales in year } t} \times 100$ (this represents the average R&D intensity of the market leaders in the industry)
5.	Advertising intensity ($ADVINT_t$)	$\frac{\text{Advertising expenditures in year } t}{\text{Sales in year } t} \times 100$ (This represents the average advertising intensity of the market leaders in the industry.)
6.	Level of Competition	$COMP4F_t = \frac{1}{\text{four-firm concentration in year } t}$ $COMPF_t = \frac{1}{\text{eight-firm concentration in year } t}$

Table B.1

Descriptive Statistics of Variables in the Study

VARIABLE	N	MEAN	STD DEV	SUM	MINIMUM	MAXIMUM
BKRATE	352	5.777841	5.963194	2033.800	0.200000	64.80000
DIMP	346	3.660029	8.316899	1266.370	0.020000	59.18000
IMPRS	346	7.207283	8.028913	2493.720	0.080000	44.38000
RNDINT	253	2.948617	1.748619	746.000	0.200000	8.40000
ADVINT	169	4.798225	3.901030	810.900	0.100000	16.10000
CAPINT	352	3.770114	2.261514	1327.080	0.850000	15.20000
COMP4F	96	3.179583	2.366443	305.240	1.080000	16.67000
COMP8F	96	2.239896	1.585546	215.030	1.010000	11.11000

Table B.2

Correlation Matrix of All Variables* in the Study

PEARSON CORRELATION COEFFICIENTS / PROB > |R| UNDER HO:RHO=0 / NUMBER OF OBSERVATIONS

	BKRATE	DIMP	IMPRS	RNDINT	ADVINT	CAPINT	COMP4F	COMP8F
BKRATE	1.00000	0.44640	-0.03484	-0.03879	-0.24718	0.02140	0.07810	0.08178
	0.0000	0.0001	0.5184	0.5391	0.0012	0.6891	0.4494	0.4283
	352	346	346	253	169	352	96	96
DIMP	0.44640	1.00000	0.25954	0.10950	-0.34848	0.09916	-0.19868	-0.17482
	0.0001	0.0000	0.0001	0.0828	0.0001	0.0654	0.0549	0.0919
	346	346	346	252	169	346	94	94
IMPRS	-0.03484	0.25954	1.00000	0.21590	-0.01054	0.23548	-0.15515	-0.14921
	0.5184	0.0001	0.0000	0.0006	0.8918	0.0001	0.1354	0.1512
	346	346	346	252	169	346	94	94
RNDINT	-0.03879	0.10950	0.21590	1.00000	-0.18585	0.47947	-0.02118	-0.04247
	0.5391	0.0828	0.0006	0.0000	0.0268	0.0001	0.8792	0.7604
	253	252	252	253	142	253	54	54
ADVINT	-0.24718	-0.34848	-0.01054	-0.18585	1.00000	-0.10356	0.01255	-0.02163
	0.0012	0.0001	0.8918	0.0268	0.0000	0.1803	0.9379	0.8932
	169	169	169	142	169	169	41	41
CAPINT	0.02140	0.09916	0.23548	0.47947	-0.10356	1.00000	-0.07619	-0.05596
	0.6891	0.0654	0.0001	0.0001	0.1803	0.0000	0.4607	0.5881
	352	346	346	253	169	352	96	96
COMP4F	0.07810	-0.19868	-0.15515	-0.02118	0.01255	-0.07619	1.00000	0.98343
	0.4494	0.0549	0.1354	0.8792	0.9379	0.4607	0.0000	0.0001
	96	94	94	54	41	96	96	96
COMP8F	0.08178	-0.17482	-0.14921	-0.04247	-0.02163	-0.05596	0.98343	1.00000
	0.4283	0.0919	0.1512	0.7604	0.8932	0.5881	0.0001	0.0000
	96	94	94	54	41	96	96	96

*All variables have continuous values

Table B.3

Correlation Matrix of Variables in the Study with Structural Characteristics Specified in Binary Form

PEARSON CORRELATION COEFFICIENTS / PROB > |R| UNDER HO:RHO=0 / NUMBER OF OBSERVATIONS

	BKRATE	DIMP	IMPRS	RNDINTH*	ADVINTH*	CAPINTH*	COMP4FH*	COMP8FH*
BKRATE	1.00000 0.0000 352	0.44640 0.0001 346	-0.03484 0.5184 346	0.00633 0.9202 253	-0.20746 0.0068 169	-0.01231 0.8180 352	0.04652 0.6526 96	0.02765 0.7891 96
DIMP	0.44640 0.0001 346	1.00000 0.0000 346	0.25954 0.0001 346	0.15195 0.0158 252	-0.38725 0.0001 169	0.07654 0.1554 346	-0.23898 0.0204 94	-0.24680 0.0165 94
IMPRS	-0.03484 0.5184 346	0.25954 0.0001 346	1.00000 0.0000 346	0.10776 0.0878 252	-0.11447 0.1384 169	0.15910 0.0030 346	-0.05616 0.5908 94	-0.05981 0.5669 94
RNDINTH	0.00633 0.9202 253	0.15195 0.0158 252	0.10776 0.0878 252	1.00000 0.0000 253	-0.40245 0.0001 142	0.31189 0.0001 253	0.08911 0.5217 54	0.03878 0.7807 54
ADVINTH	-0.20746 0.0068 169	-0.38725 0.0001 169	-0.11447 0.1384 169	-0.40245 0.0001 142	1.00000 0.0000 169	-0.19567 0.0108 169	0.17506 0.2736 41	0.21823 0.1705 41
CAPINTH	-0.01231 0.8180 352	0.07654 0.1554 346	0.15910 0.0030 346	0.31189 0.0001 253	-0.19567 0.0108 169	1.00000 0.0000 352	0.00000 1.0000 96	-0.08333 0.4195 96
COMP4FH	0.04652 0.6526 96	-0.23898 0.0204 94	-0.05616 0.5908 94	0.08911 0.5217 54	0.17506 0.2736 41	0.00000 1.0000 96	1.00000 0.0000 96	0.91667 0.0001 96
COMP8FH	0.02765 0.7891 96	-0.24680 0.0165 94	-0.05981 0.5669 94	0.03878 0.7807 54	0.21823 0.1705 41	-0.08333 0.4195 96	0.91667 0.0001 96	1.00000 0.0000 96

*dummy variables

Table B.4

Correlation Matrix with Lagged Values of DIMP

PEARSON CORRELATION COEFFICIENTS / PROB > |R| UNDER HO:RHO=0 / NUMBER OF OBSERVATIONS

	BKRATE	DIMP	DIMP1[a]	DIMP2[a]	DIMP3[a]	RNDINTH[b]	ADVINTH[b]	CAPINTH[b]	COMP4FH[b]	COMP8FH[b]
BKRATE	1.00000	0.44640	0.56588	0.58547	0.55859	0.00633	-0.20746	-0.01231	0.04652	0.02765
	0.0000	0.0001	0.0001	0.0001	0.0001	0.9202	0.0068	0.8180	0.6526	0.7891
	352	346	314	282	250	253	169	352	96	96
DIMP	0.44640	1.00000	0.98663	0.96837	0.95378	0.15195	-0.38725	0.07654	-0.23898	-0.24680
	0.0001	0.0000	0.0001	0.0001	0.0001	0.0158	0.0001	0.1554	0.0204	0.0165
	346	346	314	282	250	252	169	346	94	94
DIMP1	0.56588	0.98663	1.00000	0.98476	0.96326	0.14944	-0.39219	0.09255	-0.22874	-0.25343
	0.0001	0.0001	0.0000	0.0001	0.0001	0.0206	0.0001	0.1016	0.0714	0.0451
	314	314	314	282	250	240	163	314	63	63
DIMP2	0.58547	0.96837	0.98476	1.00000	0.98223	0.14429	-0.40949	0.10305	-0.21611	-0.24015
	0.0001	0.0001	0.0001	0.0000	0.0001	0.0328	0.0001	0.0841	0.0889	0.0580
	282	282	282	282	250	219	151	282	63	63
DIMP3	0.55859	0.95378	0.96326	0.98223	1.00000	0.13388	-0.41541	0.11252	-0.22143	-0.24576
	0.0001	0.0001	0.0001	0.0001	0.0000	0.0627	0.0001	0.0758	0.0811	0.0522
	250	250	250	250	250	194	138	250	63	63
RNDINTH	0.00633	0.15195	0.14944	0.14429	0.13388	1.00000	-0.40245	0.31189	0.08911	0.03878
	0.9202	0.0158	0.0206	0.0328	0.0627	0.0000	0.0001	0.0001	0.5217	0.7807
	253	252	240	219	194	253	142	253	54	54
ADVINTH	-0.20746	-0.38725	-0.39219	-0.40949	-0.41541	-0.40245	1.00000	-0.19567	0.17506	0.21823
	0.0068	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0108	0.2736	0.1705
	169	169	163	151	138	142	169	169	41	41
CAPINTH	-0.01231	0.07654	0.09255	0.10305	0.11252	0.31189	-0.19567	1.00000	0.00000	-0.08333
	0.8180	0.1554	0.1016	0.0841	0.0758	0.0001	0.0108	0.0000	1.0000	0.4195
	352	346	314	282	250	253	169	352	96	96
COMP4FH	0.04652	-0.23898	-0.22874	-0.21611	-0.22143	0.08911	0.17506	0.00000	1.00000	0.91667
	0.6526	0.0204	0.0714	0.0889	0.0811	0.5217	0.2736	1.0000	0.0000	0.0001
	96	94	63	63	63	54	41	96	96	96
COMP8FH	0.02765	-0.24680	-0.25343	-0.24015	-0.24576	0.03878	0.21823	-0.08333	0.91667	1.00000
	0.7891	0.0165	0.0451	0.0580	0.0522	0.7807	0.1705	0.4195	0.0001	0.0000
	96	94	63	63	63	54	41	96	96	96

a = lagged variables

b = dummy variables

Table B.5

Correlation Matrix with Lagged Values of IMPRS

PEARSON CORRELATION COEFFICIENTS / PROB > |R| UNDER HO:RHO=0 / NUMBER OF OBSERVATIONS

	BKRATE	IMPRS	IMPRS1[a]	IMPRS2[a]	IMPRS3[a]	RNDINTH[b]	ADVINTH[b]	CAPINTH[b]	COMP4FH[b]	COMP8FH[b]
BKRATE	1.00000	-0.03484	-0.02761	-0.03199	-0.03692	0.00633	-0.20746	-0.01231	0.04652	0.02765
	0.0000	0.5184	0.6259	0.5927	0.5612	0.9202	0.0068	0.8180	0.6526	0.7891
	352	346	314	282	250	253	169	352	96	96
IMPRS	-0.03484	1.00000	0.98784	0.97292	0.95618	0.10776	-0.11447	0.15910	-0.05616	-0.05981
	0.5184	0.0000	0.0001	0.0001	0.0001	0.0878	0.1384	0.0030	0.5908	0.5669
	346	346	314	282	250	252	169	346	94	94
IMPRS1	-0.02761	0.98784	1.00000	0.98755	0.96950	0.14027	-0.14148	0.18557	-0.01506	-0.03295
	0.6259	0.0001	0.0000	0.0001	0.0001	0.0298	0.0716	0.0010	0.9068	0.7977
	314	314	314	282	250	240	163	314	63	63
IMPRS2	-0.03199	0.97292	0.98755	1.00000	0.98619	0.15421	-0.14525	0.18211	-0.03246	-0.05506
	0.5927	0.0001	0.0001	0.0000	0.0001	0.0224	0.0752	0.0021	0.8006	0.6682
	282	282	282	282	250	219	151	282	63	63
IMPRS3	-0.03692	0.95618	0.96950	0.98619	1.00000	0.18913	-0.17735	0.18349	-0.03770	-0.06110
	0.5612	0.0001	0.0001	0.0001	0.0000	0.0083	0.0374	0.0036	0.7693	0.6343
	250	250	250	250	250	194	138	250	63	63
RNDINTH	0.00633	0.10776	0.14027	0.15421	0.18913	1.00000	-0.40245	0.31189	0.08911	0.03878
	0.9202	0.0878	0.0298	0.0224	0.0083	0.0000	0.0001	0.0001	0.5217	0.7807
	253	252	240	219	194	253	142	253	54	54
ADVINTH	-0.20746	-0.11447	-0.14148	-0.14525	-0.17735	-0.40245	1.00000	-0.19567	0.17506	0.21823
	0.0068	0.1384	0.0716	0.0752	0.0374	0.0001	0.0000	0.0108	0.2736	0.1705
	169	169	163	151	138	142	169	169	41	41
CAPINTH	-0.01231	0.15910	0.18557	0.18211	0.18349	0.31189	-0.19567	1.00000	0.00000	-0.08333
	0.8180	0.0030	0.0010	0.0021	0.0036	0.0001	0.0108	0.0000	1.0000	0.4195
	352	346	314	282	250	253	169	352	96	96
COMP4FH	0.04652	-0.05616	-0.01506	-0.03246	-0.03770	0.08911	0.17506	0.00000	1.00000	0.91667
	0.6526	0.5908	0.9068	0.8006	0.7693	0.5217	0.2736	1.0000	0.0000	0.0001
	96	94	63	63	63	54	41	96	96	96
COMP8FH	0.02765	-0.05981	-0.03295	-0.05506	-0.06110	0.03878	0.21823	-0.08333	0.91667	1.00000
	0.7891	0.5669	0.7977	0.6682	0.6343	0.7807	0.1705	0.4195	0.0001	0.0000
	96	94	63	63	63	54	41	96	96	96

a = lagged variables

b = dummy variables

Table B 6

Estimated Regression Coefficients of Annual Models
Incorporating the Effect of Domestic Competition (COMP4FH)

MODEL #1 (t=1972)	b	Prob. <	MODEL #2 (t=1977)	b	Prob. <	MODEL #3 (t=1982)	b	Prob. <
Intercept	+3.71	0.34	Intercept	+3.24***	0.00	Intercept	+8.86***	0.00
DIMP	+0.52	0.15	DIMP	+0.21***	0.00	DIMP	+0.07	0.55
COMP4FH	+3.93	0.45	COMP4FH	-0.39	0.66	COMP4FH	-1.25	0.67
TEMPH	-0.35	0.74	TEMPH	+0.26	0.30	TEMPH	+0.93	0.16
R^2 (unadjusted)	0.09	0.51	R^2 (unadjusted)	0.45***	0.00	R^2 (unadjusted)	0.10	0.43
R^2 (adjusted)			R^2 (adjusted)	0.40				

*** p < .01

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1975-81	Corporate experience: Marketing Officer, Gokaldas Harbhagwandas, Bangalore, India Management Trainee, Hegde and Golay Ltd., Bangalore, India Finance Department, Sandoz (India) Ltd., Bombay, India