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The strategy of corporate survival: A resource dependence approach

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University of Washington, 1989

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THE STRATEGY OF CORPORATE SURVIVAL:
A RESOURCE DEPENDENCE APPROACH

By

JERRY PAUL SHEPPARD

A dissertation submitted in partial fulfillment
of the requirements for the degree of

Doctor of Philosophy

University of Washington

1989

Approved by _____
              (Chairperson of Supervisory Committee)

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Abstract

THE STRATEGY OF CORPORATE SURVIVAL:
A RESOURCE DEPENDENCE APPROACH

By Jerry Paul Sheppard

Chairperson of Supervisory Committee:
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The study of survival is important because it is critical for all organizations. All too often, however, **failure** is the accomplished end product of management's efforts. Resource dependence theory tells us that organizations fail when they do not possess sufficient resources to continue payments demanded by critical coalitions. Organizations protect themselves (from coalitions who wish to extract payments for previous support) by filing a bankruptcy petition.

By employing a list of about 300 publicly traded failed and non-failed firms this research dealt with two questions: (1) can an accurate predictive model of bankruptcy be constructed using dependency theory; and (2) which factors contribute most significantly to reducing a corporation's likelihood of failure? Data from various secondary sources were employed in a model which measured: (1) the profitability and growth in the firm's domains of activity; (2) the firm's degree of industry control; (3) the firm's influence with critical resource providers; (4) the extent of the firm's buffering against environmental forces through diversification; and (5) the firm's present level of resources. A factor analysis, logit analysis

and a stepwise discriminant analysis, was used to develop specific parameters within the model.

This research found significant consistent positive relationships between the firm's present level of resources and survival as well as the firm's control over critical resource providers (particularly in the form of board interlocks) and survival.

By going beyond strict financial ratio predictors of failure this study aids management in arriving at additional effective measures to prevent failure. Mainly, that management may wish to take care to develop significant political relationships with other firms through board interlocks.

This study also addresses the resource dependency perspective by using actual survival or failure. Pfeffer and Salancik (1978), suggested that organizational effectiveness reflects the firm's control of its resource dependencies, and the most critical measure of whether an organization has been effective is whether or not it continues to survive. Thus, this study cuts to the heart of the resource dependency perspective by addressing the essential issue of organizational survival and failure.

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ACKNOWLEDGEMENTS

I wish to thank my wife Sharon for her understanding and emotional, research, secretarial, and editorial support. She spent too many nights and weekends helping me research this project. She also managed to proofread this epic tale without falling asleep. Also, thanks go to my parents, without whom I.

I would also like to thank my committee, particularly Gary Hansen who provided vital data and kept sufficient, but not overly close, tabs on what I was doing (and for pushing me when he knew I could do better). My chair, Tom Jones, also deserves a special note of thanks. He made sure I, among others, had a program from which to graduate (an incredible feat by itself). I'd also like to thank Don Beard, for his suggestions regarding the literature review and factor analyses.

The University of Washington Business School librarians also deserve thanks; as do the computer support people. Additionally, I must thank the University of Washington for their financial support of this project.

Lastly, I would like to thank Bruce Springsteen and Michelle Schocked for their music. It kept my mind from getting too numb while working on this research. Or maybe it was their music which kept it numb so I could finish this research. Whatever.

CHAPTER ONE

INTRODUCTION

Organizational research generally attempts to examine cause and effect relationships (e.g. moving the organization into more profitable industries will mean more profit for the firm). Such studies usually assume that all the examined firms exist during the period of study; that specific managerial actions (divesting of subsidiaries in low profit industries) or firm specific characteristics (effectiveness at working in a wide variety of industries) are responsible for the firm's performance (e.g. profit); and that some conclusions can be drawn to predict and discriminate between adequate and excellent performance. Carrying further the organizational researcher's basic cause/effect assumption: the opposite of what ever causes success will cause failure (e.g. staying in low profit industries will generally result in firm failure).

Interestingly enough, most organizational studies do not include any failed firms in their models or in their samples. Why not? In order to make any assumptions with regard to what discriminates between unacceptable and adequate performance we must include some failed firms. If we were to run a study to evaluate the effectiveness of a new training course and we found that those who completed the course were more effective at their jobs would we say the course was effective? Maybe. If 90% of those who started the course dropped out because the course materials were badly organized would we say the course was effective? Probably not. In order to find out the true effectiveness of the course it is necessary to investigate the

dropouts, or those the program has **failed** to reach. To not do so would be considered negligent.

Campbell and Stanley (1963) list "mortality" as among the serious threats to a study's validity. If there is a particular pattern to those who drop out of a study, then there is need for concern as to the study's validity. In the study of organizations we often neglect to investigate those who have dropped out: the failed firms. Organizational research cannot validly understand the complete behavior of firms unless it looks at both the failed and surviving ones. This research project seeks to provide a better understanding of the corporation by looking at those variables which influence survival and failure.

A. WHY STUDY SURVIVAL AND FAILURE?

This research is intended to provide a better understanding of the factors which influence corporate survival and failure. Several important reasons demand that this topic be studied. The main reasons can be summarized as: (1) survival of the organ-ization is a logical necessity; (2) research work is seldom done in this area and is needed; (3) management may not be adequately addressing those issues critical to the organization's continued existence; (4) the managers who control the organization are agents seeking, among other goals, to ensure their firm's long term survival and thus could benefit from this research.

1. SURVIVAL OF THE ORGANIZATION AS A LOGICAL NECESSITY

Survival is of primary importance to an organization. Before an organization can perform any action it must exist. In order to continue to function it must maintain its existence. Regardless of whether or not they fulfill any other goals the organization will attempt to continue onward. Once the organization meets its objectives, it may seek new ones in order to continue. The classic case of the Foundation for Infantile Paralysis, better known as the March of Dimes (Sills, 1957) illustrates this point well. The Foundation aided research that would eliminate polio. When the Salk vaccine was introduced the organization could have simply disbanded. However, the March of Dimes carried on as an agency devoted to the fight against birth defects. Therefore, survival is a logical necessity if the organization wishes to continue any of its functions.

An organization may maximize profit or minimize cost, but then again it may not. It may impart prestige, power, and security to its members, or it may not. It may or may not do a great many things, but the "one thing which it must do, if it is to be an organization at all, is to survive" (Starbuck 1965: 463). Survival is, in some sense the ultimate acid test for the organization. Before the organization can do anything else it must continue to keep operating.

Managers may deal with many issues, but their basic priority (and that of the organization as a whole) is whether or not the organization continues to survive. As Barnard (1938) has pointed out:

"Thus in every organization there is a quadruple economy:
(1) physical energies and materials contributed by the
members and derived by its work upon the environment, and
expended on the environment and given to its members; (2)
the individual economy; (3) the social utilities related to
the social environment; and (4) a complex and comprehensive
economy of the organization under which both material
services and social services are contributed by members and
material things are secured from the environment, and
material is given to the environment and material and social
satisfactions to the members. The only measure of this
economy is the survival of the organization" (Barnard, 1938:
251-252).

Barnard is telling us several things: (1) demands made upon the
organization are so complex that the only true measure of a firm's
success is its survival; (2) firms attempt to (and can) affect their
environment so as to improve their likelihood of survival; (3)
survival depends on the firm being able to obtain resources from the
environment; and (4) resources are provided to the firm because those
providing the resources derive some utility from doing so. Thus, in
order to survive the firm must have access to external resources
because they are dependent upon those resources (Barnard, 1938,
Selznick, 1949; Katz and Kahn, 1966; Thompson, 1967; Hannan and
Freeman, 1977; Pfeffer and Salancik, 1978; Aldrich, 1979; Kotter,
1979). In conclusion, survival should be viewed as an organizational
priority dependent upon the firm's ability to secure resources from
the environment.

2. THE NEED FOR RESEARCH WORK ON SURVIVAL

Let us make an analogy between the health of an organization and the health of an individual. A health professional may study a set of individuals and tell us that in order to achieve better individual performance a person should eat a well balanced diet, obtain a specific amount of exercise, etc. One quickly realizes that the diet and exercise program for a world class athlete is far different from the diet and exercise program for the average person. Since most of us are not trying to be world class athletes why do we care about diet and exercise at all? The most obvious reason is because good diet and exercise will help us live longer. **How do we know this?** We know this because medical researchers do something organizational researchers seldom do. To put it crudely, they look at both living and dead bodies.

A medical researcher may notice a relationship between the age of a person at the time of their death and their percentage of body fat. The researcher hypothesizes that the percentage of body fat affects life span and that diet and exercise affect the percentage of body fat. The hypothesis may be tested by comparing the history of diets and exercise programs of similarly aged people (some of whom are currently living, some recently deceased) and seeing whether there is a significant difference between the two groups. Thus, the medical researcher may confirm his or her hypothesis by studying both living and dead subjects. Organizational researchers could increase their

knowledge of organizational survival if they looked at organizations which die.

The doctor who can train a woman to do a four minute mile but cannot prevent her from dying of tetanus when she runs into a rusty nail is not a very good doctor. Likewise, focusing instruction and study in the business field on "achieving excellence" and/or "improving organizational profitability" (Peters and Waterman, 1982) without diagnosing a fatal firm disease is perhaps no more beneficial to the corporate patient. Organizational researchers rarely examine simple survival. We expect those who study human beings to be able help them survive. We should also expect those who study organizations to do the same.

3. MANAGEMENT KNOWLEDGE OF SURVIVAL

Because little work has been done on the essential requirement of organizational survival it should come as no surprise that management may not be addressing those issues critical to the organization's existence. Evidence of recent years points out that top managers are in no way perfect at ensuring the survival of their organizations. Witness the failures of long established firms like Allis Chalmers, Evans Products, LTV, Revere Copper and Brass, and Rath Packing, to name a few. U.S. businesses fail at the rate of 168 every **day**, 365 days a year (based on the U.S. Department of Commerce figures for 1986 and 1987 from the Survey of Current Business, U.S. Department of Commerce, 1988). The essential question then is why do businesses

fail? And, just as importantly, can the manager do anything to stop such failure?

4. MANAGERS AS AGENTS SEEKING TO ENSURE LONG TERM FIRM SURVIVAL

Managers are the fourth point. A widely held view is that ownership is divorced from control in large corporations (Berle and Means, 1932). As a result, it is believed that while ownership rests nominally with shareholders, control rests with top management (Berle and Means, 1932; Marris, 1964; Galbraith, 1967; Nader, Green and Seligman, 1976).

Although stockholders may wish for maximizing long run firm profits or personal cash flows (Fama, 1970), managers may have a wide variety of other goals for their firm (Monsen and Downs, 1965). Many of these goals may have little to do with the concept of firm profit maximization. Top management may simply seek to satisifice (Simon, 1957; Cyert and March, 1963), to increase the size and prestige of the firm (Monsen and Downs, 1965) or to increase the diversity and size of the firm (Marris, 1964; Williamson, 1964; Amihud and Lev, 1981; Hill and Snell, 1988). Various objections to the economic model of profit maximization have, in fact, become so numerous (eg. Simon, 1957; Cyert and March, 1963; Monsen and Downs, 1965; Braybrooke and Lindblom, 1970) that perhaps all that can safely be said about those running the corporation is that, despite other motivations, they seek to maintain the existence of the organization.

Top management cares about maintaining the existence of the

organization because they derive utility satisfaction from their employment. They receive both intrinsic (such as satisfaction for a job well done) and extrinsic (eg. monetary) rewards from their employment. In order to maintain this reward structure, they try to avoid loss of employment. One of the most important ways top managers can avoid loss of employment and loss of intrinsic and extrinsic rewards is by preventing the firm's failure (Amihud and Lev, 1981). So, we may assume that one of top management's primary concerns is taking actions to prevent their firm's failure and not necessarily to maximize profit, minimize cost, etc. as a pure economic model may suppose.

What if shareholders object to this non profit maximizing behavior? There is usually little they can do to remove entrenched management. In order to change management the shareholders must first obtain control of the board of directors. It has been argued that top management both selects and controls the board (Galbraith, 1967; Pfeffer, 1972; Allen, 1974; Nader, Green and Seligman, 1976). Thus, removing top management becomes extremely difficult and expensive (Williamson, 1964).

Even if the owners were able to change the board and change management we must still face the fact that managers are only agents of the owners. Agency theory basically states that the owners' desires for profit maximization and other goals may not be carried out due to the fact the the organization is run by agents who have other desires, e.g. optimizing their own income or utility of job effort.

(For an in depth introduction to the concept of agency theory see Jensen and Meckling, 1976: 308. Gamble, O'Doherty and Hyman, 1987, provide a fine citation review of this area. Most recently Eisenhardt, 1989, presents an excellent conceptualization of agency theory.) While this research is not intended to do in-depth research on agency theory, the theory is important in understanding that the desires of those running the firm may not be to maximize profit, as an owner might desire, but rather to ensure firm survival, as managerial prerogative might dictate.

It can be argued that management's employment contract with shareholders may be arranged in such a way as to cause managers to act as entrepreneurs. In order to do this, however, managers must be allowed to keep all profits over a normal rate of return and take the risk of loss (Berle and Means, 1932). This relegates the role of shareholder to that of an investor with voting rights. From the manager's viewpoint this kind of contract makes little sense since a leveraged buy out will result in the same arrangement without the added burden of shareholder voting rights.

As agents, managers do not necessarily act in the best interests of the owners, but rather in their own best interests (Jensen and Meckling, 1976). Thus, managers, like a great many political and social actors, will attempt to reduce their employment risk by trying to prevent their organization's demise (Amihud and Lev, 1981). They will, of course, fight those forces which threaten, erode or destroy their company.

The assumption that one of top management's primary concerns is their firm's survival is supported by Donaldson and Lorsch (1983). They contend that corporate executives are primarily concerned with long-term corporate survival. However, they argue from the perspective that top management has a need to see the enterprise continue because of personal or psychological reasons (e.g. the desire to turn something over to the next generation). According to Donaldson and Lorsch (1983: 29):

> "Corporate managers... recognized that they, as well as their CEOs, were also most concerned with perpetuating the company:
>
>> The consistent theme in our decisions is what represents the future of [the company].
>>
>> [The CEO's] goal has been to perpetuate the company, not himself.
>>
>> As a management we want to survive... Part of our responsibility is to have a healthy company to turn over to the next generation..."

Thus, Donaldson and Lorsch (1983: 30-31) are telling us that top management views "survival as the name of the game." In very strong terms they say, "[Management's] goals for the firm to excel mesh with their personal concerns to make long-term corporate survival their **single most** important objective" (emphasis added). Since managers seem to be concerned with perpetuating their company, it becomes essential to ask some important questions. For instance, why do some businesses survive and others fail? What can the manager do to prevent failure? The answers to these questions are of vital

importance to management in the long run.

B.   WHAT IS SURVIVAL AND FAILURE?

On a personal level, survival can be simple as staying alive. But on a business level, what do we mean when we talk about business survival or business failure? To C.P.A.s survival means the firm is a "going concern." What does that mean? From the C.P.A.'s perspective it means the firm is not likely to **fail** in the next couple of years. The straightforward reason for the C.P.A. to have this view is that the C.P.A.'s opinion means that the firm's financial statements meet Generally Accepted Accounting Principles and these principles assume the firm is a going concern. If the C.P.A. represents the firm as a going concern, when he or she should have suspected otherwise, he or she will be liable to interested parties who relied on their opinion. Such liability can run from millions to billions of dollars. Then the important question becomes, "what do we mean by failure?"

When we talk about business failure, typically the idea of bankruptcy comes up. When businesses do not meet the payroll and do not pay their bills we see them as "failing." Actual recognition of a failure occurs when a bankruptcy petition is filed. Why this is so should become clearer shortly.

Another perspective on survival is taken by Pfeffer and Salancik. They say that, "The key to organizational survival is the ability to acquire and maintain resources" (Pfeffer and Salancik, 1978: 2). The firm's ability to acquire resources is dependent upon their ability to

induce coalitions which control those resources. For example, they must be able to induce suppliers to provide resources by paying the suppliers for those resources. Coalitions will continue to support the firm as long as the firm can induce them to do so (i.e. suppliers ship as long as payments keep coming). Failure occurs when the organization does not have sufficient resources to maintain support from critical coalitions (e.g. when the firm can no longer convince the supplier they will eventually be repaid).

When coalitions recognize the firm's inability to provide inducements, they will stop supporting the organization. At the same time coalitions will attempt to extract payments from the organization due to the coalition's past support. An example is the supplier who refuses to ship and is demanding payment for past shipments. Failure occurs then in the form of bankruptcy when the firm no longer possesses sufficient resources to meet the coalitional demands for payment of past support. From this perspective, as long as the organization can avoid bankruptcy, it may be said to be "surviving".

1.   ORGANIZATIONAL "SURVIVAL" AS "NON-FAILURE"

Pfeffer and Salancik's resource dependency perspective thus gives us a way to view survival and failure. As long as the organization can continue to receive resources from and provide inducements to coalitions it may be said to be surviving. The organization fails when coalitions are unwilling to provide resources and the

organization cannot and will not meet demands for payments due critical coalitions for past support. At such a point a bankruptcy petition is filed to prevent coalitions from extracting payment for past support. Thus, our operating definition for failure is bankruptcy and our operating definition for survival is non-failure (i.e. the fact that the firm is not bankrupt).

2. IS TAKE OVER FAILURE?

Failure is not the take over of the organization by another organization. Why? First of all, there are three coalitions involved in a take over: (1) the organization which is to be taken over — the "target," (2) those who seek to take over the target — the "buyer" and (3) those who presently own the target — the "seller". When the buyer offers to take over the target, the buyer is essentially stating, "I am willing to provide resources in exchange for the right to control the target firm." In other words, the target is able to attract an investor coalition, the buyers who are willing to provide resources to other coalitions, the sellers — in order to maintain the existence of the target. How long the buyers intend to "maintain the existence of the organization" is not the issue. What is important is that the organization has not failed to attract needed resources. Thus a take over would not represent failure.

C.   THE RESEARCH IDEA

The original idea for this research is based first on the concept that those in control of the firm are top management (Berle and Means, 1932). Secondly, managers as agents of the owners will not always act in the best interests of the owners but rather will act in their own best interests (Jensen and Meckling, 1976: 308: Eisenhardt, 1989). Thirdly, managers have an employment risk which we can expect that they will attempt to reduce (Amihud and Lev, 1981: 606). Lastly, managers are hurt more by potential firm failure than shareholders. Investors can reduce their risk via a diversified portfolio of investments but managers cannot diversify their employment risk through a diversified portfolio of employers (Amihud and Lev, 1976: 606). Thus, the solution for the manager is to take actions which prevent the firm's failure (and those in the shareholders' employ) even if such moves do not maximize the owners' wealth.

When Cyert and March say that, "Security surely ranks in importance amongst the ideas which... concern the manager" (Cyert and March, 1963: 238-239) they are telling us that managers wish to maintain the existence of the corporation in order to maintain, among other things, their own personal financial security. Thus managers, and others who depend on the firm (from board members down to line workers), are at some level working toward maintaining the survival of the organization. In other words, interested parties are attempting to prevent the destruction or failure of the organization. For example,

employees may not care if the organization is not as efficient as it could be, but if the organization is in danger of failing those same employees may be more than willing to take action to save the firm. This is particularly true in communities where the organization employs a large percentage of the workforce and/or where the firm is in a depressed industry since workers may not be able to easily find new jobs. In such a situation unions make contract concessions which can save the firm millions of dollars and allow the organization to survive (e.g. workers at Wheeling Pittsburgh Steel and Rath Packing made extensive concessions to keep their employers afloat).

By this point we can safely assume that the first concern of those in charge of the corporation is the prevention of the ultimate destruction of the organization. We can also assume that other interested parties are similarly concerned since failure of the firm would mean loss of utility to those parties (eg. workers would lose jobs, suppliers would lose a customer).

D. THE RESOURCE DEPENDENCE APPROACH

Taking the Resource Dependence perspective, we see that interested parties will attempt to secure and control an adequate mix of resources in order to prevent the failure of the firm. Resource dependency theory is useful for conceptualizing the variables which might affect firm failure. To summarize:

> "All organizations find themselves dependent... on some
> elements [that is, other actors] in their external

environments. This dependence is usually based on the external elements' control of some resources which the organization needs... To avoid having to cater to the desires of those they are dependent upon, risk their organization's demise, accomplish their goals, those who are in positions of authority... try to direct their organizations to somehow actively manage their external dependence" (Kotter, 1979: 87).

In addition to providing a definitive perspective on failure and survival, resource dependency can also be helpful is addressing the issue of how managers might promote survival or elude failure. What would we find if we were to take a resource dependence perspective in determining the variables which lead to survival and failure? To begin with, this perspective implies that in order to avoid risking their organization, those in positions of authority will actively try to manage those resources required to maintain the existence of the organization (Kotter, 1979: 87). In other words, top management will try to manipulate (decrease) the extent of environmental resource dependence (Thompson, 1967; Pfeffer and Salanick, 1978). For the purpose of a survival and failure study the resource dependence perspective assumes that:

1)   Firms which are likely to fail do not adequately manage the selection of the industries in which they operate (e.g. they operate in unprofitable or slow growth industries).

2) Firms which are likely to fail are unable to exercise control over the industries in which they operate (e.g. they have insufficient market share to control the market and maintain market order).

3) Firms which are likely to fail lack significant influence over key resource providers, those upon which the firm relies (i.e. the firm does not maintain sufficient interlocks or has not successfully manipulated their exchange relationship with other firms in order to control their environment).

4) Firms which are likely to fail are over-reliant upon a narrow range of industries. Thus, detrimental changes in a small number of such industries can cause the firm to fail (e.g. the firm is not sufficiently diversified to withstand adverse shifts in one or a narrow range of industries).

5) Failure results when the organization no longer has the resources with which to entice suppliers into providing resources (i.e. the firm files for bankruptcy).

Firms choose to involve themselves with a variety of activities and in a wide range of environments. They can exercise varying degrees of influence over those activities and environments. The level of variety and influence will thus affect the firm's chance of

survival. To better visualize this concept we could use corporate diversification strategy to represent variety; industry attributes (such as profitability or growth) to capture the nature of the firm's environments; director interlocks and size as a way to measure the firm's ability to influence its resource providers; and market share as a way to control at least part of its environment. All of these aspects would thus be important in distancing the firm from failure.

Given all of the above, what does this research attempt to do and how will does it go about it? This question is addressed in the next section.

E.   RESEARCH QUESTIONS AND RESEARCH DESIGN

The three main questions this research will endeavor to address are as follows:

1) Can an accurate descriptive model of corporate failure be developed using dependency theory?

2) Can an accurate predictive model of bankruptcy likelihood be constructed using dependency theory?

3) Which variables contribute most significantly to reducing a corporation's likelihood of bankruptcy?

The first research question takes a complex set of variables (which will be operationalized fully in the Research Design section) and seeks to construct a model which will discriminate between firms

which could be in a danger of failing and those which are likely to survive. All the variables in the model are expected to have statistical significance. Unlike previous financial ratio models, the approach employed here shall use the resource dependence factors listed in Figure 1 as discriminators (i.e. the independent variables or predictors) of bankruptcy the model to be developed. (Please see the Literature Review section for greater detail.)

This model employs the failed/non-failed distinction as the dependent variable in a discriminant analysis. Simply stated, the model views failure as a function of the firm's inability (or neglect) to correctly manipulate its resource dependencies. This model (with suggested variables) is displayed in Figure 1.

```
 _____
|                                                               |
|   _____         _____    |
|  |  Manipulate    Extent of        |  ----> | Survival /  |   |
|  |  Resource      Dependency       |        | Failure     |   |
|  |_____|        |_____|   |
|   Selecting Environment:                     Valid            |
|        Industry Profitability                Description      |
|        Industry Growth                       and              |
|   Control the Environment:                   Prediction       |
|        Firm Market Share                                      |
|   Influence Resource Providers:                               |
|        Director Interlocks                                    |
|        Joint Ventures                                         |
|        Firm Size                                              |
|   Variety of Environmental Involvement:                       |
|        Diversification                                        |
|   Maintain Present Resources:                                 |
|        Induce Providers                                       |
|_____|
```

FIGURE 1:   RESOURCE DEPENDENCY MODEL OF SURVIVAL AND FAILURE

As the dependent variable in a logit analysis this model will employ a failed/non-failed criterion. This second test serves as a reliability check against the discriminant analysis model. T-Tests can also be employed to determine the significance of the differences between the failed and non-failed firms for all elements of the model.

The second research question, "Can an accurate predictive model of bankruptcy likelihood be constructed using dependency theory?" employs both Logit and Discriminant Analysis models and compares their predictive accuracy regarding failed versus non-failed firms with the effectiveness of Altman's Z (a well known failure predictor). To evaluate the accuracy of the Logit Analysis, Discriminant Analysis and Altman's Z an "accuracy matrix" (Altman, 1968: 598-599) will be used. This "accuracy matrix" (displayed in Figure 2) compares the numbers of actual failures and survivors found in the samples with the numbers of predicted failures and survivors as determined by the discriminant and logit analysis. The matrix will evaluate overall accuracy, correct prediction of failures and correct prediction of survivors.

The third research question, "Which variables contribute most significantly to reducing a corporation's likelihood of bankruptcy?" involves testing the relative "importance" of each variable in relation to the others. This should demonstrate which elements of the Resource Dependence model are of greatest importance in distancing the firm from failure. Is the most important element of the model the firm's control of resource providers via board interlocks and joint ventures (Pfeffer and Salanick, 1978)? Is the most important element

of the model the firm's level of diversification (Rumelt, 1974), or
the quality of the diversification move — e.g. movement into a
profitable industry (Christensen and Montgomery, 1981)?

Actual Group Membership	Predicted Group Membership	
	B a n k r u p t	Non - Bankrupt
Bankrupt	Correctly Predict Firm's Bankruptcy	Incorrect Type I Error
Non - Bankrupt	Incorrect Type II Error	Correctly Predict Firm's Survival

FIGURE 2:   THE ACCURACY MATRIX

F. SUMMARY

This chapter began to address the subject of survival and
failure. In doing so it applied some concepts from the Resource
Dependency. The specific questions this research will concern itself
with were also discussed. Most importantly, this chapter has
addressed the importance of studying failure. Both the manager and
organizational researcher need to attend to this often overlooked
topic. This is not to say that the study of survival and failure has
been completely neglected; quite a few authors have studied this topic

and several different approaches have been taken. These various approaches will be discussed at length in the next chapter. The next chapter will also show how Resource Dependency can be used to tie together the various approaches.

CHAPTER TWO

LITERATURE REVIEW

This literature review is broadly divided into five parts. The first three parts deal with prior approaches to organizational failure, the last two parts deal with the resource dependence perspective of firm failure. The five parts of this review are as follows:

1) Financial approaches to organizational failure.

2) Behavioral approaches to organizational failure.

3) Environmental approaches to organizational failure.

4) Resource dependence approach to organizational failure.

5) The specific aspects of the resource dependence approach which are logically concerned with failure.

A resource dependence approach will be employed to bring together elements of the various financial, behavioral and environmental theories of firm decline and demise into a coherent whole. Resource dependency will be used to both define failure and to sketch out concepts which should help us discriminate firms which are likely to fail from those which are likely to succeed.

A. FINANCIAL APPROACHES TO THE STUDY OF ORGANIZATIONAL FAILURE

Generally speaking, financial approaches to the study of organizational failure do not look at the underlying causes of the firm's failure but rather at indicators of potential failure. These indicators can be grouped into essentially two classes: (1) financial

ratio analysis or (2) cash flow models. These indicators are employed in a statistical analysis (a test of means, a discriminant analysis or a logit analysis) to test their predictive accuracy. A graphic description of this approach can be seen in Figure 3 below. What follows will be a description of these various treatments from the financal research perspective.

```
 _____
|  (  _ _ _ _  )          _____        _ _ _ _          _____ |
| (           )          |            |       ( Means   )      |            ||
| (   ???     )          | Financial  |   -->( Discrm.  )-->   |            ||
| (          )--->       |            |       ( Logit _  )      | Firm       ||
| ( Under-   )           | Ratios     |                         |            ||
| (  lying   )           |_____|                         | Failure    ||
| (          )                                                  |            ||
| ( Causes   )            _____                         | or         ||
| (          )           | Cash  Flow |       _ _ _ _           |            ||
| (   ???    )--->        |            |   -->( Means   )-->     | Survival   ||
| (          )           | Indicators |       ( Discrm.  )      |            ||
| (  _ _ _ _ )           |_____|       ( Logit _  )      |_____||
|_____|
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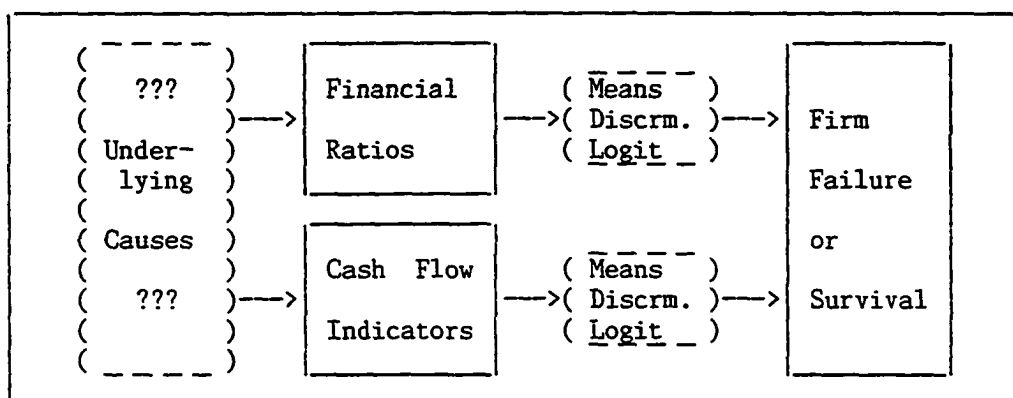
FIGURE 3:   FINANCIAL MODELS USEFUL IN PREDICTING FAILURE

Altman (1968) traces the beginnings of failure studies as far back as Smith and Winakor's 1935 book, Changes in the Financial Structure of Unsuccessful Corporations. However, the typical starting point for looking at the financial analysis of failure is with the bankruptcy prediction work of Beaver (1967, 1968). Beaver's work achieved a moderate level of predictive accuracy by employing a univariate model to differentiate survivors from failures. Beaver also provides us with the financier's definition of failure:

"'Failure' is defined as the inability of the firm to pay
its financial obligations as they mature. Operationally, a
firm is said to have failed when any of the following events
occurred: bankruptcy, bond default, an overdrawn bank
account, or nonpayment of a preferred stock dividend"
(Beaver, 1967: 71)

Beaver looked at a total of 158 firms for the period from 1949 to
1964. The 158 firms consisted of 79 failed firms (59 bankruptcies, 16
non-payments of preferred dividends, 3 bond defaults and 1 overdrawn
bank account) and 79 non-failed firms. The failed firms were matched
to non-failed firms by industry. Beaver compared the financial ratios
of failed and non-failed firms in order to investigate which ratios do
the best job of predicting failure. The ratios Beaver found useful
are listed in Table 1, below. Also listed in Table 1 are the
accuracy rates (percentage of failures and non-failures correctly
predicted) for each ratio.

TABLE 1:   BEAVER'S FINANCIAL RATIOS USEFUL IN PREDICTING FAILURE

	Years in Advance of Failure				
R a t i o s	1	2	3	4	5
Cash Flow / Total Debt	88%	80%	78%	76%	78%
Net Income / Total Assets	88%	83%	77%	71%	74%
Total Debt / Total Assets	81%	76%	69%	75%	72%
Working Capital / Total Assets	78%	68%	67%	60%	38%
Current Ratio	80%	71%	66%	65%	66%

Beaver's study deserves credit for his objective testing of commonly used financial ratios, his degree of success in making predictions and his advocacy for the use of cash flows as a theoretical starting point for failure research. There are, however, several problems with his study. First of all, Beaver did not adequately control for firm size. Second, he does not investigate whether the different definitions of failure affect the outcome of the predictions. Third, Beaver does not have an adequate theoretical explanation for employing all the variables used (other than the fact that the variables are commonly employed ratios). Lastly, he tests each ratio independently by a test of means. While the test itself is acceptable, the predictions could have been more accurate if the ratios were used in conjunction with one another. The use of discriminant analysis to create a failure likelihood score from several financial ratios would have addressed this last issue.

Altman (1968) improved on Beaver's (1967) work in three basic ways. First, he used discriminant analysis to create a bankruptcy likelihood score from several financial ratios (called "Altman's Z-Score"). Second, Altman controlled for industry type and firm size. Third, he used bankruptcy as the definition for failure — therefore all firms were held to the same standard of "failure." Altman, like Beaver compared a sample of failed firms to a sample of non-failed firms. Altman's predictive accuracy was better than Beaver's for the period one to two years prior to a possible bankruptcy. For the period of three to five years prior to a possible bankruptcy Altman

showed no great improvement over Beaver. However, Altman's important contribution was to promote the use of discriminant analysis to create bankruptcy likelihood scores from financial ratios.

After Altman (1968) researchers began to extensively use discriminant analysis to create bankruptcy prediction models. Different sets of ratios were employed in these models and researchers also employed different samples covering various time periods. A summary of the major studies employing discriminant analysis is contained in Table 2.

TABLE 2:   SUMMARY OF FINANCIAL RATIO DISCRIMINANT FAILURE MODELS

Researchers	Principle Ratios Employed			Accuracy	Years
Altman, 1968	WC/TA MVE/BVD	RE/TA Sales/TA	EBIT/TA	95% Yr.1 29% Yr.4	1946– 1965
Wilcox, 1973	ACF	ACP	VACF	94% Yr.1 76% Yr.5	1949– 1971
Blum, 1974	QFR MROR	CF/TD	NQA/I	93% Yr.1 70% Yr 3	1954– 1968
Altman, etal, 1977	ROA RE/TA	SOE WC/TA	EBIT/IP MVCE/TC	93% Yr.1 71% Yr.5	1969– 1975
Rose and Giroux, 1984	CA/TA R/Sales LTD/IC	Current TL/TE D/NP	Sales/SE IE/Sales Sales/IC	92% Yr.1 88% Yr.2	1970– 1978

ACF = Adjusted Cash Flow; **ACP** = Adjusted Cash Position; **BVD** = Book Value of Debt; **CF** = Cash Flow; **EBIT** = Earnings Before Interest and Taxes; **I** = Inventory; **IP** = Interest Payments; **MROR** = Market Rate of Return; **MVCE** = Market Value of Common Equity; **MVE** = Market Value of Equity; **NI** = Net Income; **NQA** = Net Quick Assets; **QFR** = Quick Flow Ratio; **RE** = Retained Earnings; **ROA** = Return on Assets; **SOE** = Stability of Earnings (10 year error of EBIT/TA); **TA** = Total Assets; **TC** = Total Capital; **TD** = Total Debt; **VACF** = Variance in Adjusted Cash Flow; **WC** = Working Capital.

The above list is intended to serve as an introduction to the extensive literature in this area. Other significant studies include Wilcox, 1971; Deakin, 1972; Elam, 1975; Van Frederiskslust, 1978; Ohlson, 1980; Chen and Shimerda, 1981; Altman, 1983. Other studies add variations to specifically study small businesses (Edminister, 1972) and analyze the effect of environmental changes over time (Ketz, 1978; Norton and Smith, 1979; Mensah, 1983, 1984).

The above studies suffer from the fact that they employ methodologies, such as discriminant analysis or T-tests, which require sample data to be normally distributed. If some of the variables are not normally distributed, the methods employed may result in selection of an inappropriate set of predictors. This was the problem Zavgren (1985) addressed. She used logit analysis to predict bankruptcies in U.S. industrial firms for the period from 1972 to 1976.

Logit differs from discriminant analysis in that the latter is designed to develop a linear function to discriminate between survivors and failures and the former uses a non-linear method to develop probabilities of failure. According to Lo (1986), logit analysis is a much more robust technique and is not affected by data sets which are not normally distributed.

Consequently, Zavgren's model (a combination of return on investment, financial leverage, short term liquidity, cash position, and capital, receivables and inventory turnover) can be considered more robust that the models using discriminant analysis. Her model's

predictive accuracy ranges from 83% correct classification of bankrupts and non-bankrupts (two years prior to potential failure) to 72% correct classification (three years prior to potential firm demise). In spite of Zavgren's use of improved techniques, her study, like many others, gave little theoretical justification for the variables employed.

Almost all of the above studies have been attacked because they have theoretically weak justifications for using the particular set of variables they employ (Ball and Foster, 1982; Aziz, Emanuel and Lawson, 1988). Aziz, Emanuel and Lawson (1988) claim the models are constructed by "brute empiricism" and the, "ratios included in [these] bankruptcy prediction models are based on a type of ad hoc pragmatism rather than sound theoretical work." In other words, the researchers are throwing all the ratios they can think of at a particular list of failed and non-failed firms to see which ratios predict failure the best. There is no theory developed as to why a particular set of variables may be included in the analysis (Rose and Giroux's 1984 test of 130 accounting-based predictors is an excellent example of this type of lets-run-it-through-the-computer-and-see-what-comes-out attitude).

The finance studies which do employ theory are typically cash flow based models (Casey and Bartczak, 1985; Gentry, Newbold and Whitford, 1985; Aziz, Emanuel and Lawson, 1988). Particularly significant is the model developed by Aziz, Emanuel and Lawson (1988). Their cash flow model (employing liquidity changes, net cash from

operations, debt raised and retired, equity raised and dividends paid) correctly distinguished between surviving and non-surviving firms 90% of the time in year one, 81% of the time in year two and 73% of the time in year three. Their model employed both logit and discriminant analysis to predict firm bankruptcies from a sample of firms covering the period from 1971 to 1982. The use of both statistical techniques and a theoretical rationale for the variables make this an excellent model.

While we can credit financial approaches to organizational death with objectively employing accounting data to predict corporate bankruptcy, several major criticisms have been be launched against them. In general, financial approaches to the study of failure have been criticized for not being timely enough to aid management in preventing failure because they do not predict failure far enough in advance (Zavgren, 1985, Argenti, 1986A, 1986B; D'Aveni, 1987C). The finance approach has also been criticized for being overly simplistic (D'Aveni, 1987C). For example, the cash flow approach tells us that the firm went under because it did not have sufficient funds to meet its obligations. Such a statement does not address the question of, "Why did the firm run into cash flow problems to begin with?" In order to answer this and more complex questions like it we must turn to other approaches to explain the more fundamental underlying causes of organizational demise.

B.   BEHAVIORAL APPROACHES TO ORGANIZATIONAL FAILURE

What are the underlying reasons for firm failure? Are there some behaviors exhibited by the individuals who run the firm which might cause it to fail? To answer these rarely addressed questions we need to look at behavioral explanations for a firm's typical actions (only then we can begin to discuss firm failure specifically).

Cyert and March's, Behavioral Theory of the Firm (1963) address this issue and explain why firms will not necessarily maximize profit. Cyert and March present an image of the firm as a many headed giant. The firm is one body, one unit, but not of one mind.   Different managers may have conflicting goals for the firm. The sales manager may wish to lower the product's price in order to reach market share or sales goals; the finance officer may wish to raise price in order to reach profit goals. In order to reconcile such goals the firm will, among other things, satisfice (i.e. strive for an acceptable level of performance with regard to its various goals); attempt to maintain a supply of slack resources (keep more resources on hand than are currently needed so that such resources can be called upon when required); and employ standard operating procedures (which set some minimum level of performance acceptable to all top managers).

Cyert and March looked at which behaviors the firm cause the firm to simply reach for "acceptable" levels of profit (rather than maximizing profit). But what about the flip side? What causes the firm to not attain even the "acceptable" levels of profit? What,

particularly, causes the firm to fail? Cyert and March do not directly answer these questions. They do, however, provide us with the components which could lead us in the direction of an answer.

Cyert and March (as well as March, 1962) view the organization as being made up of coalitions of individuals. Such coalitions may include sales people, line workers, researchers, managers, etc. (we could also expand the boundaries of the firm to include investors, suppliers, customers, etc.). Cyert and March note the need to provide inducements to coalitions in order to get them to participate in the organization. March and Simon (1958) make similar statements. Following their logic, coalitions will make contributions to the organization in return for these inducements. For example, investors will provide funds if they are encouraged with monetary rewards (interest and a promise of repayment for creditors, dividends and stock appreciation for shareholders); employees will provide skill and effort depending on the job related incentives (wages, vacations, the promise of promotion, etc.); and so on. Participating coalitions will enter and/or leave an organization depending upon their assessment of the value to be gained by continuing the exchange of inducements.

According to this coalitional perspective, an organization is viable as long the inducements it can grant to coalitions are sufficient to acquire the necessary contributions from such coalitions (e.g. the firm will receive materials for as long as they can pay their suppliers). If current contributions (e.g. cash inflows) are insufficient to meet current demands for incentives (e.g. cash

outflows), the organization may not be able to provide the necessary inducements to coalitions to obtain their suppport. In such a situation the organization must call upon a "pool of emergency resources" in order to satisfy coalitions. Such a set of resources is called "organizational slack."

For example, if current cash outflows exceed current cash inflows the organization, will then have use upon cash reserves to make up the difference. If cash outflows continue to exceed inflows, the cash reserves will eventually run out. In order to generate more cash the organization must then call upon other "slack" resources: marketable securities, lines of credit, etc. Eventually, the organizational will run out of resources if outflows continue to exceed inflows. Failure occurs when the organization does not have sufficient resources to maintain support from critical coalitions (e.g. when the firm can no longer convince the supplier that it will eventually pay). The firm may then have no other legal recourse than to stay the actions of the supplier by filing for reorganization under Chapter 11 of the bankruptcy code. From this perspective, bankruptcy is failure and avoidance of bankruptcy is survival. Thus, Cyert and March's coalitional perspective can be credited with providing us with the components of a model and a definition of survival and fail-ure. A graphic representation of this model is outlined in Figure 4.

Figure 4 demonstrates what happens when incentives exceed contributions and the firm has no slack resources: it fails. However, the model does not explicitly tell us why an organization may go from

being able to meet coalitional demands in one time period, to not being able to meet them in another. There may be two possible explanations for this change. First, coalitions' expectations for incentives may be altered due to other changes in the environment (e.g. employees demand higher wages due to inflation). Second, there may be some specific actions on the part of the firm which has changed their ability to provide incentives. Neither of these explanations is really dealt with in the model. Cyert and March cannot be greatly faulted for this omission since their original model was not intended to to describe failure.
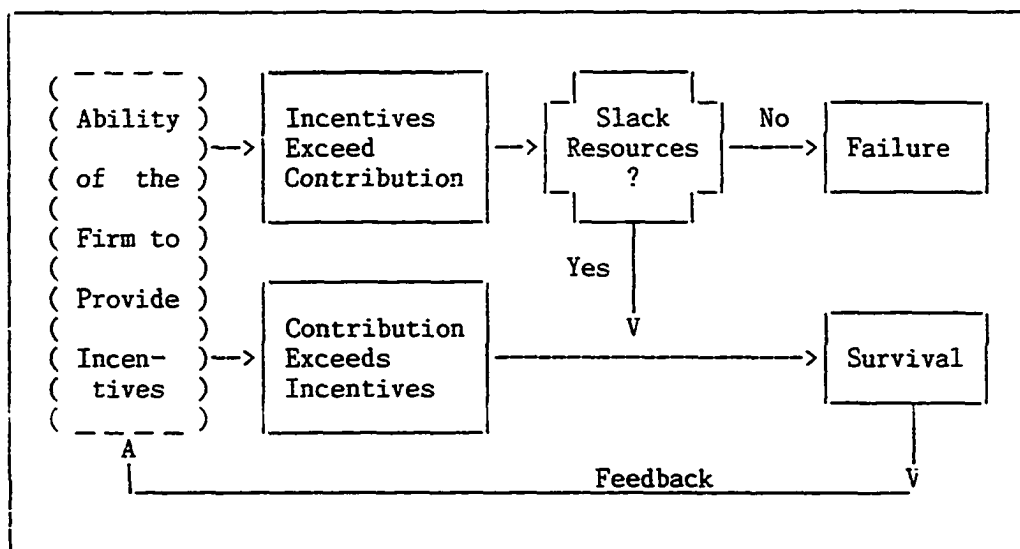
FIGURE 4:   A COALITIONAL APPROACH TO SURVIVAL AND FAILURE

There is a model which explicitly includes environmental change and the specific actions a firm may take to reduce their ability to

provide incentives. Argenti's (1986A, 1986B) model includes both of these items. Like Cyert and March, Argenti takes a behavioral approach. Argenti treats the organization's collapse as a combination of factors stemming from the behaviors of the Chief Executive Officer (CEO), the Board of Directors and the Finance Controller. Argenti sees failure is a long process having four distinct stages:

1.   STAGE ONE: DEFECTS

According to Argenti, the organization acquires specific defects which are visible to the interested observer. The accounts of the company may show no visible deterioration, but the organization may display other attributes which make it a candidate for failure. The potential for failure ten years down the line is present if the organization demonstrates the following attributes:

1. Autocratic leader with centralized power.

2. Poor finance system.

3. Poor response to change.

The first attribute, the presence of an autocratic chief executive who is also the board chair, is the first warning sign of future failure. Not that all organizations with autocratic chief executives are doomed. However, the presence of such power (particularly if unchecked) means when this executive says, "jump," people do — even if its in the wrong direction. If executive skills are not spread, there is no strong finance director, and the directors do not

actively participate, the chief executive's power is unchecked. The chief executive acting alone will sooner or later make a mistake (or mistakes) which will lead to corporate failure.

The second attribute, "a poor finance system," means that there is ineffective budgetary controls, inaccurate costing systems, and poor cash flow planning. Thus, poor information, in part, will add to the likelihood that the chief executive will make a mistake.

Lastly, a company that does not respond well to change will do less well than its competitors which do. If a company does not handle change well, its long run chances of having problems or "making a mistake," are great. A real life example of an unchecked chief executive would be Frank Lorenzo's domination of the administration of Eastern Airlines. Lorenzo was under the erroneous assumption that he could dominate the negotiation process with the airline's employees. Negotiations broke down with union representatives because of Lorenzo's insistence on employee wage concessions and the fact that the union, eventually, did not want to deal with Lorenzo as head of the airline. The workers may have preferred to see the airline go broke or be sold rather than to have deal with their boss.

2. STAGE TWO: THE THREE MISTAKES

Companies with the above defects may be predisposed to make a mistake which leads to their failure. There are three possible mistakes which a well managed company will not make: (1) overtrading, (2) the big project, and (3) high gearing. Overtrading results when a

company expands faster than its capital base and, due to poor financial management, the company's cash does not increase at a corresponding rate. Borrowing must be increased for growth to continue. In no time interest payments eat up profits and the company. The big project is when the company embarks on a project of such size that if anything goes wrong it will bring down the firm. High gearing is when the organization increases its leverage to its maximum level and leaves itself no room to for cash flow shortfalls.

Take the case of Wheeling Pittsburgh Steel Company. In the late 1970's and early 1980's Wheeling Pittsburgh expanded faster than its capital base allowed (overtrading). The company embarked on a major expansion and modernization program (the big project). Their annual reports cited the goal of becoming one of the most efficient steel producers in the world. In order to reach this goal (and keep operating) the firm maximized its available credit (high gearing). By 1984, Wheeling Pittsburgh probably was one of the most efficient steel producers in the world; it was also bankrupt.

3. STAGE THREE: THE SIGNS AND SYMPTOMS

At this stage standard measures derived from the financial statements of the company, such as financial ratios and Z-scores, show the organization is in trouble. These usually show up when it is too late to do anything to rectify past mistakes — typically one to two years before bankruptcy.

4.   STAGE FOUR: INSOLVENCY

The perceived "sudden" end of the road. Rumors, resignations and finally the filing for protection from creditors. Argenti's four stage process is visualized in Figure 5. Note that signs and symptoms are next to the last stage of the process. The finance and the coalitional approaches really only give us this stage as an explanation for a firm's demise. Thus, Argenti improves on the previous models by including possible underlying reasons for why failure occurs.

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( - - - - - - - - )
(   Environmental   )
(                   )
(   C h a n g e     )
( - - - - - - - - )
           |
           V
     _|          |_
    |  Is Chief Exec.  |
    |  Autocratic,  are |        _____        _____
    |  Executive  Skills|   No  | C o r r e c t  |      |                |
    |  Concentrated, are|------>| C h a n g e    |----->|  Survival      |
    |  Finance  Controls|       | R e s p o n s e |      |                |
    |_  Insuffient?   _|        |_____|       |_____|
      |_____|

         Yes |
             V
     _|        |_
    |            |      --> | Overtrading |-->    _____        _____
    |  Incorrect |          |_____|      | Signs &        |      |                |
    |  Change    |      --> | Big Project |-->    |                |----->|  Failure       |
    |  Responses |          |_____|      | Symptoms       |      |                |
    |_         _|      --> | High Gearing |-->    |_____|      |_____|
      |_____|
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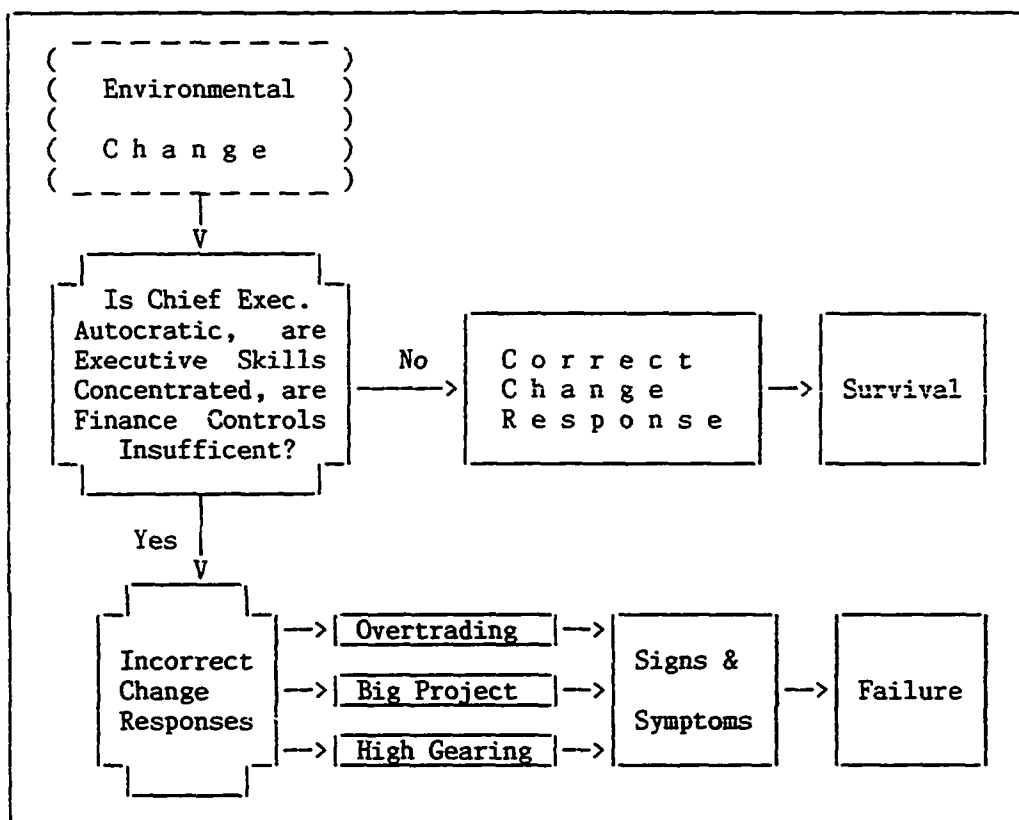
FIGURE 5:   ARGENTI'S BEHAVIORAL MODEL OF FIRM FAILURE

The stages of which Argenti speaks tell us something important. The flaws which lead to corporate collapse are present for a long time. When the end arrives for the firm we can sometimes say, "This firm failed because of liqidity or cash flow problems" (a finance approach) or, "That firm went under because they could not get suppliers to ship raw materials" (a coalitional approach). Argenti would argue that these simple explanations do not cut to the central issue of how the firm got into such a poor situation in the first place. He also argues that these explanations are only indicators which arise late in the process — within a year or two prior to failure. The predictive accuracy of the typical model of bankruptcy is no better than 70% accurate two years prior to bankruptcy (with the exception of Zavgren, 1985). Argenti argues that two years in advance is the point at which it may be too late to do much to avert the forthcoming demise of the corporation. He argues that it should be possible to foretell a failure ten years in advance.

The main failings with Argenti's model is that the concepts of which he speaks are not adequately operationalized. He uses vague notions to explain "autocratic", "poor financial controls," etc. He speaks of firms that do not respond well to changes in the environment, yet he does not delve into the firm's relationship with its environment. Several perspectives would argue that such an oversight seriously cripples his model. These perspectives can be broadly labeled as Environmental Approaches.

C. ENVIRONMENTAL APPROACHES TO ORGANIZATIONAL FAILURE

An organization's environment can be seen as infinite set of elements outside the boundaries of the firm (Osborn and Hunt, 1974). Other organizations, associations of individuals and broad forces can be seen to represent various important segments of an organization's environment. Osborn and Hunt (1974) describe these forces as macro (the general cultural context of a specified geographic area), aggregation (associations, interest groups and constituencies operating within the macro environment) and task environment (the portion of the total setting relevant for goal setting and attainment). Thus, the macro environment may be seen as the culture of a specific country. Aggregation may be seen as the institutions operating within the country (e.g. businesses, unions governments, etc.). Task environment as those environmental factors which impact most directly upon che particular institution being studied. Task environments, having the most direct impact on the institution, are of particular interest and importance to the organizational researcher.

While ways to describe task environments may be useful, for this study, a more important question is, "Given an environment what can those in charge of the organization do about increasing their chance of survival?" To address this question we can take three possible perspectives. I have labeled these perspectives Population Ecology, Strategic Choice Theory and Contingency Theory. These three approaches are shown graphically in Figure 6, below.

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┌──────────────────────────────────────────────────────────────┐
│                                                                │
│   Population         Contingency        Strategic              │
│        Ecology           Theory          Choice Theory         │
│                                                                │
│  ( ─ ─ ─ ─ ─ ─ )   ( ─ ─ ─ ─ ─ ─ )   ( ─ ─ ─ ─ ─ ─ )          │
│  ( Environment )   ( Environment )   ( Environment )          │
│  ( ─┬─┬─┬─┬─┬─ )   ( ─┬─┬─A─A─ )     ( ─┬─┬─A─A─ )             │
│    │ │ │ │ │         │ │ │ │           │ │ │ │                 │
│    V V V V V         V V │ │           V V │ │                 │
│  ┌───────────┐     ┌───────────┐     ┌Buffer┐│ │              │
│  │Organization│    │Organization│    │Organization│           │
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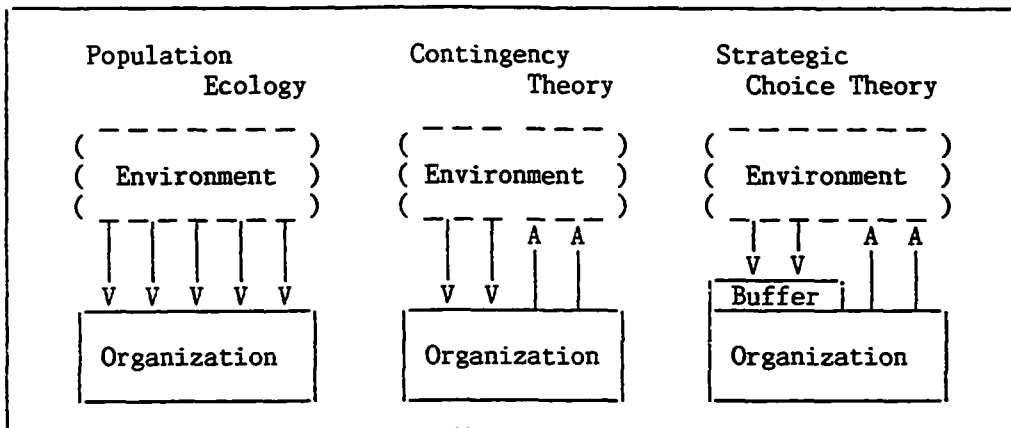
FIGURE 6:   ENVIRONMENTAL APPROACHES TO FIRM FAILURE

The population ecology approach views the survival of the organization as dependent upon the environment. Additionally, there are forces which so constrain the firm that there is little they can do to react adequately to environmental change. Contingency theory views environment as important but also says the firm can survive if it reacts correctly to environmental change. Strategic choice theory basically sees the organization as either buffering itself from, or having an effect upon, the environment.

Keats and Hitt (1988), basing their research on previous work by Romanelli and Tushman (1986), have a set of similar approaches but have labeled them the "Inertial Model", the "Strategic Management Model" and the "External Control Model." The inertial model is essentially the population ecology approach which envisions the firm as constrained by environmental and organizational forces. The

strategic management model basically strategic choice theory, which views organizations as having significant discretion. Lastly, the external control model is, at heart, a contingency theory which sees environment as the principle impetus for organizational change. In order to gain a better understanding of each of the three perspectives let us look them more closely.

1. POPULATION ECOLOGY

The population ecology approach (Campbell, 1969; Hannen and Freeman, 1977; Hannen and Freeman, 1984;) assumes that only certain strategies or structural forms of organizations are appropriate for particular environmental niches.   Organizational structures or strategies which are inappropriate for a given environment will result in organizational failure. Population ecology is a determinist view-point (D'Aveni, 1987C).   Organizational conduct is seen as being strongly determined by "both internal arrangements (for example, internal politics) and from the environment (for example, public legitimation of organizational activity)" (Hannen and Freeman, 1984: 149). Because the organization is extensively constrained, population ecology would say that the firm is unlikely to change radically, even in the face of a strong impetus to do so (Hannen and Freeman, 1977; Hannen and Freeman, 1984; Singh, House and Tucker, 1984).

Few firms will be able to adapt to a changed environment. Most will be so ill-fitted to a changed environment that they do not survive (i.e. they go out of business). More simply: "Organizations

that fit the environment survive, whereas others are selected out of the population" (Singh, House and Tucker, 1986: 587). Fortunately, there is a wide variety of organizational structures and there will always be some organizations which will survive to become the recommended structure for firms in the industry. Thus, the selection mechanism is the means by which deviant firms (those whose structure is not suited to the environment) are removed from the population (D'Aveni, 1987C: 207) and variation is the means by which some firms are found to survive (Child, 1972; Aldrich, 1979).

We should give credit to the population ecology approach for explaining that some firms survive and others fail because they cannot adapt to their environment. Thus, the population ecology approach explicitly brings the environment into a model of firm survival and failure. The theory does not, however, allow the manager to greatly influence the outcome of the selection process. Contrary to population ecology, a second viewpoint, which I have labeled strategic choice theory holds that managers do have significant influence in determining whether or not the firm will survive.

2. STRATEGIC CHOICE THEORY

Strategic choice theory (Thompson, 1967; Child, 1972, D'Aveni, 1987C) holds that organizations have substantial discretion with regard to the extent they allow environmental forces to impact them. Thompson (1967) argues that the organization will buffer itself from environmental influences (e.g they may stockpile materials and

supplies in anticipation of shortages). Child (1972) argues that power-holders within an organization have a substantial ability to manipulate the environment and to determine the organization's strategy — regardless of occurrences in the environment. According to Child, "power-holders within organizations decide upon courses of strategic action. This 'strategic choice' typically includes not only the establishment of structural forms but also the manipulation of environmental features" (1972: 1).

D'Aveni's (1987C) perspective is that, "strategists believe that organizations have relatively unconstrained free will. That is, organizations have discretion to choose their conduct and that the choices reflect the preferences of top management" (1987C: 207). Thus, if the organization fails, it is the manager's actions which have caused the firm's demise. If the firm survives it is the manager's actions which will keep it going (this perspective is essentially Argenti's behavioral approach discussed above). D'Aveni (1987B) looked at why creditors would keep lending to a firm long after the corporation's financial condition demonstrated that the firm was incapable of handling more debt. D'Aveni found that the prestige of the board and top management team had a significant impact on the firm being able to influence lenders and others.

Strategic choice theory gives credit to the manager for being able to influence and buffer against events external to the organization. It does not, however, temper this bold concept as well as it should. Not all factors can be controlled for or buffered

against. Under such circumstances the manager must attempt to adjust his or her firm's behavior in such a way as to mitigate the effects of uncontrollable environmental elements.

Although a gross over-generalization, it seems that population ecology views managers as being relatively powerless against the environment and strategic choice theory sees managers as all powerful against the environment. The middle ground between these two extremes (or what I have labeled contingency theory) may describe reality better.

3. CONTINGENCY THEORY

Contingency theory can be seen as a bridge between the extremes of population ecology and strategic choice theory. In this context, contingency theory argues that the degree of discretion which managers have is subject to the type of environment in which they do business and the nature and extent of the firm's resources. Although managers have free will they will, to some extent, be constrained by their environment.

Hoffer (1975) employed contingency theory in the study of business strategy. He viewed correct strategies as being **contingent** upon the product position in its life cycle. In other words, the product's position determined the type and extent of investment and marketing which should be undertaken.

Moulton and Thomas (1988) have two basic views on failing organizations. The first holds that firms decline due to mal-

adaptation to an increasingly hostile environment (Harrigan, 1982; Whetten, 1987). The second assumes organizations slide down hill when they unsuccessfully pursue a high risk strategy. The first view can be associated with the population ecology perspective (Moulton and Thomas take the environment as given) and the latter view with the strategic choice perspective. Moulton and Thomas looked at both these perspectives and found that, while both views can be supported, those firms which pursued the high risk strategy declined more quickly. Thus, while managers have freedom to pursue a particular strategy, the success of the strategy is, in part, contingent upon the environment.

Gross and Etzioni (1985: 172) hold the view that the population ecology approach is simply an extreme form of contingency theory. However, although contingency theory and the population ecology approach both say that firms which do not have the correct strategy or structure to "fit" their environment will fail, the difference between the two is that the former says firms fail because managers **do not** react effectively to environmental change, the latter says firms fail because managers **cannot** react effectively to environmental change.

Contingency theory thus gives substantial credit to both the effects of environment and the strategic choices made by managers. Yet contingency theory, in and of itself, does not tell us a great deal about how firms act. It does not tell us how, given a particular environment, the manager can affect or buffer against environmental forces. Such an explanation can be found within Resource Dependence Theory.

D. A RESOURCE DEPENDENCE APPROACH TO ORGANIZATIONAL FAILURE

The resource dependence approach (or theory) assumes organizations survive by acquiring and maintaining resources from their environment (Pfeffer and Salancik, 1978; Ehreth, 1987). If they cannot obtain the proper mix of resources they will eventually fail. The resource dependence model is not, however, a population ecology approach. The resource dependence model assumes that organizations will attempt to control some of the elements in their environment. The elements the firm will attempt to control depend on how vital the element is to the organization. Thus, the resource dependence model fits into the class of contingency theories. Since, however, parts of the resource dependence model assume that organizations will attempt to influence aspects of their environment the model can also be applied to defend the strategic choice perspective.

The resource dependence model is also broad enough to include the finance and behavioral models which were spoken of earlier. Table 3, below, demonstrates how resource dependence brings together the previous models. The finance approach of analyzing cash flows is captured by the resource dependence perspective but is broadened to address the firm's needs for resources of various kinds other than cash. The behavioral approach is also captured by the Resource Dependence model which looks at coalitions of resource providers. Lastly, by looking at whether the environment has sufficient resources to support the firm, resource dependency also captures elements of the environmental approach to failure.

TABLE 3: RELATING OTHER FAILURE MODELS TO RESOURCE DEPENDENCE

B a s i c M o d e l	Basic Model's Theoretic Treatment of Failure	Resource Dependence Treatment of Failure
Finance Approaches	Insufficent Cash Flow results in failure.	Insufficent Resources results in failure.
Behavioral Approaches	Coalitions withdraw sup- port due to insufficient incentives.	The Resource Providers withdraw their support due to insufficient incentives.
Environ- mental Approach	Environmental Forces will not support a firm with a particular strategy in the selected environment.	Resources available in a selected environment are inadaquate to sup- port all firm members.

In order to fully understand the resource dependence model it is important to be aware of several of its supporting concepts. First, an organization cannot generate all its resources internally (Levine and White, 1961; Aiken and Hage, 1968). Secondly, the acquisition of resources can be problematic since other parties many have control of the resources the organization needs to survive (Jacobs, 1974; Pfeffer and Salancik, 1978). Third, the organization is thus forced to enter into relationships with other organizations in order to exchange critical resources (Levine and White, 1961; Thompson, 1967; Aiken and Hage, 1968; Van de Ven, 1976; Cook, 1977; Pfeffer and Salancik, 1978; Aldrich, 1979; D'Aveni, 1987B). Lastly, since the organization is dependent upon external forces it will somehow attempt to manage those forces that are critical to its survival (Gouldner, 1959; Aiken and

Hage, 1968; Kotter, 1979).

To elaborate, Kotter (1979) tells us that the resource dependence perspective is based on the theory that organizations rely on some elements in their external environment in order to accomplish their goals, increase their options, or continue their existence. Other parties external to a particular organization may control critical resources (Gouldner, 1959; Thompson, 1967; Jacobs. 1974; Aldrich, 1976; Aldrich and Pfeffer, 1976). Top management will attempt to minimize the influence of these external parties (Gouldner, 1959; Aiken and Hage, 1968; Kotter, 1979). Thus, top managers will try to direct their organizations to somehow actively manage these resource dependencies to ensure that resources will be available on a continuing basis (Cook, 1977; Jacobs, 1974; Ven de Ven, 1976; Pfeffer and Salancik, 1978; Aldrich, 1979; Kotter, 1979).

The resource dependence theory originates from theories of social exchange and power applied to organization-environment relations (Seabright, 1987). As such, it is important to have an understanding of this exchange theory. Levine and White (1961), building on earlier work by Homans (1958, 1961), defined organizational exchange as "any voluntary activity between two organizations which has consequences, actual or anticipated, for the realization of their respective goals or objectives" (Levine and White, 1961: 587). At the heart of exchange theory" are several concepts. First, an organization has goals or objectives. Using Levine and White's (1961) example, health agencies may have the goal of prevention and cure of disease. Second,

in order to perform its functions the organization must possess or control certain necessary elements (e.g. the health care agency must have funds, professional staff, clients, etc.). Third, since few if any organizations will have sufficient access to all the elements necessary for them to reach their objectives, they must establish relationships with other organizations in their environment. For example, a health agency may specialize in the providing of services by hiring professionals and treating clients but the organization may establish a relationship with the United Way for fund raising purposes.

In the above fashion organizations exchange various needed elements or resources with other social actors in their environment (Levine and White, 1961; Blau, 1964; Emerson 1972, 1976). Continuing with the above healthcare example, an agency may agree to provide information on its programs in exchange for United Way funding. Thereafter, if the agency does not elsewhere solicit funds and it will become dependent upon the United Way as a source for such funding. Conversely, United Way will have power over the agency. The process of dependency and power described initially by Emerson (1962) is illustrated in Figure 7 below (adapted from Gross and Etzioni, 1985).

If the focal organization in the above example obtains needed resources from Organization A, it is **dependent** on Organization A; that is Organization A has **power** over the focal organization. Such power is based on Organization A's ability to withhold resources and thus demand concessions in the exchange relationship with the focal

organization. If alternative resource providers exist (for example Organization B in Figure 7), then the focal organization may be able to draw resources from both Organization A and B or play one organization off against the other. By playing Organization A off against Organization B the focal organization will be able to lessen its dependence on either organization (Organization A and B will have less power over the focal organization). Note that the exchange relationship works both ways: resources are exchanged for incentives between the focal organization and organization A andr B (e.g. cash is exchanged for materials). Thus both parties in the exchange have something to gain by maintaining the relationship.
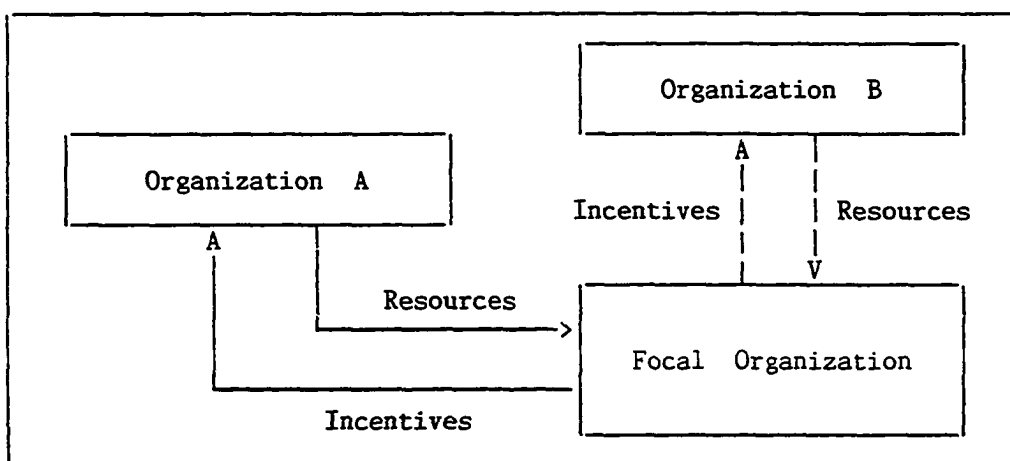
FIGURE 7:   POWER AND DEPENDENCE IN THE EXCHANGE RELATIONSHIP

In the above example we saw how a health agency could become dependent upon United Way. United Way may use its power to attempt to alter the programs of the agency. If the organization has, or

believes it has, other sources of funding available, the United Way would be less able to enforce its desires. The recent example of United Way's fight with Seattle's Planned Parenthood illustrates this point. Planned Parenthood decided to provide abortion services and King County United Way threatened to drop funding to Planned Parenthood. The latter organization had to decide whether to stop its abortion services or maintain them. If Planned Parenthood maintained abortion services then they had to find other sources of funding. If they stopped the services, United Way had sufficient power over them to force the policy change. Planned Parenthood believed it had viable alternative sources and severed its relationship with the King County United Way. The latter organization's reputaion was hurt in the course of the dispute and, despite extending its 1988 fund drive, did not meet its fund raising goals. Note that severing the exchange effected both parties: Planned Parenthood lost some funding and United Way lost some legitimacy (and contributions).

In the case where one organization has power over another organization the dominant firm can force concessions which could run the firm out of business. Such is the case of a furniture manufacturer who became increasingly dependent on a single retailer. The retailer demanded and was able to get price concessions since they did such a great volume of business with the manufacturer. In the end the manufacturer went out of business due to the ever increasing price concessions it was forced to make and the retailer lost a reliable supplier.

The dominant organization may not go so far as to purposely run the dependent organization into the ground. However, when the dominant organization runs into problems, the situation may be amplified in the less powerful organization. The close relationship between International Harvester and Steigler Tractor made certain that when the former had financial problems the latter would feel them severely. Much of Steigler Tractor's sales depended on how well International Harvester sales were going. When International Harvester hit a long sales slump, Steigler had to file for bankruptcy. In other words, International Harvester sneezed and Steigler caught a cold; when International Harvester's sneeze became a cold, Steigler developed pneumonia and died.

Exchange Theory explains that organizations, in order to achieve their goals and objectives, establish relationships with other organizations in their environment. Exchange Theory also leads us into the concepts of power and dependency. Studies of power (Crozier, 1964; Perrow, 1970; Salancik and Pfeffer, 1974) indicate that certain power holders may be more important than others. Those which provide resources which are critical to the firm's existence will be able to wield the most power (Hinnings, Hickson Pennings and Schneck, 1974; Salancik and Pfeffer, 1974). Firms will wish to minimize the effective power of dominant organizations and will thus seek ways to mitigate the effects of their dependencies (Gouldner, 1959; Thompson, 1967; Jacobs, 1974; Pfeffer and Salancik, 1978).

An organization can manage its resource dependencies via a number

of methods. One way in which this can be done is by simply internalizing the dependency through, for example, a merger (Thompson, 1967; Pfeffer and Salancik, 1978). Thus, suppliers who could have forced concessions from the firm are no longer able to do so. Another way in which the organization can manage its dependencies would be to establish external linkages via the use of contracts (Kotter, 1979).

Kotter (1979) suggests several ways to minimize the effects of external dependencies. One strategy he proposes is that a firm should only select controllable domains or niches in which to involve itself (eg. the firm does business only in market segments where it feels it can be the leader). Another suggested way to control resource dependencies is by establishing external linkages (e.g. through board of directors interlocks). The organization can also attempt to minimize the effect of any one particular dependency by establishing, for example, a policy which never allows any one customer to make up more than five percent of a firm's sales. Thus, while organizations are dependent on external parties they can and do have methods by which to deal with such dependencies. This study is concerned with the methods by which the organization attempts to deal with its external or resource dependencies.

Based on the above discussion one can visualize the resource dependence model as is shown in Figure 8. According to this model the organization's ability to induce resource providers will be reduced if the firm does not adequately select environments, control and buffer environmental forces, or influence the firm's exchange relationships

with other firms.   If the firm does not begin to adequately perform

some or all of these tasks, it will eventually result in a condition

where the firm does not possess sufficient incentives to induce

parties in an exchange to contribute resources to the firm. When this

occurs, the model says the firm will fail.

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 _____
|    ____      _____     ( _ _ _ _ _ )                     |
|   |    |    | Firm Selects,|  (            )                    |
|   |    |    | Controls  and|  ( Reduction )                     |
|   |    |    | Buffers  the |  ( in Firm's )                     |
|   |Surviving| Environment  |  No ( Ability   )                  |
|   |    | -> | OR Influences|  --->( to Induce )                 |
|   |Firm|    | the Exchange |  ( Resource  )                     |
|   |    |    | Relationship |  ( Providers )                     |
|   |    |    | with  Other  |  ( _ _ _ _ _ )                      |
|   |    |    | Firms        |          |                          |
|   |____|    |_____|          |                         |
|       A                               V                         |
|       |                         _____    _____      |
|       |                        | Firm has   |  |          |     |
|       |            Yes         | Sufficient |  |          |     |
|       |                 V      | Incentives to| No| Firm  |     |
|       |_____| Induce Parties|-->|       |    |
|                                | in an Exchange|  | Fails |     |
|                                | to Contribute |  |          |  |
|                                | Resources    |  |_____|   |
|                                |_____|                 |
|_____|
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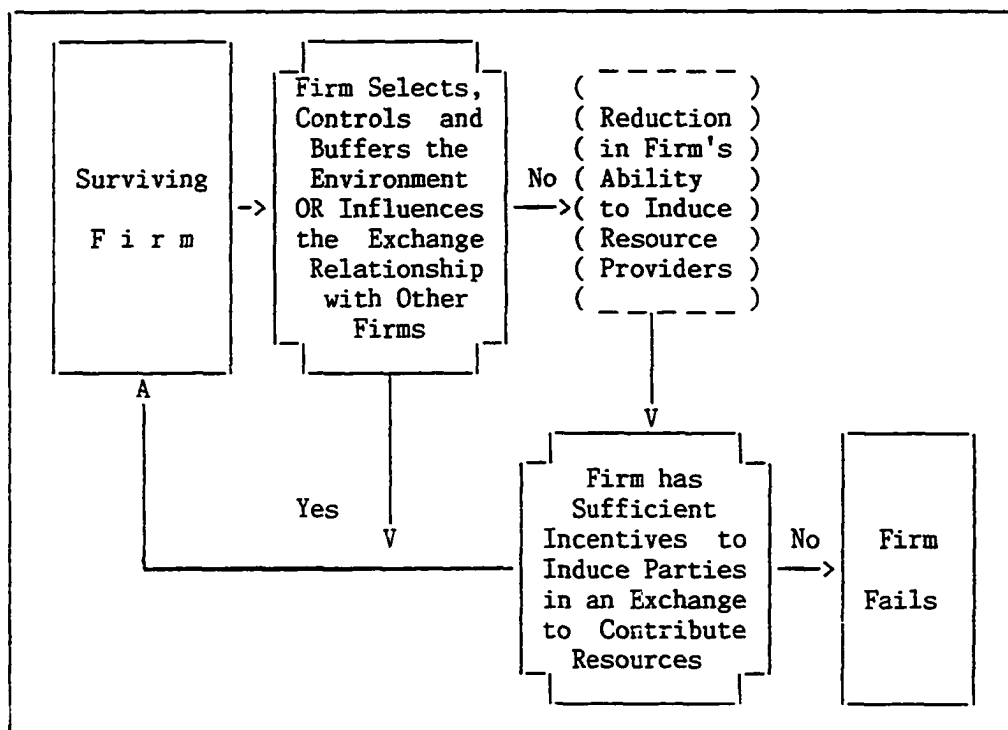
FIGURE 8:   A RESOURCE DEPENDENCE APPROACH TO SURVIVAL AND FAILURE

Pfeffer and Salancik's (1978) comprehensive overview of the

resource dependence theory, in their landmark book The External

Control of Organizations, A Resource Dependence Perspective, brought

together essentially all of the elements that have so far been

discussed. How these elements relate to the topic of this study of organizational survival and failure are discussed below.

E. SPECIFIC ASPECTS OF RESOURCE DEPENDENCE CONCERNED WITH FAILURE

In this section we will see how elements of the finance approach, the behavioral approach and the environmental approaches to survival and failure come together in the resource dependency model. The resource dependence model which will be employed here uses financial and behavioral approaches to define resources. The model will also use behavioral approaches to define failure and to give the organization a way to possibly influence resource providers. The model will also look at the environment as a given (a population ecology approach) and as an element the organization attempts to affect (a strategic choice approach). The following sections are not only concerned with how the resource dependence model views survival and failure but with also how the organization might be able to avoid failure.

1. DEFINING SURVIVAL AND FAILURE

Resource dependency theory provides a way to define organizational survival and failure. According to Pfeffer and Salancik (1978) "The key to organizational survival is the ability to acquire and maintain resources" (Pfeffer and Salancik, 1978: 2). Yet, Pfeffer and Salancik (1978) do not stop with this simple idea:

"We prefer to view organizations as coalitions (March 1962; Cyert and March, 1963) altering their purposes and domains to accomodate new interests, sloughing off parts of themselves to avoid some interests, and when necessary, becoming involved in activities far afield from their stated central purposes... To describe adequately the behavior of organizations and the manner in which organizations respond to pressures from the environment — [we must realize that organizations will be] acceding to the demands of some coalitional interests, avoiding the demands of others, establishing relationships with some coalitions and avoiding them with others.

March and Simon (1958)... noted that it was necessary to provide inducements for social actors to participate in organizations. In return for these inducements, participants made contributions... Participants would enter and leave an organization depending upon both their assessment of the relative value to be gained by continuing the exchange... An organization according to this perspective, is viable as long as its available inducements are sufficient to elicit the necessary contributions — in other words, to maintain a viable coalition of support" (Pfeffer and Salancik, 1978: 24-25).

What Pfeffer and Salancik (1978) are in effect telling us is that, if resources are properly allocated, critical coalitions will continue to support the organization; if resources are not properly allocated, critical coalitions will not support the organization and the organization will fail. One reason an organization might fail to allocate resources to maintain the support of critical coalitions might be because of mismanagement (Argenti, 1986B: 101) or because of insufficient resources to implement a desired strategy (Tillis, 1963: 115-118).

In the short run organizational slack can keep the organization going. To paraphrase Cyert and March (1963: 38), coalitions may have built up "a pool of emergency resources" (organizational slack) which

permits the aspirations of critical coalitions to be maintained during hard times. If the organization can meet the expectations of critical coalitions (that is, maintain their aspirations) while the organization corrects for problems (e.g. poor management practices), the coalitions will continue to provide necessary resources to the firm. For example, as long as the organization can meet workers expectations with regard to pay and expected wage increases, the workers will continue to provide labor to the organization.

In the long run such a pool of organizational slack will dry-up if the poor management practices continue. At the point when the pool goes dry the organization is faced with the fact that the affected critical coalitions will leave the organization, eg. managers may abandon their association with the organization, bankers may call loans, etc. (Argenti, 1986:A). If the process has gone far enough the organization will be forced to admit failure and file for bankruptcy.

The above argument implies that failure is not the take over of the organization by another organization. Why is this? First of all, there are three coalitions involved in a take over: (1) the organization which is to be taken over — the "target," (2) those who seek to take over the target — the "buyer" and (3) those who presently own the target — the "seller". By offering to take over the target, the buyer is essentially stating, "I am willing to provide resources in exchange for the right to control the target firm." The target is able to attract an investor coalition. The buyers are willing to provide resources to the sellers in order to maintain the

existence of the target. How long the buyers intend to "maintain the existence of the organization" is not the issue. What is important is that the organization has not failed to attract needed resources. Thus a take over would not represent failure.

2. DEFINING RESOURCES

Resources can be considered anything the firm receives in an exchange with others. For example, the firm buys materials from suppliers, gets revenues by selling its product to customers, receives skills by paying its employees, etc. These resources (materials, revenues, expertise, etc.) can thereafter be used as inducements to encourage others, with whom the firm has an exchange relationship, to contribute resources to the organization (e.g. to get a bank to loan the firm money). Thus, the resources the firm possess can also be considered any inducement it can provide to others in order to get them to contribute to the organization. It is important therefore to define the concept of inducements and what these inducements might be.

Take for example, the firm that has a great deal of equity, relative to its total assets. Because of its present level of resources (e.g. the firm's equity to total assets) it will find it easier to induce lenders to contribute funds to keep the firm going. In this sense the firm's ability to pay interest with low risk acts as an incentive to convince potential creditors to lend to the firm.

Not all inducements can be measured on a strictly financial basis. Lenders may be induced to contribute resources, in spite of

financial ratios that show the firm is less than financially sound. If lenders believe that members of the firm's management and board are dependable and capable of having the firm meet its obligations, they may be willing to loan the firm more funds (D'Aveni,1987B). In this sense the resource the firm possesses is management and board talent. The firm could also use positions on the board itself to induce resource providers.

One way of looking at what resources the firm possess is to look at the firm's current financial condition (Ijiri, 1970). The level of resources a firm possesses might be captured by measuring working capital, cash on hand, or even potential cash flows. All of these present a rather narrow view of the level of an organization's resources since they do not include such such items as human talent, current market value of assets, or net present value of future cash flows. The financial ratios discussed previously all address various aspects of the firm's resources (e.g. working capital, earnings, etc.). However, in the broadest sense it is the total assets of the company which objectively equal the firm's total financial resources (Granof, 1980). Total assets do not take into consideration claims others may have against the firm. In a strict sense, both liabilities and equity are claims against the firm (Granof, 1980), however the claims of creditors (liabilities) are definite while the claims of owners permit management great discretion. Thus the net worth or equity of the corporation becomes another resource base from which management has to work in order to keep the firm going. Net worth

over total assets is, for financial institutions, a general indication of solvency (Mun and Garcia, 1983). Additionally, several authors mention Net Worth over Total Assets as being a useful ratio (Chudson, 1945; Pinches and Mingo, 1973; Chen and Shimerda, 1981).

There is one final question with regard to resources which must be addressed; that question is, "Is protection under bankruptcy a resource?" Is it proper for us to consider bankruptcy as failure or could we consider bankruptcy as a resource? Does not the organization which declares bankruptcy obtain a resource from the bankruptcy court in the form of protection from creditors? Bankruptcy is less a resource obtained than it is a preventative measure to stop resources from being spent. Bankruptcy is **not** a resource granted **to** an organization but rather a device which ensures that resources are less able to flow **from** the organization. Bankruptcy is the formal notification that coalitions in the environment are no longer willing to provide sufficient resources TO the firm, and the firm is trying to prevent additional resources from flowing away FROM the organization via protection in the bankruptcy courts.

The resource dependency model (as shown in Figure 8) states that the firm's selection of environments also plays a role in the firm's chance of survival. It is the firm's selection of its environment to which we will now turn our attention.

3. SELECTING THE ENVIRONMENT

If we were to take a population ecology approach we would accept

the firm's environment as a given. A strategic choice approach however, would argue that even if we accept the environment as a given, we must also recognize that firms can, over the long run, decide with which domains of activity the firm will become involved.

Selecting the environment is essentially defining "what business the company is in or is to be in" (Andrews, 1971: 25; Beard and Dess, 1981: 668). This is what some authors have called corporate level strategy (Andrews, 1971; Beard and Dess, 1981), and other authors have called domain selection (Levine and White, 1961; Thompson; 1967; Kotter, 1978). Regardless of the label the concept involves selecting an industry where conditions are promising (ie. the environment will more readily provide resources) and the chance of the firm surviving is more likely.

Industry factors have, for quite some time, been seen as vital to the well being of the firm. Beginning with studies by Bain (1956) and continuing on into the present day (Vernon, 1972; Scherer, 1980; Ravenscraft, 1983; Schmalensee, 1985) various researchers in industrial economy have confirmed the relationship between industry structure and firm performance. Schmalensee (1985) found that industry effects accounted for a better than 75% of the variance of company rates of return.

The profitability of the industry in which a firm competes can provide a significant explanation of the firm's performance or lack thereof (Lieberson and O'Conner, 1972; Christensen and Montgomery, 1981). Industry profitability is indicative of the existence of

barriers to entry and the lack of supplier and buyer bargaining power (Porter, 1979). (Firms in more profitable industries can be seen as being less dependent upon their resource providers.) Industry profitability can also be used to summarize a number of industry effects (Hansen and Wernerfelt, 1987). Thus the model's industry profitability variable implicitly controls for industry barriers to entry, supplier and buyer power and many of the dimensions of the environment that have been previously discussed. Additionally, industry growth rates are a significant factor in a firm's decision whether to enter or remain in an industry (Hambrick, MacMillian and Day, 1982). Often the perception that an industry will be profitable plays a major role in the firm's decision to involve itself in that industry (Bourgeois, 1980).

4. CONTROLLING THE ENVIRONMENT

By controlling the environment the organization ensures that it will continue to receive the resources it needs to keep operating. Controlling the environment essentially includes acquiring sufficient control of the relevant market. As stated above, profitability is necessary for the long run survival of the firm (Drucker, 1970; Altman, 1983). Market share has been found to significantly affect a firm's profitability (Gale, 1972; Shoeffler, Buzzell and Heaney, 1974; Buzzell, Gale and Sultan, 1975; Dalton and Penn, 1976; Bass, Catten and Wittink, 1978). Thus by possessing sufficient market share the firm should be able to earn sufficient profits to stay afloat. Market

share should, however, be viewed in relative terms, ie. to what extent can the firm control the market relative to other firms in the industry (Hedley, 1977; Hambrick, MacMillian and Day, 1982).

One way to measure relative market share is to compare the firm's market share to the combined market shares of the four largest firms in the industry (Shepherd, 1972). This measure gives, "an indicator of the extent to which dominant firms can prey on their rivals (Hansen and Wernerfelt, 1987:3)." In other words we can measure the degree to which a firm can control a market. Additionally this type of measure takes into account the level of industry concentration — an important industry structural variable (Bain, 1951).

5.   INFLUENCING THE PARTIES IN THE EXCHANGE RELATIONSHIP

To influence the parties in the exchange relationship managers may utilize connections with other firms (in the form of board interlocks) or use the firm's size (e.g. use buying power to obtain volume discounts). Connections with other firms essentially means the use of interlocks with other firms; or what Thompson (1967) has termed a "cooperative strategy" (Thompson, 1967: 34). Firm size may also play a part in the ability of a firm to control resource providers (Pfeffer and Salancik, 1978: 53-54) because a firm's size may allow it to "enforce" a "cooperative" strategy.

Size gives the firm power (Pfeffer and Salancik, 1978) and prestige (Monsen and Downs, 1965). The firm can press this advantage over resource suppliers if the firm represents a substantial

percentage of the supplier's sales (Pfeffer and Salancik, 1978: 53-54; Porter, 1979). On its own, size creates a prestigious image for the firm (Monsen and Downs, 1965) which could also be used to ensure the availability of resources (Perrow, 1961; Thompson, 1967), particularly during economic hard times (D'Aveni, 1987A).

Interlocks, on the other hand, provides a method by which a firm may influence resource both providers and competitors as well (United States Senate, 1978). In addition, interlocks may provide the organization with legitimacy or prestige (Pfeffer and Salancik, 1978: 145) which can prove helpful in securing resources during troubled times (D'Aveni, 1987A).

Interlocks which give the firm greater influence over their environment can come in two basic forms: (1) those which co-opt elements into the leadership of an organization (Selznick, 1949; Thompson, 1967; Pfeffer and Salancik, 1978; Kotter, 1979; Pennings, 1980; Burt, 1983); and/or (2) those which coalesce with other organizations in the environment (Thompson, 1967).

An example of co-opting would be the existence of interlocking boards of directors, i.e. when one director sits on the boards of two firms (Thompson, 1967; Pennings, 1980). Interlocking boards are used to gain the assistance of those who have access to critical resources (Pfeffer and Salancik, 1978: 161). The presence of a board interlock between a firm and its resource supplier may result in agreements being reached which might not have otherwise occurred. For example, the presence of a banker on a board may allow the organization to more

easily obtain financing when they may not otherwise have been able to get. The bankers' membership would act as an additional assurance that the loan will be repaid since the bank will have more control over the firm due to the interlock. Board members who have no apparent interlock with resource providers may also help the firm with because of some special managerial skill they possess. The presence of such a board member may reassure resource providers that the company is well run or dependable (D'Aveni, 1987C). Hence resources which may not have otherwise been provided will be obtainable.

An example of coalescing with other organizations in the environment would be through the use of the joint venture. Through joint ventures a firm can establish a greater degree of interdependence between itself and other firms (Thompson, 1967; Pfeffer and Salancik, 1978; Kotter, 1979). The result of this interdependence may mean some reduction of uncertainty in the firm's ability to obtain critical resources (Pfeffer and Salancik, 1978).

Another method by which resource providers may be influenced is through the use of long term contracts which give the organization legal power over such providers (Thompson, 1967; Pfeffer and Salancik, 1978; Kotter, 1979). Long term contracts, however, are highly variable in nature and importance (i.e. such contracts can deal with a wide range of goods and services; some of the goods and services may be critical to the firm, others not). In order to analyze long term contracts it would be necessary to categorize them as to their nature and importance. However, categorizing the wide variability in such

contracts is beyond the scope of the present study, and so their effects will not be included the present model.

6. BUFFERING AGAINST ENVIRONMENTAL FORCES

In order to buffer against the effects of the environment the firm can expand its range of activities. Diversification serves this function in several ways. First, the organization can gain control of resource suppliers via vertical integration. This allows the firm to eliminate some external parties upon which they were dependent but requires the firm to absorb the external firm's functions. This action, while eliminating some outside constraints, will cause the firm to inherit the dependencies that exist for its new position in the value added chain. Therefore the firm may not truely protect itself from the potential adverse effects of a dependency relationship.

Second, the organization can expand its size through diversification. Because anti-trust regulations may prevent expansion in their home market, diversification is one of the few ways for market share leaders or those in highly concentrated industries to grow. The increase in size could result in a more effective or efficient use of the firm's talents (Penrose, 1958). For example, a construction equipment manufacturer diversifies into producing materials handling equipment. Since the power systems, steel castings and engineering requirements are similar to both products the manufacturer may be able to put idle resources to use. This not only makes the organization

more efficient but also lessens their reliance on a single market to provide revenue (this concept is discussed more extensively below).

Third, even if there are no synergies, the firm may find that increased size improves the firms reputation and permits easier acquisition of resources due to the view that large firms are more dependable (D'Aveni, 1987C). Diversification may allow the firm to maintain its income level if there are adverse changes occurring the firm's traditional markets (Weston and Mansinghka, 1971). This again aids the firm in assuring resource providers, such as lenders and suppliers, that the firm is capable of long term survival and can be depended upon to pay its debts.

Diversification essentially involves expanding the range of activities in which the firm is involved. Thus, the firm is not so over-reliant upon one or two industries such that harmful changes in these industries can cause the firm to fail (Jackson and Morgan, 1978: 348-350; Pfeffer and Salancik, 1978: 109).

Jackson and Morgan (1978) tell us that survival is, among other things, dependent upon, "The ability of the organization to find new patterns of activity..." (Jackson and Morgan, 1978: 348). In other words, the expansion of the number of domains or industries in which the firm operates will aid in the likelihood of firm survival. Pfeffer and Salancik (1978) state this concept very well:

> "The most effective strategies for dealing with dependence [and thus the risk of organizational failure] which arises from reliance on a single product or market are those which alter the purposes and structure of the organization so that

it no longer requires only a limited range of inputs or
serves only a few markets.

Given that the organization's vulnerability [ie. likelihood
of failure] derives from dependence on single exchanges the
most direct solution is to develop an organization which is
dependent on a variety of exchanges and less dependent on
any single exchange" (Pfeffer and Salancik, 1978: 109).

Thus, organizations will attempt to diversify into a wide range
of industries in order to lower their likelihood of failure (Levy and
Sarnat, 1970). Researchers have developed three major methods to
measure diversification, (Pritsker, 1987). The first method involves
a classification scheme or topology (Wrigley, 1970; Rumelt, 1974;
Bettis, 1981; Christensen and Montgomery, 1981; Montgomery 1982;
Montgomery and Singh, 1982) which judgmentally classifies firms into
particular categories (Montgomery, 1982). The second method involves
a product count system (Gort, 1962; Rhoades, 1974; Bass, Catten and
Wittink, 1978; Jacquemin and Berry, 1979; Dess 1980; Montgomery, 1982;
Dess and Beard, 1984; Palepu, 1985) which can develop a percentage or
ratio to measure the level of diversification. The third method
involves a simple conglomerate/non-conglomerate discriminator (Levy
and Sarnat, 1970; Joehnk and Neilson, 1974; Smith and Weston, 1977;
Mason and Goudzwaard, 1976; Mueller, 1977; Gahlen and Stover, 1979;
Beattie, 1980) which uses a simple cut-off to measure diversification.

This research will employ a product-count system (Dess, 1980; 57;
Montgomery, 1982: 304; Dess and Beard, 1984: 71) because it is
quantifiable, more objective (Montgomery, 1982) and has a significant
degree of correlation with Rumelt's more popular classification scheme

(Montgomery, 1982; Palepu, 1985).

7. SUMMARY

We have discussed various models which explain organizational failure. Resource dependency was employed to bring together elements of the various financial, behavioral and environmental theories of firm decline and demise into a coherent whole. Resource dependency was used to both define failure and to sketch out concepts which should help us discriminate firms which are likely fail from those which are likely to succeed. Controlling and buffering environmental forces, as well as successfully influencing the firm's exchange relationships with other firms were suggested as ways in which the firm may reduce its chance of going under. How well each of the above factors aid the firm in surviving, how each will be operationalized and what other factors should be considered will be discussed in the chapters which follow.

CHAPTER THREE

RESEARCH DESIGN

What follows is a description of the research design which will be used to address the research questions discussed in the introduction. This description will include:

A) General comments with regard to the relevant population of firms.

B) The specific operational definitions for environmental selection, control and buffering, exchange relationship influence, firm resources, and survival and failure.

C) The specific research hypotheses which relate to the three research questions.

D) Controls for alternate hypotheses, possible confounding variables and caveats regarding the research.

E) A description of the proposed predictive and descriptive models to be used.

F) A step-by-step outline of the data collection process (including sources of data).

G) Tests of the models.

A. THE RELEVANT POPULATION OF FIRMS

The relevant population of firms are those which meet all of the following criteria:

1) The firms must be listed in the Commerce Clearinghouse Capital Changes Reporter (source for bankrupt company names); and

2) Must be listed in Moody's Industrial Manual, Moody's OTC Industrial Manual, Moody's Unlisted OTC Manual or Dun's Million Dollar Directory at some point from 1978 to 1987; and

3) Must be listed in the Economic Information System's (EIS) Establishment Database (for a brief description of the EIS database see Montgomery, 1982); and

4) Must not be extensively involved in highly regulated, or recently deregulated industries (for a more complete explanation see the Alternate Hypothesis section); and

5) Must not be start-up companies (for a more complete explanation see the Alternate Hypotheses section).

The entire population of failed firms plus a random sample of non-failed firms will be employed in the testing.

B.   OPERATIONAL DEFINITIONS

The variables discussed to this point are expanded upon and operationalized in the following sections.

1. ENVIRONMENTAL SELECTION

The study of environmental selection will employ two broad measures, industry profitability and industry growth rate. **Industry profitability** for a firm will be measured via use of the Return on Equity (ROE) and Return on Sales (ROS) for each of the industries in which a company does business.

Industries will be defined by the four digit Standard Industrial Classification (SIC) system set by the U.S. government. Industry profitability shall be calculated by using a weighted average (by revenues) of all the firm's businesses according to 4-digit SIC codes.

Both Return on Assets (ROA) and Return on Equity (ROE) have been employed by several researchers as measures of profitability (Rumelt, 1974; Christensen and Montgomery, 1981; Bettis and Hall, 1981). Additionally, Return on Sales (ROS) has been used as a measure of organizational effectiveness (Pennings, 1980: 145-183). While ROA plays a significant role in prior bankruptcy studies (Altman 1968, 1982, 1983) it is industry ROE and ROS which shall be employed as the measure of industry profitability. Industry profitability measurements look at the extent to which the environment, by itself, affects the firm's likelihood of failure. Industry ROE and ROS are employed as the measure of industry profitability because the logic of the resource dependency model dictates that this be done.

The resource dependency model states that it is the support of critical coalitions which enable the organization to stay alive. In this sense, industry ROS represents an industry's ability to attract

buyers who wish to acquire the industry's goods. The higher the ROS the more willing the buyer would be to pay a premium to receive the product the industry produces.

Additionally, the resource dependency perspective argues that inducements must be offered in order to acquire the support of critical coalitions. In this sense, industry ROE represents an industry's ability to reward equity providers with earnings (equity providers being a highly critical coalition). Weighted average ratio using the SIC system (detailed in Appendix 1) have been employed previously in several studies (Dess, 1980; Montgomery, 1982; Dess and Beard, 1984).

Industry ROE and ROS were adjusted to account for the wide variation of interest and inflation rates which occured during the period of this study. Industry ROE was adjusted to account for interest rates (a 10% ROE is fine if interest rates are 8% but poor if interest rates are 12%). ROS was adjusted to account for differences in inflation rates.

Industry growth rate for the firm will be measured via sales growth rate average over five years for each of the industries in which the firm does business. Again, the 4-digit SIC system and a weighted average will be employed to calculate the firm's real industry growth rate. (Please see Appendix 2 for details.) Additionally the growth rate will be adjusted for inflation (employing the G.N.P. Deflator) so as to make the figures comparable across years. Sales growth using the 4-digit SIC system has been used in

several previous studies (e.g. Shepherd, 1972; Bass, Catten and Wittink, 1978).

2. ENVIRONMENTAL CONTROL

Environmental control will be measured via the firm's market share. The market share for the firm will be measured as a weighted average relative market share for each of the industries in which the firm does business. The 4-digit SIC system will again be employed to calculate the firm's relative market share.

Relative market share is the firm's market share in a particular industry over the sum of the market shares of the largest four firms in the industry (ie. the four firm concentration ratio). Relative market share has been used in previous studies by Shepherd (1972) and by Hansen and Wernerfelt (1987). (Please see Appendix 3 for details.)

3. ENVIRONMENTAL BUFFERING

Diversification will be used to measure the extent of environmental buffering employed by the firm. Diversification will be measured by a weighted average formula of the type employed by Dess (1980), Montgomery (1982), and Dess and Beard (1984). Industry will be defined using the four digit SIC system. (For a detailed version of the diversification measure please see Appendix 5.) The weighted average ratio using the SIC system (of the type detailed in Appendix 5) has been employed previously in several studies (Dess, 1980; Montgomery, 1982; Dess and Beard, 1984) and is comparable to Rumelt's

topology (Montgomery, 1982).

4. EXCHANGE RELATIONSHIP INFLUENCE

Since no firm has control of all the necessary elements, or resources to reach their goals they must enter into exchange relationships with other organizations (Levine and White, 1961). In order to better insure the the acquisition of resources the firm will attempt to influence the resource providers. There are several ways in which the firm can influence the parties in the exchange relationship. First, managers may utilize connections with other firms in the form of board interlocks or joint ventures. For example, a manager may take advantage of the firms size to obtain volume discounts from other firms. For the above reasons, this study will look at director interlocks, joint ventures and firm size.

Director interlocks come in two basic forms: direct and indirect. As Pennings (1980: 37-38) explains,

"A direct interlock exists when one individual is a director
of two organizations; a direct interlock is a single path
between two organizations. In contrast, an indirect
interlock exists when two organizations are linked by a path
through one or more third organizations... Many indirect
interlocks, however, have little relevance for interorgan-
izational relationships... In theory, firm's benefits from
indirect interlocks are marginally decreasing ones,
especially if the indirectness includes two or more
intermediaries. Information that is transmitted through
several consecutive intermediaries is likely to lose
validity and richness in the transmission. The indirectly
linked director's attention is much more diffused than that
of a directly linked director; thus the former is a less
effective liaison."

For the reasons stated above this study will look only at direct interlocks. The number of direct interlocks will be used as one measure of director interlocks. This measure by itself, though useful, is not sufficient to adequately describe the extent of the interlock (Pennings, 1980). An additional measure relating to the percent of outside directors is required. Outside directors are classified as those directors who are not employed by the organization, those who are not officers or directors of subsidiaries or parent organizations, and those who are not retired officers of the corporation (Pennings, 1980: 63).

Pfeffer (1972) advanced the idea that there is an optimal ratio of inside to outside directors. The contention is that the organizations which develop an optimal balance between inside and outside directors have better political effectiveness (Pennings, 1980: 58). Pfeffer (1972) subtracted this "optimal" proportion from the actual proportion of inside directors. The resulting deviation correlated negatively with performance measures (Pfeffer, 1972). (This makes sense in the short run since directors with specific backgrounds may be required to assist the firm. In the long run the firms needs will change but the directors may not. Such a situation can result in a board which may be less than "optimal.") This study, however, will employ a simple percentage of outside directors. The reason for using a simple percentage is that both Pfeffer's (1972) and Pennings' (1980) optimal percentage of inside to outside directors are contingent on variables which are already present in other parts of

the analysis (e.g. size, diversity and industry selection). To adjust the percentage to the optimal point may be redundant. Additionally, the percentage of outside directors can act as a second measure for the relative degree of interlocks a firm may maintain (Please see Appendix 4 for details).

Joint ventures can be called ties through ownership (Burt, 1983: 70-74, 224-225). Joint ventures represent another way for firms to acquire information and/or co-opt resource providers or potential rivals (Burt, 1983: 71). This study will employ the number of joint ventures as a measure of ties through ownership (Please see Appendix 4 for details).

Firm size is typically operationalized by assets and/or annual sales (see Burt, 1983: 85, for a brief summary of literature in this area). This study could operationalize size as the book value of firm assets and the annual total gross revenues for the firm. However, since these two variables are likely to have problems of extreme multicollinearity only one will be used.

In order to decide whether to use asset size or sales size let us look at the rationale behind using each variable. The logic behind using each variable is that the organization is attempting to use its size to manipulate its exchange relationship with other firms. This being the case, annual sales becomes the more logical choice for a measure of size, since most of a firm's exchanges are due to its sales (both the sales of the product and the acquisition of the inputs for the product are exchanges). Exchanges which show up as assets on the

balance sheet occur less often (with the exception of inventory, but exchanges involving inventory are also reflected in sales).

Sales size will be adjusted for inflation using the G.N.P. deflator to make cases across years comparable. G.N.P. deflator is used since it is the most widely based price index (Dornbush and Fisher, 1984) and the firms employed in this study are involved in a wide range of endeavors. (Please see Appendix 4 for details.) As is common when measuring size (e.g. Christensen and Montgomery, 1981), the log of sales will be employeed in order adjust for the wide range of possible sizes.

5. PRESENT LEVEL OF ORGANIZATIONAL RESOURCES

The present level of firm resources a firm possesses could be considered working capital or cash on hand. Working capital or cash on hand represent only a small portion of the firm's resources and present a rather narrow view of such resources.

Present level of firm resources a firm possesses could also include human talent, potential cash flow or even current market value of assets. These measures are not readily ascertainable and estimates of their value can be highly subjective (Ijiri, 1970). Current market value of a firm's resources would matter most in cases where the firm is not a going concern and is in the process of liquidation. However, most bankruptcies are Chapter 11 bankruptcies. A Chapter 11 bankruptcy does not call for liquidation, but looks to develop means by which the organization can again become a going concern. (The

debtor is given time to develop a plan of reorganization by obtaining "an order for relief" from creditors). Thus, using the current market value of the assets is only an effective measure for the level of firm resources if the firm were in liquidation.

In the broadest sense it is the total assets of the company which objectively equal the firm's financial resources (Granof, 1980); human resources and other subjective measures will not be discussed for reasons mentioned above. Total assets do not take into consideration claims others may have against the firm. In a strict sense, both liabilities and equity are claims against the firm (Granof, 1980), however the claims of creditors (liabilities) are definite while the claims of owners permit management great discretion. Thus the net worth or equity of the corporation is the real and objective resource base from which management has to work.

Since net worth can vary greatly relative to the size of the firm it would be necessary to standardize net worth. Since we are addressing the issue of resources, and the broadest measure of resources is total assets, the ratio net worth over total assets will be used as the measure of a firm's resource base. Net worth over total assets is, for financial institutions, a general indication of solvency (Mun and Garcia, 1983). Additionally, several authors mention Net Worth over Total Assets as useful ratio in financial analysis (Chudson, 1945; Pinches and Mingo, 1973; Chen and Shimerda, 1981).

6. SURVIVAL AND FAILURE

Firm failure shall be defined as the filing by a firm or its creditors of a petition for reorganization under Chapter 11 or Chapter 7 of the U.S. bankruptcy code. Firm survival, as was discussed in Chapter 2, will be considered simply the absence of failure. Survivors were mathematically coded as a "1" and failures were coded as a "0".

Failure likelihood shall be calculated using Altman's Z (Altman, 1968, 1982, 1983). Please see the Literature Review for details on the extent to which this measure has been employed. Also see Appendix 6 for details on how Altman's Z is calculated.

7. SUMMARY

Environmental selection will be studied employing two broad measures. The first measure will be industry profitability and the second will be industry growth rate. Environmental control will be measured via the firm's market share. Diversification will be used to measure the extent of environmental buffering employed by the firm. The firm can influence the parties in the exchange relationship via board interlocks, joint ventures or firm size. The present level of firm resources a firm possesses will be measured by the ratio of Net Worth to Total Assets. Firm failure is defined as the filing by a firm or its creditors of a petition for reorganization under Chapter 11 or Chapter 7 of the U.S. Bankruptcy Code. Firm survival is be considered simply the absence of failure. Failure likelihood shall be

calculated using Altman's Z.   All of these variables are brought together as shown below, in Figures 9 and 10.

FAIL   = f(IROS+IROE+IGRO+FRMS+FDIL+FPOD+FJVS+FSZS+FDIV+FWOA)

Where FAIL = Failure and failure is a function of:

IROS = Average Industry Return On Sales
       (Please see Appendix 1 for Details);

IROE = Average Industry Return On Equity
       (Please see Appendix 1 for Details);

IGRO = Average Industry 5 Year Growth Rate
       (Please see Appendix 2 for Details);

FRMS = Average Firm Relative Market Share
       (Please see Appendix 3 for Details);

FDIL = Number of Firm's Director Interlocks
       (Please see Appendix 4 for Details);

FPOD = Percent of Firm's Outside Directors
       (Please see Appendix 4 for Details);

FJVS = Number of the Firm's Joint Ventures
       (Please see Appendix 4 for Details);

FSZS = Size of Firm as determined by Sales
       (Please see Appendix 4 for Details);

FDIV = Firm's extent of   Diversification
       (Please see Appendix 5 for Details);

FWOA = Firm's present level of resources as
       a % of Net Worth over Total Assets.

FIGURE 9:   CALCULATIONS FOR ONE STEP MODEL OF SURVIVAL AND FAILURE

C. THE MODEL

Figure 9 displays what I have called the "one step model of survival and failure". This "one step" model simply takes all the variables discussed above and employs them in a single function to predict survival and failure. Calculations for the independent variables can be found in the appendices indicated. The benefit of this model is that it allows us to study the effect of each variable on failure likelihood.

```
FAIL = f(Selection+Control+Influence+Buffering+Resources)

Where:
FAIL = Failure and is a function of:

    Selection = A Firm's Environment  and is as a function of
                IROS = Average  Industry  Return  On   Sales
                IROE = Average  Industry  Return  On  Equity
                IGRO = Average  Industry 5 Year  Growth  Rate

    Control   = Environmental  Control and is a  function  of
                FRMS = Average  Firm  Relative  Market  Share

    Influence = Influence  with  Resource Providers  and is a
                function of
                FDIL = Number  of  Firm's Director Interlocks
                FPOD = Percent  of  Firm's  Outside Directors
                FJVS = Number of the  Firm's  Joint  Ventures
                FSZS = Size  of  Firm as determined by  Sales

    Buffering = Environmental Buffering  and is a function of
                FDIV = The  Firm's Extent of  Diversification

    Resources = Level  of  Resources  and  is  a  function of
                FWOA = Firm's  present level of resources  as
                       a % of Net Worth  over  Total Assets
```

FIGURE 10:   CALCULATIONS FOR TWO STEP MODEL OF SURVIVAL AND FAILURE

The drawback to the "one step" model is that it does not allow us to group the variables as we have conceptualized them. Figure 10 has been included in order to show this conceptualization. Figure 10 shows that failure is a function of environment as given, and the firm's environmental buffering, environmental control, influence with resource providers and present level of resources. These factors are in turn measured by the variables we discussed above. This creates what can be called a "Two Step" model.

The specific hypotheses with which the research will deal are stated below in the Research Hypotheses section. The first three sets of hypotheses will deal with the variables which have been operationalized above. Since the variables as stated above may correlate well with each other, additional sets of hypotheses will be tested. The additional sets of hypotheses will deal with a factor analysis to be performed on the relevant data. This factor analysis is intended to reduce the number of variables in order to show the set of constructs underlying the model (as shown in Figure 10).

D. RESEARCH HYPOTHESES

This section will discuss the hypotheses to be tested. The first set of research hypotheses will address the research question, "Can an accurate descriptive model of corporate failure be developed using dependency theory?" Hypotheses 1A through 1I will deal utilize logit analysis. A statistically significant relationship should emerge

between a firm's manipulation of their resource dependencies and their subsequent failure. Specifically, the hypotheses for this research question can be stated as:

Hypothesis 1A: The profitability of the industries in which a firm operates will be a statistically significant discriminator in categorizing failed from non-failed firms; failed firms will be found to operate in less profitable industries than non-failed firms.

Hypothesis 1B: The rate of growth of the industries in which a firm operates will be a statistically significant discriminator in categorizing failed from non-failed firms; failed firms will be found to operate in lower growth industries than non-failed firms.

Hypothesis 1C: The market share a firm possesses in the industries in which it operates will be a statistically significant discriminator in categorizing failed from non-failed firms; failed firms will be found to have lower market share than non-failed firms.

Hypothesis 1D: The number of director interlocks a firm possesses will be a statistically significant discriminator in categorizing failed from non-failed firms; failed firms will be found to have fewer director interlocks than non-failed firms.

Hypothesis 1E: The percentage of outside directors on a firm's board will be a statistically significant discriminator in categorizing failed from non-failed firms; failed firms will be found to have a lower percentage of outside directors than non-failed firms.

Hypothesis 1F: The number of joint ventures in which a firm is involved will be a statistically significant discriminator in categorizing failed from non-failed firms; failed firms will be found to have fewer joint ventures than non-failed firms.

Hypothesis 1G: The size of a firm will be a statistically significant discriminator in categorizing failed from non-failed firms; failed firms will be smaller in size than non-failed firms.

Hypothesis 1H: The level of diversification possessed by a firm will be a statistically significant discriminator in categorizing failed from non-failed firms; failed firms will be found to be less diversified than non-failed firms.

Hypothesis 1I: The present level of resources possessed by a firm will be a statistically significant discriminator in categorizing failed from non-failed firms;

failed firms will be found to possess fewer resources than non-failed firms.

Regarding the second research question, "Can an accurate predictive model of bankruptcy likelihood be constructed using dependency theory?" one must look at the percentage of correct predictions. Affecting the percentage of correct predictions is the time interval between prediction and failure (the further into the future the less likely the prediction is to be correct).

Hypothesis 2A (below) sets the minimum standard for prediction, ie. that correct classifications must be significantly better than random selection (50% success rate). That is, the model should accurately discrminate survivors from failures at least half of the time.

Hypothesis 2B (below) sets the minimum standard for prediction using this sample at the level which can be achieved using Altman's Z, a financial indicator of bankruptcy. This will give some uniform objective standard to which we can compare the results of the testing.

The hypotheses 2C through 2F take into account time interval and expected correct prediction. Hypothesis 2C (below) sets the standard at the levels achieved by Altman (1968, 1983) for the five year limit. Hypothesis 2D (below) sets the minimum standard at the average levels acheived by Altman (1968, 1983) and Zavgren (1985) in the three to five year range. Hypothesis #2E (below) sets the minimum standard at the approximate maximum levels achieved by Altman (1968, 1983) and Zavgren (1985) at the two year limit. Hypothesis 2F (below) sets the

minimum standard at the approximate maximum levels achieved by Altman (1968, 1983) and Zavgren (1985) at the one year limit.

The hypotheses regarding "accurate prediction" must take into account time frame and the success rate of past studies. Thus, the hypotheses for this research question become:

Hypothesis 2A: Models developed to predict corporate failure will (at a minimum) correctly classify future failures and survivors better than 50% of the time.

Hypothesis 2B: Models developed to predict corporate failure will (at a minimum) correctly classify future failures and survivors better than what can be achieved with this sample by using Altman's Z as a predictor.

Hypothesis 2C: Models developed to predict corporate failure will (at a minimum) correctly classify future failures and survivors better than 70% of the time up to five years in advance.

Hypothesis 2D: Models developed to predict corporate failure will (at a minimum) correctly classify future failures and survivors better than 75% of the time three to five years in advance.

Hypothesis 2E: Models developed to predict corporate failure will (at a minimum) correctly classify future

failures and survivors better than 80% of the time up
to two years in advance.

Hypothesis 2F: Models developed to predict corporate
failure will (at a minimum) correctly classify future
failures and survivors better than 85% of the time one
year in advance.

With regard to the third research question, "Which variables
contribute most significantly to reducing a corporation's likelihood
of bankruptcy?",is corporate diversification strategy, industry
selection, industry control or resource provider control most
important? This questions can be answered by comparing the
standardized discriminant functions of each variable (Morrison, 1969;
Klecka, 1976; D'Aveni, 1987B).

If the the statistically significant variable which possessed the
highest degree of predictive power were director interlocks, joint
ventures or the present level of firm resources (i.e. net worth over
total assets) this would suggest that the straight resource dependency
perspective is the most likely scenario to occur. In other words, the
present level of firm resources, or the firm's control of resources
will possess the highest degree of predictive power. If the
statistically significant variable which possesses the highest degree
of predictive power were buffering, this would be suggestive of Rumelt
(1974, 1982) and Christensen and Montgomery (1981) and gives first
priority to diversification. If the statistically significant

variable which possesses the highest degree of predictive power were industry profitability or industry growth rate, it would suggest that the population ecology perspective (Hannen and Freeman, 1977) has a great deal of validity. If the statistically significant variable which possesses the highest degree of predictive power were firm market share, it would be suggestive of Christensen and Montgomery (1981) and Buzzel, Gale and Sultan (1975) who rank the importance of market share highly (such a result, however, could also be considered verification of the resource dependency perspective). If the statistically significant variable which possesses the highest degree of predictive power were firm size, it would be suggestive of D'Aveni (1987A, 1987B) in that it places a high priority on size (which, according to Monsen and Downs, 1965, is related to prestige).

Only one of the possible results discussed above can occur. Which variable or variables may be most important to the analysis is sheer speculation at this point. Thus, investigation regarding the third research question must be considered exploratory in nature and will be discussed accordingly.

Since the variables as stated above may correlate well with each other and since these variables were grouped conceptually in the literature review and early part of this chapter, there are additional sets of hypotheses which can be proposed and tested. Specifically, we can test whether the variables group themselves as has been suggested above. The most straightforward approach is to perform a factor analysis on the relevant data. This factor analysis will reduce the

number of variables in order to show the principle components underlying the model (Jackson, 1983) as shown in Figure 10. Thus, factor analysis should reveal the presence of five factors: (1) the environment as given; (2) the extent of environmental buffering by the firm; (3) the extent of environmental control by the firm; (4) the influence the firm has with resource providers and; (5) the firm's present level of resources.

> <u>Hypothesis 3A</u>: Factor analysis will reveal five factors underlying the Resource Dependence approach to failure: (1) the firm's selected environment taken as a given; (2) the extent of environmental buffering by the firm; (3) the extent of environmental control by the firm; (4) the influence the firm has with resource providers; (5) the firm's present level of resources.

> <u>Hypothesis 3B</u>: Factor analysis will reveal an "Environmental" factor that will load heavily on the firm's average industry return on sales, average industry return on equity and average five year industry growth rate.

> <u>Hypothesis 3C</u>: Factor analysis will reveal an "Environmental Buffering" factor that will load heavily on the extent to which a firm is diversifed.

> <u>Hypothesis 3D</u>: Factor analysis will reveal an "Environ-

mental Control" factor that will load heavily on the firm's average relative market share.

Hypothesis 3E: Factor analysis will reveal an "Influence with Resource Providers" factor that will load heavily on the firm's number of director interlocks, percent of outside directors, number of joint ventures and sales size.

Hypothesis 3F: Factor analysis will reveal a "Present Level of Resources" factor that will load heavily on the firm's percentage of Net Worth over Total Assets.

An additional possibility exists with regard to the above hypotheses. Since the "Influence with Resource Providers" factor loads heavily on size related variables we may find that that other size related variables may be included with the factor. Both diversification ("Environmental Buffering") and relative market share ("Environmental Control") may relate to size and so be part of the "Influence with Resource Providers" factor.

How well each of the above factors aid us in differentiating potential failures from survivors is the subject of the next set of hypotheses. Hypotheses 4A through 4E will deal with the logit analysis testing employing actual bankrupts. A statistically significant relationship should emerge between a firm's manipulation of their resource dependencies and their subsequent failure. These

hypotheses can be stated as:

Hypothesis 4A: The firm's environment will be a statistically significant factor in discriminating failed firms from non-failed firms; failed firms will be found to operate in less desirable (low profit and growth industries) than non-failed firms.

Hypothesis 4B: The extent of the firm's environmental buffering will be a statistically significant factor in discriminating failed from non-failed firms; failed firms will be found to be less buffered (or diversified) than non-failed firms.

Hypothesis 4C: The extent of the firm's environmental control will be a statistically significant factor in discriminating failed from non-failed firms; failed firms will be found to have less environmental control (relative market share) than non-failed firms.

Hypothesis 4D: The firm's influence with resource providers will be a statistically significant factor in discriminating failed from non-failed firms; failed firms will be found to have less influence with external parties (via interlocks and size) than non-failed firms.

<u>Hypothesis 4E</u>: The present level of resources possessed by a firm will be a statistically significant factor in discriminating failed from non-failed firms; failed firms will be found to possess fewer resources than non-failed firms.

Can an accurate predictive model of bankruptcy likelihood be constructed using the above factors? In order to address this question one must look at the percentage of correct predictions. Affecting the percentage of correct predictions is the time interval between prediction and failure (the further into the future the less likely the prediction is to be correct). The following hypotheses take into consideration both time interval percentage of correct prediction. Essentially hypotheses 5A through 5F are repeats of Hypotheses 2A through 2F applied to the factor analysis scores.

<u>Hypothesis 5A</u>: Models developed to predict corporate failure will (at a minimum) correctly classify future failures and survivors better than 50% of the time.

<u>Hypothesis 5B</u>: Models developed to predict corporate failure will (at a minimum) correctly classify future failures and survivors better than what can be achieved with this sample by using Altman's Z as a predictor.

<u>Hypothesis 5C</u>: Models developed to predict corporate failure will (at a minimum) correctly classify future

failures and survivors better than 70% of the time up to five years in advance.

Hypothesis 5D: Models developed to predict corporate failure will (at a minimum) correctly classify future failures and survivors better than 75% of the time three to five years in advance.

Hypothesis 5E: Models developed to predict corporate failure will (at a minimum) correctly classify future failures and survivors better than 80% of the time up to two years in advance.

Hypothesis 5F: Models developed to predict corporate failure will (at a minimum) correctly classify future failures and survivors better than 85% of the time one year in advance.

Which factors contribute most significantly to reducing a corporation's likelihood of bankruptcy? Which factor or factors may be most important to the analysis is sheer speculation at this point. Thus, investigation regarding of this question is considered exploratory in nature and will be discussed accordingly. We now turn our attention to controls for alternate hypothesis, possible confounding variables and caveats regarding the research.

E. CONTROL FOR ALTERNATE HYPOTHESES, CONFOUNDS AND CAVEATS

With regard to controlling for alternate hypotheses (or confounds), many of the controls involved with this study are statistical controls — that is, the variable is controlled by including it in the tested model (Kerlinger, 1973: 631; Dillon, Madden and Firtle, 1987: 166). Causality in ex post facto research cannot be readily proven due to the fact that all other possible causal factors are not controlled (Kerlinger, 1973: 393). However, this research does attempt to control for a significant number of factors. The reason the research does not appear to include or control some factors is because these variables are closely related to factors included in the analysis. For example (as was stated in the literature review), barriers to industry entry may affect industry profitability (Porter, 1979), since industry profitability is a variable in the analysis, including barriers to entry would be largely redundant.

An apparently potential confounding variable could be the presence or absence of regulation. Owen and Brautigam (1980) state, "And, while regulation may make very high rates of return difficult to achieve, it does virtually guarantee a steady stream of adequate profits" (Owen and Brautigam, 1980: 2). Thus, firms in industries which are highly regulated may be aided in avoiding bankruptcy through the presence of regulation. Additionally, firms in recently deregulated industries face an increased likelihood of failure. This increased likelihood of failure is due to the removal of the protection regulation can produce rather than any of the other

variables which will be considered. In order to remove the potential effects of regulation or recent regulatory changes firms whose principle industry is noted in Table 4 will not be included.

Another apparently potential confounding variable might be the age of the firm. Start-up firms could be particularly susceptable to the ills of autocratic leadership of which Argenti (1980A) speaks (please see the Literature Review for details). Thus firms which have been in existence less than five years shall be eliminated from the sample. Additionally, small employment figures are characteristic of start-up firms, thus firms with less than 20 employees shall be eliminated from the sample.

TABLE 4:   ELIMINATED INDUSTRIES

Telecommunications	(SIC Code Group 48)
Banking Services	(SIC Code Group 60)
Medical Practice	(SIC Code Group 80)
Insurance Services	(SIC Code Groups 63 and 64)
Transportation	(SIC Code Groups 40, 41, 42 and 44)
Legal Practitioners	(SIC Code Group 81)
Utilities	(SIC Code Group 49)

A final possible confound may be a change in the bankruptcy law. Such a change may result in a change in the number or types of firms which would declare bankruptcy. A major change in the bankruptcy law occurred on October 1, 1979 when the provisions of The Bankruptcy Reform Act of 1978 came into effect (Moulton and Thomas, 1988). The Bankruptcy Reform Act of 1978 altered the court proceedures with

regard to the handling of liquidation and reorganization cases. Since it is not readily ascertainable what effect the change in the law had on firms which declared bankruptcy, any firm which declared bankruptcy before January 1, 1980 was not considered as part of the relevant population of bankrupt firms and the sample excluded such firms.

This research also takes into account the temporal ordering of events via the variations in observed variables. This feature, combined with the above controls, would make a strong case for implying causality.

There are, however, some strong caveats with regard to this study. With regard to casuality, ex post facto research can support several theories to explain the same events since not all causal factors are controlled (Kerlinger, 1973: 393). So, although one can legitimately say that an event in the prior period relates to, or correlates well with, events in a later period it is not correct to say that the first event **caused** the latter (unless of course, one runs a controlled experiment, and this study is not a controlled experiment).

A second caveat, one relating to the first, is that this study makes makes no attempt to control for sudden catastrophic events which an organization may encounter. For example, A. H. Robins experience with the Dalkon Shield which forced the corporation into bankruptcy in 1985, or Texaco's loss of a $10 billion lawsuit forcing the oil giant into bankruptcy in 1987. The argument can be made that both cases are the result of poor control practices which allowed management to make

questionable decisions. That is, the outcomes of those decisions may have been different had, for example, management been better scrutinized by the board of directors. The presence of outsiders on a board may provide such scrutiny and this variable has been included in the analysis.

A final caveat relates to those companies which survive but might not have were it not for government intervention. The two most obvious examples are the government loan guarantees for Chrysler and the government bailout of Lockheed (fortunately, neither company was selected in the random sampling of non-failing firms). A less obvious example could include an industry obtaining import protection through the government.

However, government intervention fits well within the resource dependency model (to the extent we can view the government as another resource provider the organization needs to control). Many authors have addressed the ease with which business can manipulate the government to serve its own ends (eg. Stigler, 1971; Lindblom, 1977; Owen and Brautigam, 1980). The major problem in testing for the effects of government intervention involves the measurement of a firm's ability to manipulate the government. Thus, testing for this relationship may be far beyond the scope of this study. Though the the measurement of government intervention is not included in the analysis, one may argue that its presence would only serve to support the resource dependence model. If this study errs, it errs in the direction of a type two error (we increase our likelihood of assuming

the resource dependence model has no relation to failure when it in fact does). How the sample firms were selected for this study is addressed in the next section.

F. THE DATA COLLECTION PROCESS

This section will begin with a few pages discussing the sampling method employed, followed by a discussion regarding time horizons, and lastly a description of the steps in the data collection process.

1. SAMPLING METHOD

The firms selected for this study were not chosen entirely at random. Obviously, the bankrupt firms were unique observations selected out of the general population. Seabright (1987) calls this type of research design "a case-control study." Companies which went bankrupt (cases) were compared with companies which did not go bankrupt (controls) with respect to the hypothesized explanatory variables. This type of research design has been used in epidemiological research to study the determinants of lung cancer, sudden infant death, toxic shock syndrome, and other infrequent conditions (Schlesselman, 1982).

The case-control approach is employed occasionally in organizational research (Kosnick, 1987; Seabright, 1987) and particularly in business failure research (Altman, 1968; Beaver, 1968; Wilcox, 1973; Altman, Haldman and Narayan 1977; Van Frederiskslust, 1978; Ohlson, 1980; Altman, 1982; Rose and Giroux, 1984; Gentry,

Newbold and Whitford, 1985; D'Aveni 1987A, 1987B, 1987C; Seabright

1987; Aziz, Emanuel and Lawson, 1988). Seabright (1987: 39) describes

the case control design in this fashion:

"There are two general types of comparative designs: the
cohort and the case-control approach (Anderson, Auguier,
Hauck, Oakes, Vandaele, Weisberg, 1980). The cohort design
proceeds from cause to effect (Schlesselman, 1982). In a
cohort study, a random or stratified sample of subjects is
selected for study. The subjects are classified according
to their exposure to the hypothesized explanatory factors.
The outcome of interest is then measured, and the exposed
and unexposed subjects are compared in terms of their
outcomes. For example, a prospective cohort study of the
effect of cigarette smoking on lung cancer would select a
number of smokers and nonsmokers for study and then collect
follow-up data on the incidence of lung cancer over
subsequent years. Smokers and nonsmokers would then be
compared in terms of their morbidity rates.

"The case-control design, in contrast proceeds from effect
to cause (Anderson et al. 1980; Schlesselman, 1982). 'In a
case-control study, individuals with a particular condition
or disease (the cases) are selected for comparison with a
series of individuals in whom the condition or disease is
absent (the controls). Cases and controls are compared with
respect to existing or past attributes thought to be
relevant to the development of the condition or disease
under study' (Schlesselman, 1982, p. 140). For example, a
case-control study of the effect of cigarette smoking on
lung cancer would select subjects on the basis of whether or
not they had lung cancer and then collect data on their
smoking histories and other variables of interest. The
cases, those with lung cancer, would then be compared with
the controls, those without the disease.

"An advantage of the case-control approach, relative to the
cohort design, is that rare events or outcomes can be exam-
ined more efficiently (Anderson et al. 1980; Schlesselman,
1982). For example, a prospective study examining the effect
of cigarette smoking on lung cancer would need to select a
large number of smokers and nonsmokers at the beginning of
the study and to collect follow-up data on each subject over
subsequent years in order to obtain a sufficient number of
diseased subjects for comparison. A case-control study, in
contrast, would require fewer subjects and would not involve

the effort to follow up subjects that remained free of disease (Schlesselman, 1982)."

The advantage to the case-control approach is that it is well suited to a study of a low frequency event such as bankruptcy (according to the U.S. Dept. of Commerce 1988 <u>Survey of Current Business</u> the annual bankruptcy rate is approximately 1%). Thus a cohort study of firm failure would select a stratified sample of companies, the strata being based on the hypothesized explanatory variables, and then collect data on whether or not they declared bankruptcy. In order to obtain data on sufficient number of failed firms, a very large sample of companies and a great deal of follow-up would be required. The case-control approach, however, requires fewer subjects and less follow-up.

In using the case control approach on the study of organizational demise one would select companies on the basis of whether or not they went bankrupt and would then collect data on the explanatory variables preceeding the time period in which the bankruptcy takes place. Failures would then be compared with non-failures using equivalent lead times. This method provides an efficient approach for studying organizational demise.

There are two main disadvantages associated with the case-control design (Seabright, 1987). The first disadvantage is that the nonrandomized assignment procedure does not assure comparability between cases and controls. Noncomparability is a potential weakness of all nonrandomized designs, including nonrandomized cohort studies

(Anderson, Auguier, Hauck, Oakes, Vandaele and Weisberg, 1980; Schlesselman, 1982; Seabright, 1987). Confounding variables which have not been taken into account would affect different distributions of an explanatory variable for cases and control. Such confounds could result in a spurious relationship between the explanatory variable and failure. Steps to control for potential confounds in this study were discussed previously.

Another disadvantage of the case-control method stems from its after-the-fact sampling scheme. The selection of subjects in a case-control study is not representative of the actual proportion of cases to controls in the target population. According to Seabright (1987), "This lack of representativeness creates incorrect estimates of the risk of incidence for subjects exposed to the explanatory condition, as compared with unexposed subjects. It does not bias estimates of the cross-product ratio, or the ratio of the odds of incidence for exposed subject relative to unexposed subjects" (Seabright, 1987: 40).

However, if estimates are available for the incidence rate of the condition under study (bankruptcy in the present investigation) a correction can be made to account for the bias. With regard to a logit model for a case-control study of firm failure the constant term in the model would not reflect the incidence rate of bankruptcy. Logistic regression would bias estimates of the constant in proportion to the sampling proportion of failures to non-failures. Again, according to Seabright (1987: 41):

"If the constant term were of interest... sources could be used to correct for the bias introduced by the sampling scheme. The other logistic parameters would not be affected by the retrospective sampling scheme. Estimates of the coefficients of the explanatory variables would agree with such estimates based on data from a cohort study (Anderson et al., 1980; Schlesselman, 1982)."

When the advantages and disadvantages are considered, " the case-control study is a relatively efficient method for investigating rare phenomena. One of its disadvantages, the issue of assuring comparability, is common to all nonrandomized studies [including all prior bankruptcy studies]. The other disadvantage, the interpretation of relative risk, can be overcome if the sampling fractions are known" (Seabright, 1987: 41).

2. TIME HORIZON

Before the steps of data collection can be discussed, a word about the relevant time frame is necessary. A major part of this study employs data from the EIS database (for a brief description of the EIS database — Economic Information System's Establishment Database — see Montgomery, 1982). Since EIS data is available only for the years 1977, 1980 and 1982 the data used in this research will be drawn from those three years. Thus, bankruptcies occuring in certain years and employing a certain time horizon will use a particular year from which to draw data. For example, if we wanted to predict failure three years in advance then we would look at firms which went bankrupt in 1980, 1983 and 1985 and employ data from the

years 1977, 1980 and 1982 respectively. The specifics of the selection method is shown in Appendix 7.

3. DATA COLLECTION

The steps to the data collection process were performed as follows. First, the Commerce Clearing House Capital Changes Reporter was scanned (main section, worthless securities section and recent events section) for the years 1980 to 1987 (inclusive) and those firms which declared bankruptcy during that time were noted.

Second, the Moody's Industrial Manual, Moody's OTC Industrial Manual, Moody's Unlisted OTC Manual and Dun's Million Dollar Directory were then employed in order to ensure that all the firms listed in the first step had more than 20 employees, were in existence more than 5 years and were not in industries outside of the scope of this study.

Third, the Commerce Clearinghouse Capital Changes Reporter was employed to obtain a random sample of surviving firms (all firm names obtained will be checked to ensure they meet the same requirements as the firms listed in step two above). The total number of surviving firms is equal to the number of firms obtained in step two. With regard to which year's data is used, a proportional system was employed whereby the number of firms which failed in a particular year was approximately equal to the number which survived during that same year.

Fourth, data from the Compustat files was obtained for the firms under study for the years 1977, 1980 and 1982. This data was employed

to calculate total sales size and Altman's Z for the firms in the sample. When Compustat data could not be obtained, the Annual Reports for the firm were obtained. (The comparison of a subset of the Compustat data to the Annual Report data showed both sources produce the same results.)

Fifth, copies of the Annual Reports and the Securities and Exchange Commission 10K forms for the firms disclosed in steps one, two, and three were obtained for the years 1977, 1980 and 1982. These data were employed to calculate the number of directorships held in other firms by board members of the firm in question, as well as the percentage of outside directors and the number of joint ventures. Those firms for which the 10K was unavailable were traced through the Standard and Poors' Directory of Corporate Officers and Directors in order to the locate the interlock relationships and percentage of outside directors for the appropriate years. (The comparison of a subset of the 10K data to the Standard and Poors data showed both sources produce the same results.)

Sixth, for the firms obtained in steps one, two, and three firm diversification and market share data were obtained from the EIS database for the years 1977, 1980 and 1982.

Seventh, the figures for industry growth rates for the years 1977, 1980 and 1982 relating to the firms in the sample were obtained from the 1982 Census of Construction Industries, 1982 Census of Manufactures, 1982 Census of Mineral Industries, 1982 Census of Retail Trade, 1982 Census of Service Industries, 1982 Census of

Transportation, 1982 Census of Wholesale Trade (U.S. Department of Commerce, Bureau of the Census 1985) in order to calculate industry growth rates. These figures were adjusted for inflation using the G.N.P. deflator with data obtained from The National Income and Product Accounts of the United States, 1928 - 1982 Statistical Tables (U.S. Department of Commerce, 1986).

Lastly the industry profitability figures relating to the firms in the sample were obtained for the years 1977, 1980 and 1982 from Dunn and Bradstreet's Key Business Ratios. The three month Treasury bill rate was obtained from the Federal Reserve Bulletin (U.S. Dept. of Commerce, 1978, 1981, 1983) for December 1977, 1980 and 1982. These rates were used to adjust the Industry ROE figures to account for changes in interest rates. The National Income and Product Accounts of the United States, 1928 - 1982 Statistical Tables (U.S. Dept. of Commerce, 1986) were employed to adjust the ROS figures to account for fluctuating inflation rates.

G. TESTS OF THE MODELS

The appropriate methods for testing the above model are either Discriminant Analysis or Logit Analysis (Cox, 1970). Since Discriminant Analysis and Logit arrive at predictions employing somewhat different methods each one could be used to support the findings of the other test. The differences between the two methods are essentially that Discriminate Analysis is a linear method used for dividing normally distributed populations and Logit is a non-linear

method which does not assume normality and employs probabilities to assign subjects to groups.

To test the model, both a stepwise discriminate analysis, as well as a logit analysis was employed. The sample data were lagged one to five years prior to the firm's bankruptcy as was stated previously.

The stepwise criteria employed in the discriminant analysis is Rao's V (or what SPSS whould call, "METHOD = RAO"). Rao's V is a generalized distance measure. What this means is that when a variable is selected for inclusion in the discriminant function it is the variable which contributes the largest increase in V when added to the previously included variables (Klecka 1976). The analysis stops when the next variable would not make a positive contribution to V. This is the method consistent with those used in prior studies (eg. Aziz, Emanuel and Lawson, 1988).

The stepwise discriminant analysis will not only give us a way to predict which firms are likely to survive but it will also tell us which variables are most important in differentiating survivors from failures. We can arrive at a figure for the relative "importance" of each variable by comparing the standardized discriminant function coefficents of each variable (Morrison, 1969, D'Aveni, 1987). If the reader wishes further information, please see Klecka (1976) for an informative discussion regarding discriminant analysis (Altman, 1968, is also somewhat helpful with this material).

The logit analysis can be used to both confirm the results of the discriminant analysis and to show us which variables are statistically

significant in predicting survivors from failures. Since the logit analysis is considerably more robust than the discriminant analysis it may be considered more reliable than discriminant analysis when dealing with samples which are not normally distributed (Lo, 1986). If the reader wishes additional details on logit analysis please refer to Cox (1970) for greater detail.

The predictive validity of the models and Altman's Z will be tested via use of the Accuracy Matrix shown in Figure 11. The accuracy matrix compares the numbers of actual failures and survivors found in the samples with the numbers of predicted failures and survivors as determined by the discriminant and logit analyses. The matrix will evaluate overall accuracy, correct prediction of failures and correct prediction of survivors.

The accuracy matrix is based on a two-by-two format (please see Figure 11). The upper left quadrant of the matrix will list the number and percentage of actual bankrupt firms which the models accurately predicted. The lower right quadrant will list the number and percentage of actual surviving firms which the models accurately predicted. The upper right and lower left quadrants represent errors in prediction (upper right being a type I error — misclassification of a bankrupt firm, and lower left being a type II error — misclassification of a surviving firm). The upper right and lower left quadrants will also include the percentage of firms which were misclassified (upper right being firms which were predicted to fail and, in fact, survived, and lower left being firms which were

predicted to survive and, in fact failed).

Lastly, after analizing the above tests, a factor analysis was performed using the variables previously studied. Factors with an eigenvalue greater than one will be employed in further testing. The factors were be labeled by evaluating the three largest factor loadings which were greater than .5. The factors were then used as variables in further discriminant and logit analyses. Finally, the factors will be employed in the accuracy matrix as outlined in Figure 11. Essentially, the tests which were performed on the raw variables will be repeated using the factor scores as the independent variables.

Actual Group Membership	Predicted Group Membership	
	B a n k r u p t	Non – Bankrupt
Bankrupt	Correctly Predict Firm's Bankruptcy	Incorrect Type I Error
Non – Bankrupt	Incorrect Type II Error	Correctly Predict Firm's Survival

FIGURE 11:   THE ACCURACY MATRIX

H. SUMMARY

In this chapter we have discussed the research design which will be used to address the research questions as listed in the introduction. This description has included (1) specific operational definitions for environmental selection, control and buffering, exchange relationship influence, firm resources, and survival and failure; (2) the specific research hypotheses which relate to the research questions; (3) controls for alternate hypotheses, possible confounding variables and caveats regarding the research; (4) a description of the proposed predictive and descriptive models to be used; (5) a step-by-step outline of the data collection process (including sources of data) and; (6) tests of the models. With all this said, let us turn to the results of the tests.

CHAPTER FOUR

RESULTS

Before testing of the models began correlations between the variables were examined. The initial correlations demonstrated some multicollinearity which could affect further testing. This was particularly true with regard to the correlation between director interlocks and sales size (correlations between these two variables were as high as .696 one year prior to potential bankruptcy). The correlations between industry ROE and industry ROS were as high as .705 one year prior to potential bankruptcy. As a result, two steps were taken to reduce the degree of correlation.

The first step was to simply eliminate the industry ROS variable from further investigation. Since industry ROS and ROE are both employed as industry profitability measures the elimination of either one should not seriously affect the analyses. Either variable could have been retained, but industry ROE was more likely to be critical. Industry ROE is indicative of the industry's ability to reward equity providers with earnings. Industry ROS is indicative of consumers' willingness to pay a premium to receive the industry's products. An industry with good ROE and poor ROS can attract equity providers more readily than a industry with good ROS and poor ROE. Since it is ROE which drives the investment decision an industry cannot long survive if it cannot attract investors. Therefore, ROE was the variable selected. For example, a supermarket may make only a 2% ROS but its ROE may be sufficient to attract funds for expansion. Thus it is ROE which plays the critical role in long term firm growth and health.

The second step was to adjust for firm size in the firm interlock variable. This was done by taking the number of firm interlocks and dividing it by the firm's sales size measure. Correlations of the variables (without industry ROS and with the adjusted interlocks measure) are included in Appendix 8.

Factor analysis could also eliminate the problem of multi-collinearity, but observations which might be made if the variables were not factor analyzed would be lost. Hence, this research will first look at the variables (as adjusted) without factor analysis then perform the factor analysis and test the factors for their relationship to failure and survival.

This chapter will begin by discussing the results of the logit analysis and how it relates to Hypotheses 1A through 1I regarding the statistical significance of the predictors. First the predictive accuracy of both the logit and discriminant analysis will be discussed. Second, the predictive accuracy of these analyses will be addressed when Hypotheses 2A through 2F are evaluated. Third, the relative importance of each variable will be discussed. Fourth, the logit and discriminant analyses will be compared as a reliability check. Fifth, a factor analysis will be discussed and compared to the expected factors as stated in Hypothesis 3A through 3F. Sixth, the results of the Hypotheses 5, and 6, regarding the relationship of the factors to failure and survival will be discussed.

A. THE SIGNIFICANCE OF PREDICTORS IN THE COMPONENTS OF THE MODEL

Table 5 represents the results of the logit analysis for all five years of the study. Due to the demands of the statistical package employed (SYSTAT/PC) growth, instead of being stated as a percentage, was put into the form of its decimal equivalent (e.g. 10% became .1). Such a transformation is perfectly acceptable since it does not alter the distribution of the observations (Dixon and Massy, 1957: 320-324).

Table 5 shows the estimates which were developed by the logit analysis. (This table plus the figures for the statistical significance for each variable in the table is included in Appendix 9). Of the results, the two most pronounced items in these results are (1) the present resources the firm possesses and (2) the number of board interlocks. The former is always a statistically significant variable in the logit model (this fits with the theory but is not as important as the second item). The latter variable is a statistically significant variable for almost all years in the model. This means that there is a relationship between prior periods director interlocks and future potential for bankruptcy. In essence, an organization can better insure its continued existence through the manipulation of the firm's relationships with other firms.

There are, of course, other explanations which would account for the observed relationship spotted in the director interlock variable. One explanation could be that directors who sit on many boards have a knack for discriminating firms which are likely to survive from those

which fail. While this alternate explanation makes sense it fails to

tell us why the relationship does not hold for all five years.

TABLE 5:   LOGIT ESTIMATES

| | Years In Advance: | | | | |
	1	2	3	4	5
Constant	-0.290	-5.433**	-2.902*	-0.665	-4.325**
Select Environment					
Industry ROE	-0.149*	0.126	-0.008	-0.002	0.070'
Industry Growth	-0.547	-0.028	0.901	0.616	2.181***
Control Environment					
Rel. Mkt. Share	0.110	0.039	0.071**	0.001	-0.014
Influence Providers					
Board Interlocks	-0.007	0.161*	0.190**	0.248**	0.287***
% Outsiders	-0.009	0.006	-0.001	-0.036**	0.020'
Joint Ventures	0.306	0.464	0.020	-0.264	-0.345
Firm Sales Size	0.353	0.389	0.745'	-0.251	-0.838'
Buffering:					
Diversification	-1.397	0.059	-1.683*	0.620	0.785
Present Resources					
N.W. / T.A.	0.080***	0.074***	0.019'	0.036**	0.058***

```
 ' One-tailed asymptotic T is significant beyond .2
 * One-tailed asymptotic T is significant beyond .1
** One-tailed asymptotic T is significant beyond .05
*** One-tailed asymptotic T is significant beyond .01
```

Indeed, if well-connected directors are better able to spot

failures and successes, we would find the difference in director

interlocks between failed and non-failed firms in Year 1 would most

pronounced. However, Year 1 is the only year in which director

interlocks are not statistically significantly different. The most

logical explanation is probably that directors who do have connections

are brought on board the year before the firm fails in a vain attempt

to save the organization. Thus, these directors have no special ability to spot the winners and losers but are in some way thought to affect the outcome.

Still other explanations could account for the observed relation-ships, However, the problem with ex-post-facto studies is that other explanations are always plausible. The explanation presented here is one which fits well with the theory already developed and makes logical sense. Thus the explanation given may not be the only one but it is logical given the perspective from which we are working.

Table 6 presents a review of the results of the logit analysis as the analysis relates to the first set of hypotheses. Table 6 shows the rel-ationship between the variable indicated and the firm's likelihood of survival. Significance levels are indicated after the variable name and results supporting the hypothesis are underlined in the table.

1. HYPOTHESIS 1A

With regard to industry profitability and survival, we find that there is some significant relationship. However the relationship is not uniform across all years. Five years in advance of the possible failure we find that there is a positive relationship between survival and industry ROE -- this is in agreement with the theory. However, one year prior to potential failure we find that industry profitability and survival are negatively related (ie. the more profitable the industry the lesser the firm's chance of survival).

There are several possible explanations for the observed relationship in years one and two, but these other explanations will be addressed in Chapter 5.

TABLE 6:   SIGNIFICANT RESULTS OF LOGIT ANALYSIS SUMMARIZED

	Predictive Model's Time Horizon				
Hypothesis:	1 Year	2 Years	3 Years	4 Years	5 Years
1A Ind. Profit	-IROE.1	—	—	—	+IROE.2
1B Ind. Growth	—	—	—	—	+IGRO.01
1C Rel.Mkt.Share	—	—	+FRMS.05	—	—
1D Dir.Interlock	—	+FDIL.1	+FDIL.05	+FDIL.05	+FDIL.01
1E Outside Dirs.	—	—	—	-FPOD.05	+FPOD.2
1F Joint Venture	—	—	—	—	—
1G Sales Size	—	—	-FSZS.2	—	-FSZS.2
1H Diversifictn.	—	—	+FDIV.1	—	—
1I Resources	+FWOA.01	+FWOA.01	+FWOA.2	+FWOA.05	+FWOA.01

Due to the instability of the relationship between industry profitability and survival over time I must conclude that the **Hypothesis 1A cannot be supported** (or more accurately, the null hypothesis, which would say there is no predictable relationship, should be accepted). This is not to say that no relationship at all exists, but as a consistent predictor of bankruptcy, industry profitability fails.

2. HYPOTHESIS 1B

With regard to industry growth rate and survival (Hypothesis 1B), we find that there is a significant relationship five years prior to potential failure. Coupled with the fact that industry ROE also plays a part in survival in the fifth year one may be able to say that firms in profitable, growing industries are thus more likely to survive. However, the fact that the relationship exists only in one year would be sufficient reason to cloud an unequivocal acceptance of Hypothesis 1B. There is a possible explanation for the observed relationship in year five alone, but again addressing this explanation is best left until Chapter 5.

Therefore, **Hypothesis 1B cannot be supported** due to the instability of the relationship over time (or more correctly, the null hypothesis, which would say there is no relationship, should be accepted). This, again, is not to say that no relationship exists, but as a consistent predictor of bankruptcy, industry growth rate fails.

3. HYPOTHESIS 1C

With regard to the firm's relative market share and survival, there is a significant relationship three years prior to potential failure. Again, the fact that the relationship exists only in one year would be sufficient reason to reject Hypothesis 1C.

Thus, **Hypothesis 1C cannot be supported** due to the instability

of the relationship over time (ie. the null hypothesis, which would say there is no relationship, should be accepted). That is not to say that no relationship exists; it is just that as a consistent predictor of bankruptcy, relative market share does not perform well. Reasons why relative market share relates positively with market share and survival in the third year and not other years are discussed in Chapter 5.

4. HYPOTHESIS 1D

With regard to the firm's director interlocks and survival, there is a significant relationship two to five years prior to potential failure. In other words a relationship exists between prior periods' director interlocks and future potential for survival. This, in theory, means that through the manipulation of the firm's relation-ships with other firms the organization can better ensure its continued existence.

Other explanations, of course, could account for the observed relationship in the director interlock variable. These other explana-tions have been discussed in the earlier part of this chapter, and logic dictates that the resource dependence theory is still plausible. The fact that the relationship between interlocks and survival seems to fade in the two years prior to failure may provide some indication that failing firms and their critical coalitions react too slowly to the need for these interlocks. That is, the failing firms increase their interlocks too late in order to aid in their survival. On the

basis of the logit analysis and the above discussion **Hypothesis 1D is supported** (ie. the null hypothesis, which would state there is no relationship, should be rejected).

5. <u>HYPOTHESIS 1E</u>

With regard to the firm's percentage of outside directors and survival there is a significant relationship four years prior to potential failure. However, the relationship is not in the expected direction, ie. in year four there is a negative relationship between percentage of outside directors and survival. Further clouding the results is a weak positive relationship between percentage of outside directors and survival in year five. The lack of strong indicators in several years and the instability of the relationship over time is sufficient reason to reject the hypothesis. It may seem unusual that percentage of outside directors is such a poor indicator of survival when director interlocks seems to be such a good one. However it is important to remember that inside directors can be interlocks as well as outsiders.

Thus, **Hypothesis 1E cannot be supported** due to the instability of the relationship over time (ie. the null hypothesis, which would say there is no relationship, should be accepted). This, again, is not to say that no relationship exists, but as a consistent predictor of bankruptcy, the firm's percentage of outside directors does not perform well. However, the relationship between director interlocks and survival when coupled with the discovery of the relationship

between percentage of outside directors and survival suggests that boards of directors do, in fact, play a significant role in the survival of the firm.

Why then is the strong relationship discovered between the percentage of outside directors and survival not in the expected direction in year four? One possible explanation was suggested in the literature review. That is the firm's use of positions on the board as a resource to induce external coalitions to support the organization. If organizations already have many outsiders on their boards, they may not be able to induce additional resource providers with the promise of a board seat. The presence of many outsiders may also be taken as a signal that the firm is not in good health, that the resource providers are on the board because they are worried about receiving payment. All of these possibilities are simply conjecture. A considerable amount of investigation is needed with regard to board structure and composition as they relate to firm survival.

6. HYPOTHESIS 1F

With regard to joint ventures and survival, no significant relationships were discovered in the logit analysis. Therefore, **Hypothesis 1F cannot be supported**, ie. a null hypothesis, which would say there is no relationship, should be accepted.

7. HYPOTHESIS 1G

With regard to firm size and survival, there is a weak

relationship three and five years prior to potential failure. However, the relationship is not in the expected direction, ie. there is a negative relationship between firm size and survival. In addition, the relationship is weak and exists in only two years.

Thus, **Hypothesis 1G cannot be supported** due to the instability of the relationship over time (ie. the null hypothesis, which would say there is no relationship, should be accepted). This, again, is not to say that no relationship exists, but as a consistent predictor of bankruptcy, firm size does not perform well. The negative relationship discovered between firm size is not in the expected direction and goes against the popular belief that larger firms are less risky than smaller firms (Chan, Chen and Hsieh, 1985). Perhaps conventional wisdom has also created the result, i.e. many critical coalitions extend credit to a firm because the firm's size deluded these coalitions into thinking that they would be repaid.

8. HYPOTHESIS 1H

With regard to firm diversification and survival, no significant relationships were discovered in the logit analysis. Therefore, **Hypothesis 1H cannot be supported**, ie. a null hypothesis, which would say there is no relationship, should be accepted.

9. HYPOTHESIS 1I

With regard to the firm's level of resources and survival there is a significant relationship in all five years prior to the potential

failure. This means that there is a relationship between prior periods level of resources and future potential for bankruptcy. On the basis of the logit analysis **Hypothesis 1I is supported** (ie. the null hypothesis, which would state there is no relationship, should be rejected).

10. SUMMARY

The results of the hypothesis tests compared with the logit analysis are summarized in Table 7. The only significant consistent relationships discovered were between director interlocks and survival and present level of firm resources and survival. Both were positively related to survival of the firm.

TABLE 7: RESULTS OF HYPOTHESES 1A THROUGH 1I SUMMARIZED

H y p o t h e s i s :	R e s u l t s :
Significance as a Discriminator:	
1A Industry Profitability	Rejected
1B Industry Growth Rate	Rejected
1C Firm's Relative Market Share	Rejected
1D Firm's Director Interlocks	**Accepted**
1E Firm's % of Outside Directors	Rejected
1F Firm's Joint Ventures	Rejected
1G Firm Size	Rejected
1H Firm's Diversification	Rejected
1I Firm's Resources	**Accepted**

B. THE PREDICTIVE ACCURACY OF THE MODELS

How well do the various models predict failure and survival? Tables 8, 9, 10, 11 and 12 display the accuracy matrices for the logit analysis, the discriminant analysis and Altman's Z, for years one through five respectively. (The discriminant analysis will be discussed more fully later.) By looking at the accuracy of the models these tables will aid in addressing the second research question, "Can an accurate predictive model of bankruptcy likelihood be constructed using dependency theory?"

Table 8 tells us, for example, that the logit analysis correctly predicted 28 out of the 31 firms which went bankrupt. This is converted to an accuracy rate of 74.2%, as shown in the upper left quadrant of the first matrix shown on Table 8. The logit analysis correctly predicted 25 out of the 31 firms which survived. This is converted to an accuracy rate of 80.6%, as shown in the lower right quadrant of the first matrix shown on Table 8. The upper right and lower left quadrants represent errors in prediction. The upper right being a type I error, misclassification of a bankrupt firm, and lower left being a type II error, misclassification of a surviving firm. The bottom line of the accuracy matrix lists the model's overall percentage of accuracy in correctly predicting failures and survivors. The predictive accuracy of both the discriminant analysis and Altman's Z is calculated in the same manner as the results of the logit analysis.

TABLE 8:   ACCURACY MATRIX 1 YEAR PRIOR TO BANKRUPTCY

	Logit Analysis		Discriminant		Altman's Z	
	P r e d i c t e d		**P r e d i c t e d**		**P r e d i c t e d**	
	Bankrupt	Non-Bankrupt	Bankrupt	Non-Bankrupt	Bankrupt	Non-Bankrupt
Actual Bank-rupt	23 74.2%	8 25.8%	25 80.6%	6 19.4%	18 58.1%	13 41.9%
Actual Non-Bank-rupt	6 19.4%	25 80.6%	4 16.1%	27 87.1%	7 32.6%	24 77.4%
Overall:	Accuracy 79.0%		Accuracy 83.9%		Accuracy 67.7%	

TABLE 9:   ACCURACY MATRIX 2 YEARS PRIOR TO BANKRUPTCY

	Logit Analysis		Discriminant		Altman's Z	
	P r e d i c t e d		**P r e d i c t e d**		**P r e d i c t e d**	
	Bankrupt	Non-Bankrupt	Bankrupt	Non-Bankrupt	Bankrupt	Non-Bankrupt
Actual Bank-rupt	34 81.0%	8 19.0%	32 76.2%	10 23.8%	24 57.1%	18 42.9%
Actual Non-Bank-rupt	12 28.6%	30 71.4%	10 26.2%	31 73.8%	3 7.1%	39 92.9%
Overall:	Accuracy 76.2%		Accuracy 75.0%		Accuracy 75.0%	

TABLE 10:   ACCURACY MATRIX 3 YEARS PRIOR TO BANKRUPTCY

	Logit Analysis		Discriminant		Altman's Z	
	P r e d i c t e d Bankrupt Non- Bankrupt		**P r e d i c t e d** Bankrupt Non- Bankrupt		**P r e d i c t e d** Bankrupt Non- Bankrupt	
Actual Bank- rupt	38 77.6%	11 22.4%	38 77.6%	11 22.4%	20 40.8%	29 59.2%
Actual Non- Bank- rupt	14 28.6%	35 71.4%	14 28.6%	35 71.4%	7 14.3%	42 85.7%
Overall:	Accuracy 74.5%		Accuracy 74.5%		Accuracy 63.3%	

TABLE 11:   ACCURACY MATRIX 4 YEARS PRIOR TO BANKRUPTCY

	Logit Analysis		Discriminant		Altman's Z	
	P r e d i c t e d Bankrupt Non- Bankrupt		**P r e d i c t e d** Bankrupt Non- Bankrupt		**P r e d i c t e d** Bankrupt Non- Bankrupt	
Actual Bank- rupt	38 74.5%	13 25.5%	40 78.4%	11 21.6%	21 41.2%	30 58.8%
Actual Non- Bank- rupt	17 33.3%	34 66.7%	16 31.4%	35 68.6%	4 7.8%	47 92.2%
Overall:	Accuracy 70.6%		Accuracy 73.5%		Accuracy 66.7%	

TABLE 12:   ACCURACY MATRIX 5 YEARS PRIOR TO BANKRUPTCY

	Logit Analysis		Discriminant		Altman's Z	
	P r e d i c t e d Bankrupt	Non-Bankrupt	P r e d i c t e d Bankrupt	Non-Bankrupt	P r e d i c t e d Bankrupt	Non-Bankrupt
Actual Bank-rupt	38 84.4%	7 15.6%	38 84.4%	7 15.6%	10 22.2%	35 77.8%
Actual Non-Bank-rupt	21 46.7%	24 53.3%	12 26.7%	33 73.3%	5 11.1%	40 88.9%
	Accuracy 68.9%		Accuracy 78.9%		Accuracy 55.6%	

Since the accuracy matrices contain a great deal of information, a summary has been provided in Tables 13, 14 and 15 below. Table 13 demonstrates that, overall, the use of the resource dependence model's variables results in a higher percentage of correct predictions than Altman's Z (i.e. the model differentiates survivors from failures more accurately). The predictive accuracy of the logit analysis is higher than Altman's Z in all five years of the study; discriminant analysis is higher than or equal to Altman's Z in all five years of the study.

Table 13 shows how each model predicts both survivors and failures, combined. Table 14 breaks out the accuracy of each model in predicting survivors. Table 15 breaks out the accuracy of each model in predicting failures.

TABLE 13: COMPARISON OF ACCURACY MATRICES FOR THE MODELS IN PREDICTING SURVIVORS AND FAILURES COMBINED

Predictive Accuracy	Years	In	Advance:		
	1	2	3	4	5
Logit	79.0%	76.2%	74.5%	70.6%	68.9%
Discriminant	83.9%	75.0%	74.5%	73.5%	78.9%
Z-Score	67.7%	75.0%	63.3%	66.7%	55.6%

With regard to how well the models do in predicting survival (Table 14, below), Altman's Z does a better job than the logit or discriminant analysis. If the Altman's Z score showed that a firm was likely to survive, we could be about 88% certain that the firm would survive (88% is the Z-Score average for predicting survival over five years). The logit and discriminant analysis are about 73% accurate at predicting survival (73% is the average for predicting failure over five years). For all but one year Altman's Z has a higher correct prediction rate than the logit or discriminant analysis.

TABLE 14: COMPARISON OF ACCURACY MATRICES FOR THE MODELS IN PREDICTING SURVIVAL ONLY

Predictive Accuracy	Years	In	Advance:		
	1	2	3	4	5
Logit	83.9%	71.4%	71.4%	67.7%	53.3%
Discriminant	87.1%	73.8%	71.4%	73.5%	73.3%
Z-Score	77.4%	92.9%	85.7%	92.2%	88.9%

With regard to how well the models do in predicting failure, the logit and discriminant analysis do a better job than Altman's Z

(please see Table 15, below). Thus, if the logit or discriminant analysis showed that a firm was likely to fail, we could be about 79% certain that the firm would fail (79% is the average for predicting failure over five years). Altman's Z is about 43% accurate at predicting failure (43% is the Z-Score average for predicting failure over five years). In all years logit or discriminant analysis has a higher correct prediction rate than the Altman's Z.

TABLE 15: COMPARISON OF ACCURACY MATRICES FOR THE MODELS IN PREDICTING FAILURE ONLY

Predictive Accuracy	Years	In	Advance:		
	1	2	3	4	5
Logit	74.2%	81.0%	77.6%	74.5%	84.4%
Discriminant	80.6%	76.2%	77.6%	78.5%	84.4%
Z-Score	58.1%	57.1%	40.8%	41.2%	22.2%

The high rate of accuracy for correctly predicting survival with Altman's Z is not desirable if one is most concerned about correctly predicting bankruptcy (as Altman was). This study, however, is concerned with both failure and survival. One of the goals of the study is to find out what leads to firm failure. The model's ability to accurately differentiate survivors and failures combined is much more useful in this study than would be the ability to correctly predict survivors only. How well the specific hypothesis concerning the predictive accuracy of the models performed is discussed below.

1. HYPOTHESIS 2A

Hypothesis 2A set the very minimum standard for prediction of correct classifications at better than random selection (50% success rate). Because both the logit and discriminant analysis models exceeded this miniminum standard, **Hypothesis 2A is accepted.**

2. HYPOTHESIS 2B

The Hypothesis 2B sets the minimum standard for prediction using this sample at the level which can be acheived using the financial indicator of bankruptcy — Altman's Z. Because logit analysis and discriminant analysis models met or exceeded the level of accuracy achieved by Altman's Z, **Hypothesis 2B is accepted.**

3. HYPOTHESIS 2C

Hypothesis 2C takes into account time interval and level of expected correct prediction. This hypothesis sets the standard at the levels achieved by Altman (1968, 1983) for the five years preceeding failure. That is, the models developed will (at a minimum) correctly classify future failures and survivors better than 70% of the time up to five years in advance. This standard is met in all but the fourth year before failure. Therefore, **Hypothesis 2C is accepted** for the discriminant analysis. The average predictive accuracy rate for the resource dependence model derived via the logit analysis is approximately 74% and only one year of the five failed to meet the 70% cutoff. Thus the logit analysis also helps to demonstrate that there

is some validity to the overall theoretic approach used here.

4.   HYPOTHESIS 2D

Like Hypothesis 2C, 2D takes into account the time interval and expected correct prediction. Hypothesis 2D sets the minimum standard at the average levels achieved by Altman (1968, 1983) and Zavgren (1985) in the three to five year range. Hypothesis 2D says that the models developed will (at a minimum) correctly classify future failures and survivors better than 75% of the time up three to five years in advance. This standard is met only in the fifth year before failure. Therefore, **Hypothesis 2D is rejected** (or more correctly, the null hypothesis is accepted because we cannot expect predictions as accurate as what Altman or Zavgren achieved in their previously cited studies).

5.   HYPOTHESIS 2E

Hypothesis 2E also takes into account the time interval and expected correct prediction. Hypothesis 2E sets the minimum standard as the correct classification of future failures and survivors at better than 80% of the time up to two years in advance. This 80% standard is approximately the maximum level achieved be Altman (1968, 1983) and Zavgren (1985) at the two year limit. This standard is met in the year before bankruptcy but not two years before the firm's failure, thus, **Hypothesis 2E is rejected** (or more correctly one would accept a null hypothesis which would state that we could not expect

predictions as accurate as what Altman, 1968, 1983, or Zavgren, 1985, achieved in their studies).

6. HYPOTHESIS 2F

Hypothesis 2F looks at the accuracy which may be achieved one year in advance of possible bankruptcy. Hypothesis 2F sets the minimum standard at the approximate maximum levels achieved by Altman (1968, 1983) and Zavgren (1985) at the one year limit. Hypothesis 2F says the models developed will (at a minimum) correctly classify future failures and survivors better than 85% of the time one year in advance. Because this standard was not met by either the discriminant or logit analysis, **Hypothesis 2F is rejected** (or more correctly one would accept a null hypothesis which would state that we could not expect predictions as accurate as what Altman, 1968, 1983, or Zavgren, 1985, achieved in their studies at the one year limit). However the high degree of accuracy (79% for logit and 84% for discriminant) indicate that there is some validity to the overall theoretic approach.

7. SUMMARY

The result of the hypotheses tests as they relate to the accuracy matrices are summarized in Table 16. The resource dependence model which has been employed here has a predictive accuracy better than or equal to Altman's Z in all five years. The the discriminant models predict better than 70% in all years (Hypothesis 2C) and the logit

model failed to meet the 70% in only one year. On average the logit
and discriminant models have a predictive accuracy of better than 75%.

TABLE 16:   RESULTS OF HYPOTHESES 2A THROUGH 2F SUMMARIZED

H y p o t h e s i s :	R e s u l t s :
Predictive Accuracy of the Model:	
2A Predicts 50%	**Accepted**
2B Predicts better than Altman	**Accepted**
2C Predicts 70%	**Accepted** (Discriminant only)
2D Predicts 75% 3-5 years prior	Rejected
2E Predicts 80% 1-2 years prior	Rejected
2F Predicts 85% 1 year prior	Rejected

C. RELATIVE POWER OF VARIABLES IN THE MODEL

To determine which variables were most important in discrimin-
atingsurvivors from failures a step-wise discriminant analysis was run
for each of the five years of the study (see Table 18 for details).
The standardized discriminant function coefficients for the variables
within each year were then compared. Table 17 below demonstrates the
relative importance of each each variable. The numbers in Table 17
represent the the relative power, in percentage terms, of the
variables in the discriminant analysis. A "+" next to the variable
indicates that the it is positively related to firm survival. A "-"

next to the variable indicates that the variable is negatively related to firm survival.

TABLE 17: RELATIVE POWER OF VARIABLES IN
THE DISCRIMINANT ANALYSIS MODELS

| | Years In Advance: | | | | |
	1	2	3	4	5
Select Environment					
Industry ROE	-63.3*				44.6'
Industry Growth			46.3	34.1	61.8*
Control Environment					
Rel. Market Share	46.7	28.6	93.4*		
Influence Providers					
Board Interlocks		49.4*	100.0*	100.0*	100.0*
% Outsiders				-82.7*	31.0'
Joint Ventures	26.9			40.8	
Firm Sales Size			58.5'		-51.5*
Buffering					
Diversification			-83.4'	-36.3	
Present Resources					
N.W. / T.A.	100.0*	100.0*	70.2'	90.5*	81.4*

' Significant Variable in the Logit Analysis beyond the .2 level
* Significant Variable in the Logit Analysis beyond the .1 level

So, for one year in advance of failure, the present resources a firm possesses is most important in discriminating survivors from failures. This is indicated by the number 100 in the first column, last figure in that column. The rest of the numbers in that column represent the power of the other variables relative to the most powerful explanatory variable, in this case, present resources. industry ROE is then only 63.3% as powerful as present resources in explaining why firms survive. In other words, industry ROE only explains about only about two thirds as much as present resources in a

model which predicts failure. Also, industry ROE in Year 1 is negatively related to the firm's likelihood of survival (meaning that the higher the industry ROE the less likely the firm will be to survive).

TABLE 18: DISCRIMINANT ESTIMATES

| | Years | | In | Advance: | |
	1	2	3	4	5
Constant	-1.172	-2.603*	-2.142	-0.006	-2.525*
Select Environment					
Industry ROE	-0.069*				0.055'
Industry Growth			0.687	0.501	1.362*
Control Environment					
Rel. Market Share	0.045	0.027	0.056*		
Influence Providers					
Board Interlocks		0.106*	0.142*	0.186*	0.204*
% Outsiders				-0.030*	0.012'
Joint Ventures	0.165			0.263	
Firm Sales Size			0.524'		-0.558*
Buffering					
Diversification			-1.440'	-0.753	
Present Resources					
N.W. / T.A.	0.043*	0.048*	0.017'	0.033*	0.039*
Chi Square	37.157	32.131	31.316	28.502	33.185
Wilks' Lambda	0.527	0.671	0.714	0.745	0.677

' Significant Variable in the Logit Analysis beyond the .2 level
* Significant Variable in the Logit Analysis beyond the .1 level

Table 18 contains the Wilks' lambda and chi-square statistics for the discriminant functions. The larger the Wilks' lambda the less discriminanting power is present (Klecka, 1976: 440-441). In the above analyses the chi-square statistic demonstrates that a Wilks'

lambda of this magnitude or smaller has a .0001 probability of occurring due to the chances of sampling. In other words, the likelihood of a discriminant function having this degree of power due to chance is less than .0001.

We now turn to the third research question, "Which variables contribute most significantly to reducing a corporation's likelihood of bankruptcy?" The results demonstrated in Tables 17 and 18 attempt to answer that question and provide the basis for discussion on the relative importance of each of the variables.

The straight resource dependency perspective is reflected by the concept that the current level of firm resources is the statistically significant variable possessing the highest degree of predictive power. Results for years one and two support this idea of current resources being the most important in differentiating survivors from failures. Current resources was also the second most important discriminating variable for years four and five.

The resource dependency perspective is also reflected in the relative importance of director interlocks. The firm's influence with resource providers as measured by director interlocks possesses the highest degree of predictive power in years three, four and five. Director interlocks are the second most important discriminating variable in year two.

There is some evidence to support the idea that diversification plays a role in firm survival. Three and four years prior to failure we find that more diversified firms have a higher likelihood of

surviving. In the fourth year prior to failure diversification is almost the most powerful explanatory variable. The fact that the relationship is not selected by the discriminant analysis in all years makes the significance of its role questionable. There may be some logical explanations for why diversification was employed by the discriminant analysis in only two years, but such discussion is best left until Chapter 5.

The environmental variables, industry ROE and industry growth were employed in the discriminant analysis in four of the five years under study. Industry ROE, was used by the analysis in two of the years. One year prior to potential failure industry ROE was negatively related to survival; five years prior to potential failure industry ROE was positively related to survival. Possible reasons for this peculiar switch are discussed in Chapter 5. The environmental variable, industry growth, was employed by the discriminant analysis three, four and five years prior to failure. In all three of those years the relationship between industry growth and survival was positive. Thus, the long term health of the company may depend on sustained industry growth. Possible reasons for the lack of a relationship between industry growth and survival in the two years prior to failure are discussed in Chapter 5.

Relative market share turns out to be a significant discriminator in the three years preceding failure. Three years prior to failure market share is the second most powerful explanatory variable. In years four and five relative market share is not selected by the

discriminant analysis. Thus, relative market share only plays a role as the firm gets closer to failure.

The number of joint ventures a firm is involved with was employed in the discriminant analysis in two years. The relationship between joint ventures and survival was positive but the relative discriminating power of the joint venture variable was low compared to other variables.

With regard to the remaining variables their contribution is inconsistent. Both firm sales size and percentage of outside directors are negatively related to survival in one year and positively related in another. Thus the relative value of these variables was questionable.

In conclusion, both interlocks or present level of resources seem to be the most important in discriminating future survivors from failures — depending on the year in question,. The firm's degree of diversification and the growth of the industries it does business in may also play a role in discriminating future survivors from failures.

D. COMPARISON OF DISCRIMINANT AND LOGIT ANALYSES

The first question which should be addressed in this section is, "Did the step-wise discriminant analysis select the approximate same set of variables as the logit analysis to differentiate survivors from failures?" Before looking further we should remember that the step-wise discriminant analysis keeps adding variables to the discriminant function until the point at which adding another variable would make

no significant contribution toward increasing the distance between the estimates of the failure and survival scores. In addition to a constant, the discriminant analysis selected an average of five variables to differentiate survivors from failures for each year of analysis. Table 17 lists the unstandardized discriminant functions which came out of these analyses. (Please see Appendix 10 for the standardized discriminant functions.)

The discriminant analysis employs all 13 variables which were significant at the .1 level in the logit analysis (these variables are marked with a * within Table 17). The discriminant analysis also employs twelve additional variables. Of these twelve additional variables five are significant at the .2 level in the logit analysis (these variables are marked with a ' within Table 17). Thus, out of the total of eighteen variables employed in the discriminant analysis, a total of eighteen of them are significant in the logit analysis. The variables selected are thus very similar for both logit and discriminant analyses.

With regard to the two most "important" variables in each year of the discriminant analysis, they are all significant in the logit analysis at the .1 level. The most "important" variables in each year of the discriminant analysis are all significant in the logit analysis at the .05 level. Thus, we can be fairly certain that the relative rankings of the variables selected are accurate.

With regard to accuracy, a second question must be asked, "To what extent do the logit and discriminant analyses agree in their

predictions?" For year one the logit and discriminant analyses agree in 91.9% of the cases. In years two, three, four, and five prior to potential failure the methods agree with each other in 96.4%, 98.0%, 91.2% and 87.8% of the cases, respectively. The results of the two methods are thus significantly the same and, overall, result in an average of 93.1% agreement between the two methods.

In conclusion, the above discussions demonstrate that the logit and discriminant analysis give essentially the same results. These results are also reliable when applied to other samples of firms.

E. RESULTS OF THE FACTOR ANALYSIS

Since the variables as stated above may correlate well with each other a factor analysis was performed. The results of the factor analyses are contained in Tables 19, 20, 21, 22 and 23 below.

TABLE 19: ROTATED FACTOR MATRIX FOR YEAR ONE:

		FACTORS		
VARIABLES:		1	2	3
Industry ROE:	IROS	-.30547	.67138	-.38778
Industry Growth:	FGRO	.32145	.54257	-.03496
Rel. Mkt. Share:	FRMS	.72121	.13616	.01030
Dir. Interlocks:	FDIL	.51839	.29638	-.28020
% Outside Dirs.:	FPOD	.11299	.77244	.19612
Joint Ventures:	FJVS	.03398	.17085	.73984
Sales Size:	FSZS	.89550	-.07758	-.04017
Diversification:	FDIV	-.26177	-.17937	.54422
Worth / Assets:	FWOA	.49869	.06666	-.40502
Eigenvalue		2.41317	1.38314	1.12012
% of Variance		26.813%	15.396%	12.446%

TABLE 20: ROTATED FACTOR MATRIX FOR YEAR TWO:

		——— F A C T O R S ———			
V A R I A B L E S :		**1**	**2**	**3**	**4**
Ind. ROE:	IROE	-.42922	.26460	.16670	.47325
Industry Growth:	IGRO	-.13662	.70838	.31827	.03732
Rel. Mkt. Share:	FRMS	.68323	-.18105	-.13724	.21758
Dir. Interlocks:	FDIL	.58671	.14071	.45981	.41058
% Outside Dirs.:	FPOD	.01319	-.00652	.88068	-.16046
Joint Ventures:	FJVS	.21353	.78257	-.29549	-.03326
Sales Size:	FSZS	.87123	.01885	.00882	-.20073
Diversification:	FDIV	-.62795	-.18865	-.09844	.13427
Worth / Assets:	FWOA	.00014	-.08143	-.20108	.80531
Eigenvalue		2.23145	1.42283	1.22195	1.06370
% of Variance		24.794%	15.809%	13.577%	11.819%

TABLE 21: ROTATED FACTOR MATRIX FOR YEAR THREE:

		——— F A C T O R S ———			
V A R I A B L E S :		**1**	**2**	**3**	**4**
Industry ROE:	IROE	.47409	-.03842	-.14244	.07683
Industry Growth:	IGRO	.04378	-.14640	-.05267	.52581
Rel. Mkt. Share:	FRMS	.22504	.87095	-.00255	.06652
Dir. Interlocks:	FDIL	-.38127	-.00772	.73999	.31631
% Outside Dirs.:	FPOD	-.06098	.02722	.86084	-.30979
Joint Ventures:	FJVS	-.29549	.47233	.02124	-.30810
Sales Size:	FSZS	-.65086	.53154	.05177	.18400
Diversification:	FDIV	.82662	.23305	.04445	.12128
Worth / Assets:	FWOA	.06089	.21098	-.00589	.82145
Eigenvalue		1.85120	1.46515	1.19452	1.11815
% of Variance		20.569%	16.279%	13.272%	12.424%

TABLE 22:   ROTATED FACTOR MATRIX FOR YEAR FOUR:

VARIABLES:		FACTORS 1	2	3	4	5
Industry ROE:	IROE	-.00324	.00919	-.09628	.87181	.06229
Industry Growth:	IGRO	.10764	.05779	.12967	.11444	.84043
Rel. Mkt. Share:	FRMS	-.08912	.83976	.21931	.13614	.11317
Dir. Interlocks:	FDIL	.65230	.20117	.37101	-.32345	-.09477
% Outside Dirs.:	FPOD	.72498	-.21797	.07184	.10764	.25952
Joint Ventures:	FJVS	-.06865	.01544	-.50488	-.40881	.52230
Sales Size:	FSZS	.42524	.74341	-.14329	-.23933	-.06140
Diversification:	FDIV	-.69031	-.28713	.22760	-.04941	.03742
Worth / Assets:	FWOA	-.01756	.08431	.85420	-.12993	.12723
Eigenvalue		2.06434	1.27887	1.12847	1.08648	1.03289
% of Variance		22.937%	14.210%	12.539%	12.072%	11.477%

TABLE 23:   ROTATED FACTOR MATRIX FOR YEAR FIVE:

VARIABLES:		FACTORS 1	2	3	4
Industry ROE:	IROE	-.08489	.86417	.05086	.09703
Industry Growth:	IGRO	.12735	-.09005	.79833	.27309
Rel. Mkt. Share:	FRMS	.40395	.66656	-.11213	-.14125
Dir. Interlocks:	FDIL	.70242	.25759	-.20271	.08770
% Outside Dirs.:	FPOD	.44168	.00197	.16133	-.70493
Joint Ventures:	FJVS	.32983	-.09405	-.68391	.35545
Sales Size:	FSZS	.84605	.17521	-.02941	-.02068
Diversification:	FDIV	-.74208	.16964	-.08989	-.02440
Worth / Assets:	FWOA	.28125	.02491	.19000	.66463
Eigenvalue		2.47355	1.27475	1.19569	1.13002
% of Variance		27.484%	14.164%	13.285%	12.556%

Tables 19, 20, 21, 22 and 23 represent the factor loadings after Orthogonal Rotation. Variamax Orthogonal Rotation was employed to

reduce the number of variables which load highly on each factor. By rotating the factor matrix, interpretation of the factor loadings is simplified. Within each table the largest factor loadings are highlighted in **boldface** type for ease of identification by the reader.

Table 24 summarizes the results found in Tables 19 through 23. According to Hypothesis 4A, there are five factors which were expected from these analyses; these five factors are labeled as Environmental Selection, Environmental Control, Influence with Providers, Buffering and Present Resources. Shown within the table are the varibles which loaded most heavily on each factor for each year. By analyzing the results shown on this table we can evaluate Hypotheses 3A through 3F. Hypothesis 3A lists expected factors, while Hypotheses 3B through 3F discuss the expected factor loadings.

1.   HYPOTHESIS 3A

According to Hypothesis 3A, five factors were expected from the factor analyses. These factors have been labeled: (1) environmental selection: (2) environmental control; (3) influence with resource providers; (4) buffering and; (5) present level of resources. Table 25 shows that in all years there is present a factor which may be interpreted as influence with resource providers. In three out of the five years there are factors which may be interpreted as environmental selection, environmental control and present level of resources. In two out of the five years there is a factor which may be interpreted as buffering.Since four of the expected factors appeared in four or

more years **Hypothesis 3A is accepted** with the qualification that buffering did not consistently occur as a separate factor.

TABLE 24: SUMMARY OF ROTATED FACTOR MATRICES:

FACTORS:	YEAR 1	2	3	4	5
Environmental Selection	IROE IGRO FPOD	IGRO FJVS		IROE* IGRO*	IGRO FJVS
Environmental Control		FRMS FSZS FDIV	FRMS FSZS	FRMS FSZS	FRMS IROE
Influence with Providers	FDIL FSZS FRMS	FPOD	FDIL FPOD	FDIL FSZS FDIV	FDIL FSZS FDIV
Buffering	FDIV FJVS		FDIV FSZS		
Present Resources		FWOA	FWOA FGRO	FWOA FJVS	FWOA FPOD

* Growth and ROE load highly on seperate factors in year 4.

Underlying factors could not be found which remained stable for all years since the factor loadings shift over time (attempts to find factors which were common across all years resulted in severe multicollinearity problems for certain years). This means that the factors which lead to failure are different depending upon the time horizon. If failure could be considered a disease, we could say that its symptoms change over time as the patient's condition becomes

more critical. The implication here may be that it is better to view failure as a disease with symptoms changing over time. Since four of the expected factors appeared in four or more years **Hypothesis 3A is accepted** with the qualification that buffering did not consistently occur as a separate factor.

2. HYPOTHESIS 3B

Hypothesis 3B stated that the factor analysis would reveal an environmental factor that would load heavily on the firm's average industry ROE and average five year industry growth rate. In four of the five years growth loaded highly on a factor which could be considered an environmental factor. Based on the results of the factor analyses, **Hypothesis 3B is accepted.**

3. HYPOTHESIS 3C

Hypothesis 3C stated that the factor analysis would reveal an environmental buffering factor that would load heavily on the extent to which a firm is diversified. This expected factor only occurred in two of the five years. In two years firm diversification loaded heavily on the influence factor. Thus, diversified companies may be able to wield influence over others due to the lack of dependence on any one industry. Based on the results of the factor analyses, **Hypothesis 3C is rejected.**

4. HYPOTHESIS 3D

Hypothesis 3D stated that the factor analysis would reveal an environmental control factor that would load heavily on the firm's average relative market share. In four of the five years this hypothesis held true. In years three and four the firm's average relative market share loaded most heavily on one particular factor. In years two, three and four, firm relative market share and firm size were the main variables in the factor. The combination of firm relative market share and firm size seems intuitive. We would expect that high relative market share firms would be larger. It should also come as no surprise that diversity is part of the factor in year two. Firms which possess high relative market shares may, due to antitrust laws, need to diversify if they wish to grow. In year five, firm relative market share and industry ROE were the main variables in one factor. However, industry ROE loads more heavily than firm relative market share on the factor in those years. This could be interpreted to mean that the factor is a second environmental dimension. Based on the above discussion **Hypothesis 3D is accepted.**

5. HYPOTHESIS 3E

Hypothesis 3E stated that the factor analysis would reveal an influence with resource providers factor that would load heavily on the firm's number of director interlocks, percent of outside directors, number of joint ventures and sales size. This factor was

present in all five years of the study. Both number of director interlocks, percentage of outside directors and sales size loaded frequently on to this factor. The joint venture variable did not load onto this factor (or consistently onto any other factor). In two years firm diversification loaded heavily. on this factor. Possibly, diversified companies are able to wield influence over others due to the lack of dependence on any one industry. Thus, based on the results of the factor analyses, **Hypothesis 3E is accepted** with the qualification that the percentage of joint ventures was not a part of this factor and diversification played some role.

6. HYPOTHESIS 3F

Hypothesis 3E stated that the factor analysis would reveal a present level of resources factor that would load heavily on the firm's percentage of net worth over total assets. In four of the five years this hypothesis was found to be true. In one of those years the firm's percentage of outside directors also loaded heavily onto this factor. Given the direction of the relationship, one possible explanation is that the firm uses inside directors' positions as a resource to be granted to outsiders if the need arises. For example, if a firm needs capital and the bank will only lend if they can place someone on the board, the firm that has many insiders can eliminate one of the insiders and give the position to an outsider.

Joint ventures was also included in the factor in one year. Given the direction of the relationship, a reasonable explanation is

that a firm with a higher net worth is less likely need to involve itself in a joint venture. Thus this factor may be seen in some ways as a broad definition for resources the firm possesses. Thus, based on the results of the factor analyses, **Hypothesis 3F is accepted.**

7. SUMMARY

Table 25 summarizes the results of Hypotheses 3A through 3F. For the most part the table confirms that the expected factors are present. This tends to validate the resource dependence view as conceptualized within this research. However, the true importance of the factors lay in how well they can serve in a predictive model. This issue is discussed in the next section.

TABLE 25:   RESULTS OF HYPOTHESES 3A THROUGH 3F SUMMARIZED

H y p o t h e s i s :	R e s u l t s :
Existence of Factors:	
3A Five factors listed below found	**Accepted** (except buffering)
3B Environment = f(IROE+IGRO)	**Accepted**
3C Buffering = f(FDIV)	Rejected
3D Environmental Control = f(FRMS)	**Accepted**
3E Influence = f(FDIL+FPOD+FSZS+FJVS)	**Accepted** (less FJVS; + FDIV)
3F Present Resources = f(FWOA)	**Accepted**

F.   THE SIGNIFICANCE OF FACTORS AS PREDICTORS IN THE MODEL

Table 26 shows the estimates which were developed by the logit analysis (the statistical significance of each factor is included in parentheses). The three most pronounced items found in these results

are (1) present resources (loading heavily on net worth over total assets) is a statistically significant factor in years two through five at a fairly high level of significance; (2) environmental control (loading heavily on relative market share) is also a statistically significant factor in years two through five and; (3) influence with resource providers (loading heavily on board interlocks and size) is important at a low level of significance (.2) in year three and at a fairly high level of significance (.05) in years one and five. How well each of the factors aid us in discriminating potential failures from survivors is detailed in Hypotheses 4A through 4G.

1. HYPOTHESIS 4A

Hypothesis 4A stated that the firm's environment would be a statistically significant factor in discriminating failed firms from non-failed firms and that failed firms would be found to operate in less desirable (low profit and growth industries) than non-failed firms. While it was generally true that failed firms operated in less desirable industries than non-failed firms the difference was not significant; thus, **Hypothesis 4A is rejected.**

2. HYPOTHESIS 4B

Hypothesis 4B dealt with the firm's environmental buffering (i.e level of diversification). Environmental buffering was highly significant in year three and somewhat significant in year five. Since the factor did not appear as a separate factor in the majority

of years **Hypothesis 4B is rejected.**

TABLE 26: LOGIT ESTIMATES BASED ON INITIAL FACTOR ANALYSIS

	Years In Advance:				
	1	2	3	4	5
Constant	0.1495 (.75)	0.0704 (.86)	0.0361 (.92)	0.0158 (.96)	0.0119 (.97)
Select Environment	0.0751 (.88)	0.0411 (.92)		-0.4566* (.09)	0.3389 (.32)
				0.7951 (.45)	
Control Environment		0.8740 (.06)	0.6711 (.06)	0.5249 (.06)	0.4732 (.17)
Influence Providers	1.7403 (.01)	0.0934 (.86)	0.4927 (.18)	0.2316 (.36)	0.5910 (.10)
Buffering	-0.2906 (.50)		-0.8000 (.04)		0.4582 (.20)
Present Resources		2.4848 (.01)	0.7951 (.03)	0.6133 (.02)	0.5932 (.09)

* The first environment factor listed for year 4 loads highly on
  industry ROE, the second loads highly on industry growth.

3. HYPOTHESIS 4C

Hypothesis 4C stated that the extent of the firm's environmental control would be a statistically significant factor in discriminating failed from non-failed firms and failed firms would be found to have less environmental control (relative market share) than non-failed firms. Environmental control (loading heavily on relative market

share) was a statistically significant factor for years two through five. Some of the results (particularly in the years where the results were most significant) may be due to the fact that the environmental control factor loaded highly on the size variable. Consequently, **Hypothesis 4C** **is accepted** with the qualification that the part of the result may also be caused by firm size.

4. HYPOTHESIS 4D

Hypothesis 4D stated that the firm's influence with resource providers would be a statistically significant factor in discriminating failed from non-failed firms and that failed firms would be found to have less influence with external parties (via interlocks and size) than non-failed firms. In year three this factor was found to be important in discriminating failed from non-failed firms at a low level of significance (beyond .2). In years one and five this factor was found to be important in discriminating failed from non-failed firms at a fairly high level of significance (.05). Therefore, based on the results of the logit analyses, **Hypothesis 4D is accepted.**

5. HYPOTHESIS 4E

Hypothesis 4E stated that the firm's present level of resources would be a statistically significant factor in discriminating failed from non-failed firms and that failed firms would be found to possess fewer resources than non-failed firms. Present resources (loading heavily on net.worth over total assets) is a statistically significant

factor in years two through five and thus, **Hypothesis 4E is accepted.**

6. SUMMARY

Table 27 presents a review of the results of the hypothesis tests which relate to the logit analysis. Table 27 shows the relationship between the factor indicated and the firm's likelihood of survival. Significance levels beyond .2 are shown on the table and all significance levels beyond .1 are shown in **bold** type.

TABLE 27: SUMMARY OF RESULTS FOR HYPOTHESES 4A THROUGH 4E WITH LOGIT SIGNIFICANCE LEVELS

H y p o t h e s i s	Results	Years In Advance 1	2	3	4	5
Significance as a Discriminator						
4A Environmental Selection	Rejected				**.09**	
4B Environmental Buffering	Rejected			**.04**		.20
4C Environmental Control	**Accepted**		**.06**	**.06**	**.06**	.17
4D Influence with Providers	**Accepted**	**.08**		.18		.10
4E Firm's Present Resources	**Accepted**		**.01**	**.03**	**.02**	**.09**

G. THE PREDICTIVE ACCURACY OF THE FACTORIAL MODEL

How well do models constructed out of these factors predict failure and survival? Tables 28, 29, 30, 31 and 32 display the accuracy matrices for the logit and discriminant analysis using the above factors, using the above factors as well as Altman's Z, for

years one through five respectively.

TABLE 28:   FACTOR ANALYZED ACCURACY MATRIX 1 YEAR
PRIOR TO POTENTIAL BANKRUPTCY

	Logit Analysis		Discriminant		Altman's Z	
	P r e d i c t e d Bankrupt Non-Bankrupt		**P r e d i c t e d** Bankrupt Non-Bankrupt		**P r e d i c t e d** Bankrupt Non-Bankrupt	
Actual Bank-rupt	26 83.9%	5 12.9%	27 87.1%	4 12.9%	18 58.1%	13 41.9%
Actual Non-Bank-rupt	9 29.0%	22 71.0%	10 32.3%	21 67.7%	7 32.6%	24 77.4%
Overall:	Accuracy 77.4%		Accuracy 77.4%		Accuracy 67.7%	

TABLE 29:   FACTOR ANALYZED ACCURACY MATRIX 2 YEARS
PRIOR TO POTENTIAL BANKRUPTCY

	Logit Analysis		Discriminant		Altman's Z	
	P r e d i c t e d Bankrupt Non-Bankrupt		**P r e d i c t e d** Bankrupt Non-Bankrupt		**P r e d i c t e d** Bankrupt Non-Bankrupt	
Actual Bank-rupt	32 76.2%	10 23.8%	32 76.2%	10 23.8%	24 57.1%	18 42.9%
Actual Non-Bank-rupt	11 73.8%	31 26.2%	12 28.6%	30 71.4%	3 7.1%	39 92.9%
Overall:	Accuracy 75.0%		Accuracy 73.8%		Accuracy 75.0%	

TABLE 30: FACTOR ANALYZED ACCURACY MATRIX 3 YEARS
PRIOR TO POTENTIAL BANKRUPTCY

	Logit Analysis		Discriminant		Altman's Z	
	P r e d i c t e d		**P r e d i c t e d**		**P r e d i c t e d**	
	Bankrupt	Non-Bankrupt	Bankrupt	Non-Bankrupt	Bankrupt	Non-Bankrupt
Actual Bank-rupt	35 71.4%	14 28.6%	35 71.4%	14 28.6%	20 40.8%	29 59.2%
Actual Non-Bank-rupt	14 28.6%	35 71.4%	15 30.6%	34 69.4%	7 14.3%	42 85.7%
Overall:	Accuracy 71.4%		Accuracy 70.4%		Accuracy 63.3%	

TABLE 31: FACTOR ANALYZED ACCURACY MATRIX 4 YEARS
PRIOR TO POTENTIAL BANKRUPTCY

	Logit Analysis		Discriminant		Altman's Z	
	P r e d i c t e d		**P r e d i c t e d**		**P r e d i c t e d**	
	Bankrupt	Non-Bankrupt	Bankrupt	Non-Bankrupt	Bankrupt	Non-Bankrupt
Actual Bank-rupt	38 74.5%	13 25.5%	34 66.7%	17 33.3%	21 41.2%	30 58.8%
Actual Non-Bank-rupt	19 37.2%	32 62.8%	17 33.3%	34 66.7%	4 7.8%	47 92.2%
Overall:	Accuracy 68.6%		Accuracy 66.7%		Accuracy 66.7%	

TABLE 32: FACTOR ANALYZED ACCURACY MATRIX 5 YEARS
PRIOR TO POTENTIAL BANKRUPTCY

	Logit Analysis		Discriminant		Altman's Z	
	P r e d i c t e d Bankrupt Non- Bankrupt		**P r e d i c t e d** Bankrupt Non- Bankrupt		**P r e d i c t e d** Bankrupt Non- Bankrupt	
Actual Bank- rupt	31 68.9%	14 21.1%	31 68.9%	14 31.1%	10 22.2%	35 77.8%
Actual Non- Bank- rupt	14 21.1%	31 68.9%	12 31.1%	31 68.9%	5 11.1%	40 88.9%
Overall:	Accuracy 68.9%		Accuracy 68.9%		Accuracy 55.6%	

Since the Accuracy Matrices contain a great deal of information they have been summarized in Tables 33, 34 and 35 below. Table 35 shows that the use of factors previously mentioned generally, result in a higher percentage of correct predictions than Altman's Z (i.e. the model differentiates survivors from failures more accurately). Logit and discriminant analyses employing the factor analysis scores have higher overall predictive accuracy in four out of five years.

Table 33 shows how each model predicts both survivors and failures, combined. Table 34 breaks out the accuracy of each model in predicting survivors only. Table 35 breaks out the accuracy of each model in predicting failures only.

TABLE 33: COMPARISON OF ACCURACY MATRICES FOR THE FACTOR MODELS
IN PREDICTING SURVIVAL AND FAILURE COMBINED

	Years In Advance:				
	1	2	3	4	5
% Correct: Logit	77.4%	75.0%	71.4%	68.6%	68.9%
% Correct: Discriminant	77.4%	73.8%	70.4%	66.7%	68.9%
% Correct: Z-Score	67.7%	75.0%	63.3%	66.7%	55.6%

With regard to how well the models do in predicting survival, (Table 35, below) Altman's Z does a better job than the logit or discriminant analysis . If the Altman's Z score showed that a firm was likely to survive, we could be about 88% certain that the firm would survive (88% is the Z-Score average for predicting survival over five years). The logit and discriminant analysis are about 69% accurate at predicting survival (69% is the average for predicting failure over five years). In all years Altman's Z has a higher correct prediction rate than the logit or discriminant analysis.

TABLE 34: COMPARISON OF ACCURACY MATRICES FOR THE FACTOR MODELS
IN PREDICTING SURVIVAL ONLY

	Years In Advance:				
	1	2	3	4	5
% Correct: Logit	71.0%	73.8%	71.4%	62.8%	68.9%
% Correct: Discriminant	67.7%	71.4%	71.4%	66.7%	68.9%
% Correct: Z-Score	77.4%	92.9%	85.7%	92.2%	88.9%

With regard to how well the models do in predicting failure (Table 35, below), the logit and discriminant analysis do a better job

than Altman's Z. Thus, if the logit or discriminant analysis showed that a firm was likely to fail, we could be about 74% certain that the firm would fail (74% is the average for predicting failure over five years). Altman's Z is about 43% accurate at predicting failure (43% is the Z-Score average for predicting failure over five years). In all years the logit and discriminant analysis have a higher correct prediction rate than the Altman's Z.

TABLE 35: COMPARISON OF ACCURACY MATRICES FOR THE FACTOR MODELS MODELS IN PREDICTING FAILURE ONLY

| | Years In Advance: | | | | |
	1	2	3	4	5
% Correct: Logit	83.9%	76.2%	71.4%	74.5%	68.9%
% Correct: Discriminant	87.1%	73.8%	71.4%	66.7%	68.9%
% Correct: Z-Score	58.1%	57.1%	40.8%	41.2%	22.2%

The high rate of accuracy for correctly predicting survival with Altman's Z is not desirable if one is most concerned about correctly predicting bankruptcy (as Altman was). This study, however, is concerned with both failure and survival. Again, one of the goals of the study is to find out what leads to firm failure. Thus, the fact that the model accurately differentiates survivors from failure well overall and that it can spot failures is of greater use in this study than would be the ability to correctly predict survivors. Turning now to the specific hypothesis regarding the predictive accuracy of the models, how well did the models perform?

1. **HYPOTHESIS 5A**

Hypothesis 5A set the very minimum standard for prediction for correct classifications at better than random selection (50% success rate). Both the logit and discriminant analysis models exceeded this miniminum standard and so **Hypothesis 5A is accepted.**

2. **HYPOTHESIS 5B**

The Hypothesis 5B sets the minimum standard for prediction using this sample at the level which can be acheived using the financial indicator of bankruptcy, Altman's Z. Logit analysis models met or exceeded the level of accuracy achieved by Altman's Z in all five years. Discriminant analysis met or exceeded the level of accuracy achieved by Altman's Z in four out of the five years. On average the logit and discriminant analysis models exceed the overall accuracy of Altman's Z. Due to the lack of predictive accuracy in some years, **Hypothesis 5B is rejected,** with the strong reservation that four of the five years met the standard and, overall, the average predictive accuracy of the logit and discriminant analysis models exceed the overall accuracy of Altman's Z.

3. **HYPOTHESIS 5C**

Hypothesis 5C takes into account time interval and level of expected correct prediction. This hypothesis sets the standard at the levels achieved by Altman (1968, 1983) for the five years preceeding

failure; that is, that models developed will (at a minimum) correctly classify future failures and survivors better than 70% of the time up to five years in advance. This standard was met in three out of the five years and the average predictive accuracy rate for this model was about 72%. Therefore, **Hypothesis 5C is rejected**, with reservations due to the average predictive accuracy rate exceeding 70%.

4. HYPOTHESIS 5D

Like 5C, Hypothesis 5D takes into account the time interval and expected correct prediction. Hypothesis 5D sets the minimum standard at the average levels achieved by Altman (1968, 1983) and Zavgren (1985) in the three to five year range. Hypothesis 5D says the models developed will (at a minimum) correctly classify future failures and survivors better than 75% of the time three to five years in advance. This standard was only met in the year prior to failure. Therefore, **Hypothesis 5D is rejected**.

5. HYPOTHESIS 5E

The Hypothesis 5E also takes into account the time interval and expected correct prediction. Hypothesis 5E sets the minimum standard for correct classification of future failures and survivors at better than 80% of the time up to two years in advance. This 80% standard is the approximate maximum level achieved by Altman (1968, 1983) and Zavgren (1985) at the two year limit. This standard was not met in either in either year. Thus, **Hypothesis 5D is rejected**.

6. HYPOTHESIS 5F

Hypothesis 5F looks at the accuracy which may be achieved one year in advance of possible bankruptcy. Hypothesis 5F sets the minimum standard at the approximate maximum levels achieved be Altman (1968, 1983) and Zavgren (1985) at the one year limit. Hypothesis 5F says the models developed will (at a minimum) correctly classify future failures and survivors better than 85% of the time one year in advance. This standard was not met by either the logit or the discriminant analysis. Therefore **Hypothesis 5F is rejected.**

TABLE 36:   RESULTS OF HYPOTHESES 5A THROUGH 5F SUMMARIZED

H y p o t h e s i s :	R e s u l t s :
Accuracy of the Factor Analyzed Model:	
5A Predicts 50%	Accepted
5B Predicts better than Altman	Rejected (equal to Altman)
5C Predicts 70% for all years	Rejected (with exceptions)
5D Predicts 75% for 3-5 years	Rejected
5E Predicts 80% for 1-2 years	Rejected
5F Predicts 85% for 1 year	Rejected

7. SUMMARY

The results of the hypothesis tests related to the accuracy matrices developed from the factor analysis are summarized in Table 36. The resource dependence model which has been employed here has a predictive accuracy which exceeded Altman's Z in four out of five years and was on average a better predictor than Altman's Z. Although

the models do not predict better than 70% in all years (Hypothesis 2C) they do, on average, have a predictive accuracy of better than 72%.

H.   RELATIVE POWER OF FACTORS IN THE MODEL

To test which variables were most important in discriminating survivors from failures a step-wise discriminant analysis was run for each of the five years of the study (please see Table 38 for details). The standardized discriminant function coefficients for the variables within each year were then compared. Table 37 below demonstrates the relative importance of each variable. The numbers in Table 37 represent the the relative power, in percentage terms, of the variables in the discriminant analysis. The sign indicates the direction of the variable's relationship to firm survival. For example, two years in advance of failure, the resources a firm possesses is most important in discriminating survivors from failures. This is indicated by the number 100 in the second column. The other number in that column represents the power of the other factor relative to the most powerful explanatory factor or,in this case, the degree of environmental control. Influencing resource providers is then only 55.4% as powerful as environmental control (i.e. resource providers only explain about half as much as environmental control in a model which predicts failure).

The results demonstrated in Table 37 allow one to address the question, "Which variables contribute most significantly to reducing a corporation's likelihood of bankruptcy; is corporate diversification

strategy, industry selection, industry control or resource provider control most important?" This question is more fully addressed in the discussion to follow.

TABLE 37: RELATIVE POWER OF THE FACTORS IN THE DISCRIMINANT ANALYSIS MODELS

	Years	In	Advance:		
	1	2	3	4	5
Select Environment				-72.6*	57.4
Control Environment		55.4*	80.7*	82.8*	78.5'
Influence Providers	100.0*		59.0'	39.1	96.3*
Buffering			-94.8*		
Present Resources		100.0*	100.0*	100.0*	100.0*

' Significant Variable in the Logit Analysis beyond the .2 level
* Significant Variable in the Logit Analysis beyond the .1 level

Year 4 environment factor loads highly on industry ROE only, yr. 5 environment factor loads highly on growth and joint ventures.

We find that years two, three, four and five support the idea that current resources are most important in differentiating survivors from failures. The firm's control of its environment and its influence with resource providers were second in importance. Both factors played some role in the analyses in four of the five years studied. Resource provider influence is the most important factor in the discriminant analysis one year prior to failure. Resource provider influence is almost the most important factor five years

prior to failure (present level of resources in year five is only four percent more powerful). The environmental control factor was consistently ranked high by the discriminant analysis. In years three, four and five environmental control was approximately 80% as important as the most powerful explanatory factor in differentiating survivors from failures.

TABLE 38: DISCRIMINANT ESTIMATES OF THE FACTORS

| | Years In Advance: | | | | |
	1	2	3	4	5
Select Environment				-0.506*	
Control Environment			0.541*	0.580*	0.442
Influence Providers	1.180'	0.529*	0.390'	0.269	0.524'
Buffering			-0.644*		
Present Resources		1.057*	0.683*	0.231*	0.829*
Chi Square	20.689	27.987	27.443	16.196	33.185
Wilks' Lambda	0.706	0.708	0.747	0.848	0.677

Constants in the discriminant analysis are less than 1×10^{-14}
' Significant Variable in the Logit Analysis beyond the .2 level
* Significant Variable in the Logit Analysis beyond the .1 level

Year 4 environment factor loads highly on industry ROE only, yr. 5 environment factor loads highly on growth and joint ventures.

Environmental buffering played a strong role in the analysis in the third year prior to failure. The relationship in year three was

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also in the expected direction. Year three, however, was the only year in which this factor had any role in differentiating survivors from failures. Environmental selection played an inconsistent and minor role in the analyses.

Table 38 contains the Wilks' lambda and chi-square statistics for the discriminant functions. The larger the Wilks' lambda the less discriminanting power is present (Klecka, 1976: 440-441). In the above analyses the chi-square statistic demonstrates that a Wilks' lambda of this magnitude or smaller has a .005 probability of occurring due to the chances of sampling. In other words, the likelihood of a discriminant function having this degree of power due to chance is less than .005.

Over the five years the discriminant analysis selected a total of fifteen factors. Eleven of these factors were significant in the logit analysis at the .1 level and two factors were significant at the .2 level. Thus, the results of the logit and discriminant analyses have a fairly high degree of agreement.

I. SUMMARY

This chapter has covered a great deal of ground, and I will not inflict further pain upon the reader by attempting to review the chapter in detail. There are, however, several important results which should be reviewed here.

First, director interlocks was found to relate positively to survival except within two years prior to potential failure. Under

the factor analyzed version of the model the results were not as strong but were still significant in at least two years under study.

Second, the present level of resources a firm possesses is positively related to the firm's chance of survival. This was true for both the factor analyzed version and for direct use of the variable net worth over total assets.

Lastly, size is positively related to the firm's likelihood of survival. When looking at the role size plays in the firm's likelihood of survival. The concept should not be limited to financial indicators, like assets or sales. Both relative market share and director interlocks were found to be related to size and to play an important role in aiding the firm's chances for survival. As was suggested in the literature review, size and interlocks may aid the firm by enabling it to influence resource providers (or, at least, to avoid being influenced by such providers).

CHAPTER FIVE

CONCLUSIONS AND IMPLICATIONS

This chapter will present a summary of the research, a discussion of the findings, the conclusions and implications of the study, and those items which should be addressed in future research.

A. SUMMARY OF THE RESEARCH

The study of survival is important because survival is a critical concern for all organizations. All too often, however, **failure** is the accomplished end product of management's efforts.

This research began by asking "what is survival and failure?" Resource dependence theory answers that question by explaining how organizations fail: when firms do not possess sufficient resources to continue payments demanded by critical coalitions they die. The organization in order to protect itself (from coalitions who wish to extract payments for past support) files a bankruptcy petition. The organ-ization thus fails.

The main questions this research attempted to address were (1) can an accurate predictive model of bankruptcy be constructed using dependency theory, and (2) which factors contribute most significantly to reducing a corporation's likelihood of failure? Utilizing a list of about 300 publicly-traded failed and non-failed firms the above questions were studied. Data from various secondary sources were employed in a model which measured (1) the profitability and growth in a firm's domains of activity; (2) the firm's degree of industry control; (3) the firm's influence of critical resource providers; (4)

the extent of the firm's buffering of external influences via diversification; and (5) the firm's present level of resources. A logit analysis and a step-wise discriminant analysis was used to test the model. A factor analysis was employed to remove the effects of correlations between variables, and tests were performed on resulting factors to see how they affected the firm's likelihood of failure.

B. DISCUSSION OF THE RESEARCH FINDINGS

The logit analysis demonstrated that the present level of resources a firm possesses and the firm's control of resource providers (via the number of board interlocks adjusted for size) is almost always a statistically significant variable in differentiating survivors from failures (in all years except Year 1). What this tells us is that one way managers can better insure the organization's continued existence is through the manipulation of the firm's political relationships with other firms the organization. So, while it's important to have the resources at your disposal it is also important to influence resource providers (in this case, through board interlocks).

With regard to the variables which were covered in the discriminant analysis there are three things to note. First, domain selection variables — profitability or growth — were almost always employed by the analysis. Thus the environment management chooses can have some affect on the firm's ability to survive. This lends support to the population ecology viewpoint. However, the direction of the

environment-survival relationship is not stable, and more research should be done before any definitive comments can be made (see the discussion section below). Second, the present level of resources always plays a role in determining the firm's failure likelihood — particularly within two years of bankruptcy. Third, in the period three to five years prior to failure director interlocks are most important. This tends to confirm what was previously stated about the importance to the firm of manipulating the relationship it has with other firms.

On average, the models developed can correctly discriminate firms which will survive from those which will fail about 74% of the time. By comparison, Altman's Z predicts about an average of 65% correctly. This model is a fairly decent improvement over Altman. In addition, the models are approximately 85% accurate in discriminating survivors from failures 1 year in advance of a potential bankruptcy.

Some hypotheses were clearly rejected and others were clearly accepted. Still other hypotheses were accepted or rejected with qualifications. Although some hypotheses have been rejected the results of the analysis raise interesting issues which are commented on below.

1.   COMMENTS ON HYPOTHESIS 1A

As was stated in Chapter 4, industry profitability and survival demonstrate some significant relationship, but the relationship is not uniform across all years. Five years in advance of possible failure

we find there is a positive relationship between survival and industry profitability. Yet within one year prior to potential failure, there is a negative relationship (i.e. the more profitable the industry the lesser the firm's chance of survival). It is tempting to explain these observations by claiming that firm profit is unrelated to industry profit, but according to Lieberson and O'Conner (1972) the two should be related. Apparently, when it comes to potentially bankrupt firms the industry-firm profitability relationship may not hold. It may be that other factors, such as management skill, can give us better clues as to the firm's likelihood of survival. Why then does industry profitability seem to play an important role in our analysis, particularly in an unexpected direction in year one?

There are several possible explanations for the observed relationship in year one. First, it may be that these industries, though profitable, are also very competive. Thus the industry may attract such intensive competition that it is difficult for weaker firms to stay in business. Along the same lines, low profit industries provide great stability for the firms which are able to remain in them since they are less likely to attract competitors; thus providing firms in low profit industries with a kinder, gentler environment in which to do business. However, just as high profit industries with intense competition are not likely to remain profitable for long, likewise low profit industries are not likely to be stable for long. Price stability, in particular, is difficult to maintain among marginal producers.

A second possible explanation may be that the results are the end product of weak firm's attempts to diversify into more profitable or faster growing industries. After the firm moves into these more profitable industries it may still not be able to compete and then must declare bankruptcy. However, in order for that to hold true, evidence would have to confirm that the more diversified firms were, the more likely they are to go bankrupt.

Before looking for such confirmatory data it is necessary to gain a better understanding of the diversification measure. The diversification measure creates a figure between .001 and 1. The firms which score toward a .001 are highly diversified and the firms which score a 1 are single business organizations. Thus, when the logit analysis in year one shows a negative relationship between the diversification measure and survival it means the lower the diversification measure the more likely the firm is to survive. The lower the diversification measure the more the firm is diversified. Therefore, the logit analysis in years one through four shows that the more diversified firms are more likely to survive. Thus, the expected confirmatory evidence that more diversified firms are less likely to survive is not present to support this alternate explanation of the profit-survival relationship.

There is a final, more likely possibility to explain the negative relationship between industry profitability and survival. A firm may not be changing the number of industries in which it does business but rather it is changing the selection of industries in which it does

business. In other words these firms are no more diversified than previously but are attempting to move into different industries. (For example a firm may go from being $\frac{1}{2}$ iron foundry plus $\frac{1}{2}$ heavy equipment manufacturer to being $\frac{1}{2}$ robotics plus $\frac{1}{2}$ machinery manufacturer. The firm is still only in two industries but the particular industries are very different from the firm's original businesses.) This means that weak firms may be attempting to involve themselves in profitable industries, yet do not consider their own abilities to compete in the industry (i.e. there is a poor fit between the firm's capabilities and the demands for industry survival). Thus the firm in the profitable industry fails because it does not have proper resources, such as human resources (eg. trained technical staff), physical plant (eg. sufficent R & D facilities), etc. to compete effectively in the type of industry in which the firm is attempting to enter.

This explanation agrees with the resource dependency theory in that it argues that one needs to study resources which will enable a firm to survive in a particular environment. This explanation also supports the recent study by Moulton and Thomas (1988) which argues, in part, for the importance of fit between environment and firm resources to insure the survival of the organization. Lastly, this explanation suggests additional research to test if failing organizations do, in fact, attempt to move into more profitable industries without the proper wherewithal (such the proper structure and strategy for their industry) to do so. Such research, however, is beyond the scope of this particular study.

In Chapter 4 it was concluded that Hypothesis 1A could not be supported due to the instability of the relationship over time. Industry profitability, in and of itself, is not what may be important in advancing a firm's survivability. However, the strength of the firm when entering the industry, the fit between the firm's talents and industry's requirements for survival, or the level of competition within the industry may be more important in determining survival than the simple profitability of the industry.

2. COMMENTS ON HYPOTHESIS 1B

With regard to industry growth rate and survival some significant relationship was found in the logit analysis five years prior to potential failure. Coupled with the fact that industry ROE also plays a part in survival in the fifth year, one may be able to say that firms in profitable, growing industries are more likely to survive. However, the fact that the relationship exists only in one year was sufficient reason to cloud acceptance of Hypothesis 1B.

A possible explanation of why the growth-survival relationship appears only in the fifth year may be that a change in growth rates between the fifth and fourth years serves as a trigger mechanism for potentially failing firms to move out of poor performing industries. Observe that the industry profitability-survival relationship in the fifth year supports this explanation (i.e .failing firms are in lower ROE industries in the fifth year). However, evidence which may tend to confirm such an explanation, such as a negative relationship

between diversification and survival in years closer to the
bankruptcy, are not present in the logit analysis. The explanation
that firms may be switching the industries in which they do business
may be true (i.e. firms may not be more diversified than previously
but are attempting to move into entirely different industries). The
data at hand do not allow for a full investigation of this idea, but
this is certainly an area worthy of future research.

As an aid in understanding what may lead a firm to failure, both
industry growth rate and industry profitability lead to a possible
explanation of the mechanisms which trigger failure. Namely that weak
companies in low growth, low profit markets may attempt to radically
alter the environments in which they do business without having the
resources (in the form of managerial skills, etc.) to compete in their
changed universe of activity.

3. COMMENTS ON HYPOTHESIS 1C

With regard to the firm's relative market share and survival
there was some significant relationship three years prior to potential
failure. Again, the fact that the relationship existed only in one
year was sufficient reason to reject the hypothesis. However, the
relationship between relative market share and survival seems to
support the alternate explanation being developed in these hypotheses.
That explanation implies that weak companies in markets where growth
is slowing may attempt to switch the industries in which they compete
(this would also explain why the factor analysis teams up diversi-

fication and relative market share in the third year). In switching industries these firms may find that they possess lower market shares when they first enter the industry. In an effort to build share the firm may lower price and thus aid its own slide toward bankruptcy. Thus, such moves would explain the appearance of a positive relationship between market share and survival in the third year and not other years.

4. COMMENTS ON THE DISCRIMINANT ANALYSES

Some evidence was found to support the idea that diversification might play a role in firm survival, however it is questionable that the role is significant. Diversification may, however, have a greater relationship to survival the the data indicate. There may be other factors which are affecting the likelihood of survival. Such other factors may include the length of time the firm has been in the industries in which it does business. Looking into other explanations is, again, beyond the scope of the present study and is best left to future research.

The negative relationship discovered between the industry profitability variables one year before potential bankruptcy was not in the expected direction and goes against the conventional wisdom that firms in profitable industries are less likely to fail. It is, perhaps, the conventional wisdom which has created this result. What may be occurring is that weak firms attempt to enter more profitable industries thinking that such a move will increase their chance of

survival. These firms may not, however, have the particular resources or talents needed to compete in their new industry and so they fail. Thus, in one sense, population ecology theory is wrong in stressing the effects of environment on survival. It is perhaps not the environment alone which causes the firm's collapse but rather the firm's capacity to deal with the environment which determines its likelihood of failure. (On the other hand, the population ecology point of view serves well to explain these results if we think of the notion of "survival of the fittest," i.e. the firms which are most well adapted to the environment survive).

5. COMMENTS ON HYPOTHESES 3A THROUGH 3F

Hypotheses 3A through 3F predicted that the factor analysis would create five factors as follows:

1) Environmental Selection (loading on industry growth and profitability);

2) Environmental Control (loading on relative market share);

3) Influence with Resource Providers (loading on size, director interlocks and percent of outside directors);

4) Buffering (loading on the firm's level of diversification) and;

5) Present Level of Resources (loading on net worth over total assets).

Buffering or diversification only occurred as a separate factor in two years. In two years diversification was typically a part of the factor labeled influence with providers. One reason for this could be that all three variables which load onto this factor are size-related (highly diversified firms being larger than less diversified firms). A second possible reason could be that all three variables which load onto this factor serve to mitigate the influence of external parties.

Joint ventures the did not load consistently on any one factor. On the occasions when the joint ventures **did** load on to a particular factor it was usually positively associated with the environmental factor (especially where industry growth also loaded highly on to the factor). The possible reason for this relationship could be that firms in high growth industries seek out others to share risks inherent in potentially unstable markets. Tthough this relationship was not expected it is appears to fit with the overall resource dependence perspective.

C. CONCLUSIONS OF THE STUDY

This research project has developed and studied a model which accurately goes beyond strict financial ratio predictors of failure. This should aid top managers in arriving at additional effective measures to prevent failure. The main finding of this study is that management should take care to develop significant relationships with other firms through board interlocks. By using the particular

variables employed in this study we have stepped away from the typical financial criteria models which are targeted toward the potential creditor or investor and moved toward a model which may be of some help to managers. Potential creditors and investors, however, may still find these results useful.

This study also addresses the resource dependency perspective by using actual survival or failure rather than more debatable criteria. Pfeffer and Salancik (1978), among other things, suggested that organizational effectiveness reflects the firm's control of its resource dependencies. But the true measure of whether an organization has been effective is whether or not it continues to survive. Thus, this study cuts to the heart of the resource dependency perspective by addressing the essential issue of organizational survival and failure.

A significant contribution to our knowledge and understanding of both organizational survival/failure and the resource dependence perspective has been made through this research. Specifically, this project shows that interlocks between boards of directors have a significant relationship to a corporation's likelihood of survival. This finding is consistent with the resource dependence perspective that firms which influence critical coalitions of resource providers, via board interlocks, will better ensure their survival. The study has also uncovered evidence that failing business organizations attempt to gain influence by adding interlocks.

D. FUTURE RESEARCH

Several potentially fruitful lines of research are suggested from the results of this study. These lines of research are discussed below.

1. SURVIVAL, FAILURE, AND THE NATURE OF THE DOMAINS

Since the environmental measures considered were very basic (simply profitability and growth), future research in this area should include a more well developed set of environmental measures. For example, one might employ, for example, Aldrich's (1976) or Dess and Beard's (1984) dimensions of task environments in order to better analyze the effects of the environment.

2. SURVIVAL, FAILURE, RESOURCES AND CHANGING DOMAINS

It was suggested that firms who are likely to fail will attempt to change their domains of activity. When such firms make this change they may not possess the proper fit between their resources (managerial talent, etc.) and requirements demanded by the new industry for survival. Thus, future studies should address the extent to which surviving and failing firms differ from industry standards regarding such items as capital, R & D and technical human resource requirements. Additionally, a time series study should be undertaken to see if firms really do attempt to radically switch the industries in which they compete.

3. SURVIVAL, FAILURE AND DIVERSIFICATION

A weak and inconsistent relationship was found between diversification and survival. However, such relevant factors as the length of time the firm has been in the industries in which it does business can effect the ability of diversification to buffer the firm against influence. Looking into these other explanations may help us discover a possible relationship between survival and diversification.

4. SURVIVAL, FAILURE AND BOARDS OF DIRECTORS

The finding that survival and board interlocks are related obviously calls for continued investigation into what other factors of board structure and make-up contribute to the survival of the firm. Future studies should address to what extent surviving and failing firms differ. Such differences may be the influence the audit and finance committees have with management, which board members sit on which committees, and the managerial backgrounds of board- - and committee members.

5. SURVIVAL, FAILURE AND OWNERSHIP

Agency theory suggests that owners and managers do not share the same goals for the firm. While owners can reduce their risk through diversification of their stock portfolio, managers cannot reduce their risk by having a diversified portfolio of employers. Thus, managers may be more risk adverse. In cases where managers have control of their organizations and are not substantial shareholders they may take

less risks and consequently be better at ensuring the survival of their firm. Future studies might include an ownership variable such as percentage of stock held by outsiders and the percentage of stock held by managers.

6. SURVIVAL, FAILURE AND FIRM GOVERNMENT LINKAGES

This study attempted to control for the effects of government regulation. A future study may wish to take these effects into account. Particularly interesting may be the effects of deregulation on the ability of firms to survive in various industries, e.g. airlines and telecommunications.

E. IMPLICATIONS OF THE STUDY

The implications of the study for policy makers, managers, and various corporate constituents are threefold. The first implication is that director interlocks can provide a firm with increased viability (i.e. interlocks may increase the firm's likelihood of survival). This means that a certain degree of interaction at the board level is necessary to ensure the organization's continued existence. Entrepreneurs who rely heavily on "networking" to acquire needed resources for their firms are applying this principle. If increased firm viability is desired, director interlocks may help achieve that goal.

Second, directors do serve a function. That function may be to directly aid the firm in acquiring resources or simply to lend the

board their prestige. An example of the former is when a firm gets a line of credit because one of the firm's directors is on the bank's board; the latter case is when a firm gets credit because the bank sees that some highly reputable people are on the board (reputable due to their presence on several boards). In either case, we can see that the presence of these interlocks can aid in a firm's acquisition of resources.

Third, the time to create interlocks is not when the firm is falling apart. Both Rath Packing and the Chrysler Corp. waited until the firm was near bankrupcy before creating any kind of interlocks with the unions representing their workers. In both these cases the establishment of such relationships were essential but long neglected. When the relationship was established, it was too late to help Rath Packing. One wonders if these firms would have gone as far downhill if the interlocks had been present all along. In order to illustrate the importance of timing, Laurence J. Peter (1972: 164-165) tells the following story:

> "Will D. Lae was grossly overweight but was fascinated by the idea of becoming a mountain climber. Determined to master the skill, he was able through hard work and continuous practice to develop his arm muscles so that they would support his obese body. He practiced on local slopes and then decided to try his skill on a mountain worthy of his ambitions. He picked the granite face of El Capitan. Halfway up the sheer rock he looked up and was startled to discover that his rope was fraying and in a second or two would break. He looked down and saw that there was no ledge or bush to break his fall. He made a quick decision — he decided to use a stronger rope."

Needless to say that Will's decision was correct, but his timing was off. Likewise, adding interlocks to a corporation's board is probably the right decision, but for many firm's the timing is off. Hopefully this research will serve to point out to organizational stakeholders the importance of creating interlocks in a timely fashion to help their enterprises survive in the long run.

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APPENDIX ONE

CALCULATION OF INDUSTRY PROFITABILITY

$$IROS = \sum_{j-n} (ROS_j (FIS_j / TFS_{j-n})) - \text{Inflation Rate}$$

$$IROE = \sum_{j-n} (ROE_j (FIS_j / TFS_{j-n})) - \text{Interest Rate} \atop \text{(3 mo. T-Bill)}$$

Where IROS = Industry profitability for the firm using industry ROS;

IROE = Industry profitability for the firm using industry ROE;

ROS_j = Return on sales in the four digit SIC industry j;

ROE_j = Return on equity in the four digit SIC industry j;

FIS_j = Firm sales in four digit SIC industry j;

TFS_{j-n} = Total firm sales in all their four digit SIC industries j through n;

$\sum_{j-n}$ = Total for all industries in which the firm does business (SIC industries, j through n).

Sources: - Industry: <u>Industry Norms and Key Business Ratios</u> Dun and Bradstreet Credit Services;

- Inflation Adjustment: <u>National Income and Product Accounts of the United States, 1928-1982 Statistical Tables</u> (U. S. Dept. of Commerce, 1986).

- Interest Rate Adjustment: <u>Federal Reserve Bulletin</u> (U.S. Dept. of Commerce, 1978, 1981, 1983).

- Firms: <u>Establishment EIS Database</u> Economic Information System.

APPENDIX TWO

CALCULATION OF INDUSTRY GROWTH RATE

$$IGRO = \sum_{j-n} (ISGR_j \ (FIS_j \ / \ TFS_{j-n}))$$

Where IGRO = Industry growth rate for the firm;

$ISGR_j$ = $((IVOS_0 - IVOS_{-5}) \ / \ IVOS_{-5})$

Where $IVOS_0$ = Industry value of shipments in the period under study, in 1982 dollars;

$IVOS_{-5}$ = Industry value of shipments five years prior to the period under study, in 1982 dollars;

FIS_j = Firm sales in four digit SIC industry j;

TFS_{j-n} = Total firm sales in all their four digit SIC industries j through n;

$\sum_{j-n}$ = Total for all industries in which the firm does business (SIC industries, j through n).

Sources: - Industry: <u>1982 Census of Construction Industries</u>, <u>1982 Census of Manufactures</u>, <u>1982 Census of Mineral Industries</u>, <u>1982 Census of Retail Trade</u>, <u>1982 Census of Service Industries</u>, <u>1982 Census of Transportation</u>, <u>1982 Census of Wholesale Trade</u>. (U.S.Dept. of Commerce, Bureau of the Census, 1985).

    - Inflation Adjustment: <u>The National Income and Product Accounts of the United States, 1928 - 1982 Statistical Tables</u> (U.S. Department of Commerce, 1986).

    - Firms: <u>Establishment EIS Database</u> Economic Information System.

APPENDIX THREE

CALCULATION OF FIRM'S RELATIVE MARKET SHARE

$$FRMS = \sum_{j-n} ((FMS_j/FFCR_j)\ (FIS_j\ /\ TFS_{j-n}))$$

Where FRMS = Firm's relative market share;

FMS_j = Firm's market share in four digit SIC industry j;

$FFCR^j$ = Four firm concentration ratio of four digit SIC industry j;

FIS_j = Firm sales in four digit SIC industry j;

TFS_{j-n} = Total firm sales in all their four digit SIC industries j through n;

$\sum_{j-n}$ = Total for all industries in which the firm does business (SIC industries, j through n).

Sources: – Industry: 1982 Census of Construction Industries, 1982 Census of Manufactures, 1982 Census of Mineral Industries, 1982 Census of Retail Trade, 1982 Census of Service Industries, 1982 Census of Transportation, 1982 Census of Wholesale Trade. (U.S.Dept. of Commerce, Bureau of the Census, 1985).

         – Firms: Establishment EIS Database Economic Information System.

APPENDIX FOUR

CALCULATION OF RESOURCE PROVIDER CONTROL

FDIL   = Total number of directorships held in other firms by board members of the firm under study.

FPOD   = Percentage of inside directors.

FJVS   = Number of joint ventures.

FSZS   = Size of the firm as measured by sales.

Where FDIL   = Number of direct directory interlocks;

    FPOD   = Inside directors / total directors;

    FJVS   = Total number of joint ventures which the firm is currently operating with other firms;

    FSZS   = Total gross revenues for the firm as adjusted for inflation by the G.N.P. deflator

Sources: – Inflation
      Adjustment: The National Income and Product Accounts of the United States, 1928 – 1982 Statistical Tables (U.S. Department of Commerce, 1986).

      – Firms: Annual 10K reports filed with the Securities and Exchange Commission and Standard and Poors' Directory of Corporate Officers and Directors

APPENDIX FIVE

CALCULATION OF FIRM'S DIVERSIFICATION

$$
FDIV = \frac{\sum_{j-n} (FIS^2_j)}{\sum_{j-n} (FIS^2_j)}
$$

Where FDIV = Firm's Diversification;

FIS^2_j = Firm sales in four digit SIC industry j squared;

TFS^2_{j-n} = Total firm sales in all their four digit SIC industries j through n squared;

$\sum_{j-n}$ = Total for all industries in which the firm does business (SIC industries, j through n).

Sources: – Firms: Establishment EIS Database
Economic Information System.

APPENDIX SIX

CALCULATION OF FAILURE LIKELIHOOD

FAIL   = Failure;

FFLA   = 0.012 (W C / T A) +
               0.01₄ (R E / T A) +
               0.033 (EBIT / T A) +
               0.006 (MVE / BVE) +
               0.100 (SALE / T A)

Where FAIL   = Filing of a Chapter 7 or 11 Bankruptcy petition.

FFLA   = Firm Failure Likelihood -- Altman's Z;

W C   = Firm's Working Capital;

T A   = Firm's Total Assets;

R E   = Firm's Retained Earnings;

EBIT   = Firm's Earnings Before Interest and Taxes;

MVE   = Firm's Market Value of Equity
              (Shares Outstanding X Average Market Value);

BVD   = Firm's Book Value of Debt;

SALE   = Firm's Net Sales.

Sources: – Firms: Annual 10K reports filed with the Securities and Exchange Commission, Moody's Industrial Manual, Moody's OTC Industrial Manual, Commerce Clearinghouse Capital Changes Reporter and Compustat.

UNIFORM SOURCE DATA POINTS

Year   of   Bankruptcy

Predictive Model's Time Horizon	1980	1981	1982	1983	1984	1985	1986	1987
1 Year		1980		1982				
2 Years			1980		1982			
3 Years	1977			1980		1982		
4 Years		1977			1980		1982	
5 Years			1977			1980		1982

The number within the array represents the year from which the data will be drawn.

APPENDIX EIGHT

CORRELATIONS BETWEEN VARIABLES

YEAR 1	IGRO	FRMS	FDIL	FPOD	FJVS	FSZS	FDIV	FWOA
Ind.ROE (IROE)	0.195	0.075	0.060	0.215	-0.092	-0.251	-0.109	0.089
Industry Growth (IGRO)		0.176	0.124	0.234	0.009	0.271	-0.152	0.217
Rel. Market Share (FRMS)			0.234	0.159	-0.082	**0.585**	-0.028	**0.292**
Dir. Inter-locks (FDIL)				0.273	-0.079	0.358	-0.266	**0.341**
Percent Outside Dir.s (FPOD)					0.077	0.044	-0.104	-0.059
Joint Ventures (FJVS)						-0.066	0.116	-0.051
Sales Size (FSZS)							**-0.296**	**0.280**
Diversifica-tion (FDIV)								-0.206
Net Worth / Assets (FWOA)								

Bold face numbers have a two-tailed significance beyond the .01 level.

NOTE: The last row in the above chart is only included to remind the reader that FWOA is the abbreviation for Firm net Worth Over Assets. This last row is not included in charts below since all correlations between FWOA and other variables are handled in the last column (FWOA) and including an FWOA row would be redundant.

YEAR 2

	IGRO	FRMS	FDIL	FPOD	FJVS	FSZS	FDIV	FWOA
Ind.ROE (IROE)	0.157	-0.066	-0.058	0.042	0.036	-0.405	0.143	0.079
Industry Growth (IGRO)		-0.187	0.142	0.127	0.184	-0.050	-0.010	-0.048
Rel. Market Share (FRMS)			0.311	-0.125	0.041	0.489	-0.192	-0.008
Dir. Inter-locks (FDIL)				0.241	0.120	0.374	-0.234	0.130
Percent Outside Dir.s (FPOD)					-0.082	0.040	-0.097	-0.198
Joint Ventures (FJVS)						0.149	-0.146	-0.017
Sales Size (FSZS)							-0.493	-0.123
Diversification (FDIV)								0.032

YEAR 3

	IGRO	FRMS	FDIL	FPOD	FJVS	FSZS	FDIV	FWOA
Ind.ROE (IROE)	0.068	0.086	-0.178	-0.061	-0.114	-0.210	0.106	0.051
Industry Growth (IGRO)		-0.036	0.017	-0.094	0.001	-0.017	0.070	0.127
Rel. Market Share (FRMS)			-0.036	-0.001	0.140	0.299	0.277	0.142
Dir. Inter-locks (FDIL)				0.349	0.072	0.252	-0.241	0.174
Percent Outside Dir.s (FPOD)					0.092	0.045	-0.009	-0.219
Joint Ventures (FJVS)						0.176	-0.113	-0.083
Sales Size (FSZS)							-0.360	0.142
Diversification (FDIV)								0.182

YEAR 4	IGRO	FRMS	FDIL	FPOD	FJVS	FSZS	FDIV	FWOA
Ind.ROE (IROE)	0.017	0.036	-0.173	0.039	-0.059	-0.149	0.009	-0.068
Industry Growth (IGRO)		0.076	0.008	0.134	0.081	0.027	-0.119	0.084
Rel. Market Share (FRMS)			0.127	0.012	-0.060	**0.392**	-0.051	0.172
Dir. Interlocks (FDIL)				0.297	-0.048	**0.419**	-0.280	0.275
Percent Outside Dir.s (FPOD)					0.049	0.096	-0.206	0.003
Joint Ventures (FJVS)						0.084	0.012	-0.143
Sales Size (FSZS)							**-0.426**	-0.015
Diversification (FDIV)								0.059

YEAR 5	IGRO	FRMS	FDIL	FPOD	FJVS	FSZS	FDIV	FWOA
Ind.ROE (IROE)	0.010	**0.292**	0.171	-0.042	-0.012	0.022	0.042	-0.028
Industry Growth (IGRO)		-0.105	-0.079	-0.028	-0.170	0.055	-0.149	0.119
Rel. Market Share (FRMS)			0.283	0.175	0.096	**0.481**	-0.140	0.048
Dir. Interlocks (FDIL)				0.248	0.279	**0.539**	**-0.338**	0.222
Percent Outside Dir.s (FPOD)					-0.115	0.269	-0.185	-0.089
Joint Ventures (FJVS)						0.225	-0.197	0.053
Sales Size (FSZS)							**-0.495**	0.167
Diversification (FDIV)								-0.079

APPENDIX NINE

RESULTS OF LOGIT ANALYSIS WITH SIGNIFICANCE LEVELS

	Years		In	Advance:	
	1	2	3	4	5
Constant	-0.290 (.92)	-5.433 (.02)	-2.903 (.08)	-0.665 (.69)	-4.325 (.03)
Select Environment:					
Industry ROE	-0.149 (.10)	0.126 (.85)	-0.008 (.84)	-0.002 (.96)	0.070 (.13)
Industry Growth	-0.547 (.62)	-0.028 (.96)	0.901 (.23)	0.616 (.27)	2.181 (.01)
Control Environment:					
Rel. Mkt. Share	0.110 (.94)	0.039 (.34)	0.071 (.05)	0.001 (.97)	-0.014 (.81)
Influence Providers:					
Board Interlock	-0.007 (.94)	0.161 (.09)	0.190 (.02)	0.248 (.02)	0.287 (.01)
Percent Outsiders	-0.009 (.83)	0.006 (.72)	-0.001 (.94)	-0.036 (.02)	0.020 (.16)
Joint Ventures	0.306 (.42)	0.464 (.37)	0.020 (.97)	-0.264 (.25)	-0.345 (.44)
Firm Sales Size	0.353 (.65)	0.389 (.62)	0.745 (.16)	-0.251 (.62)	-0.838 (.16)
Buffering:					
Diversification	-1.397 (.37)	0.059 (.95)	-1.683 (.09)	0.620 (.27)	0.785 (.43)
Present Resources:					
N.W. / T.A.	0.080 (.01)	0.074 (.01)	0.019 (.15)	0.036 (.01)	0.058 (.01)

APPENDIX TEN

STANDARDIZED DISCRIMINANT FUNCTION COEFFICIENTS

	Years In Advance:				
	1	2	3	4	5
Select Environment:					
Industry ROE	-0.3320*				0.3292'
Industry Growth			0.2381	0.2244	0.4561*
Control Environment:					
Rel. Mkt. Share	0.4228	0.2505	0.4799*		
Influence Providers:					
Board Interlock		0.4329*	0.5140*	0.6582*	0.7378*
% Outsiders				-0.5445*	0.2285'
Joint Ventures	0.2431			0.2686	
Firm Sales Size			0.3008'		-0.3800'
Buffering:					
Diversification			-0.4286*	-0.2390	
Present Resources:					
N.W. / T.A.	0.9044*	0.8765*	0.3609'	0.5957*	0.6008*

' Significant Variable in the Logit Analysis beyond the .2 level.
* Significant Variable in the Logit Analysis beyond the .1 level.

APPENDIX ELEVEN

SUMMARY STATISTICS

YEAR 1	ALL FIRMS		SURVIVORS		FAILURES		DIFF.
	Mean	St.Dev.	Mean	St.Dev.	Mean	St.Dev.	T-Test
IROE	5.87	4.77	5.34	4.32	6.39	5.13	-0.85
IGRO	0.16	0.38	0.25	0.30	0.08	0.43	1.75
FRMS	7.45	9.87	11.15	11.72	3.76	5.51	3.12
FDIL	4.34	4.05	5.44	4.04	3.24	3.75	2.19
FPOD	57.82	18.56	57.73	16.35	57.90	20.54	-0.03
FJTV	0.29	1.45	0.42	1.96	0.16	0.57	0.69
FSZS	2.15	0.73	2.41	0.81	1.89	0.51	2.98
FDIV	0.58	0.29	0.54	0.32	0.63	0.25	-1.24
FWOA	27.96	26.71	44.58	17.47	11.34	23.86	6.16
COUNT	62.00	62.00	31.00	31.00	31.00	31.00	62.00

YEAR 2	ALL FIRMS		SURVIVORS		FAILURES		DIFF.
	Mean	St.Dev.	Mean	St.Dev.	Mean	St.Dev.	T-Test
IROE	6.52	4.41	6.61	3.63	6.42	5.08	0.20
IGRO	0.24	0.49	0.23	0.53	0.25	0.44	0.14
FRMS	7.81	9.48	9.54	11.03	6.08	7.21	1.68
FDIL	4.70	4.24	6.03	5.03	3.37	2.66	2.99
FPOD	60.08	16.83	59.22	18.34	60.94	15.13	-0.46
FJTV	0.18	0.76	0.26	0.87	0.10	0.61	1.00
FSZS	2.23	0.67	2.32	0.70	2.14	0.63	1.21
FDIV	0.56	0.31	0.54	0.32	0.59	0.28	-0.75
FWOA	39.91	21.10	50.54	16.10	29.28	20.13	5.28
COUNT	84.00	84.00	42.00	42.00	42.00	42.00	84.00

YEAR 3	ALL FIRMS		SURVIVORS		FAILURES		DIFF.
	Mean	St.Dev.	Mean	St.Dev.	Mean	St.Dev.	T-Test
IROE	9.48	5.65	9.25	5.50	9.71	5.78	-0.40
IGRO	0.20	0.34	0.24	0.34	0.16	0.35	1.08
FRMS	7.58	8.69	9.51	10.01	5.65	6.59	2.23
FDIL	3.94	3.84	5.31	4.46	2.57	2.43	3.73
FPOD	55.86	20.53	56.70	17.55	55.03	23.10	0.40
FJTV	0.13	0.47	0.16	0.47	0.10	0.46	0.65
FSZS	2.20	0.61	2.43	0.65	1.98	0.47	3.88
FDIV	0.57	0.30	0.51	0.30	0.63	0.29	-2.11
FWOA	40.09	21.42	45.25	20.09	34.92	21.45	2.44
COUNT	98.00	98.00	49.00	49.00	49.00	49.00	98.00

YEAR 4	ALL FIRMS		SURVIVORS		FAILURES		DIFF.
	Mean	St.Dev.	Mean	St.Dev.	Mean	St.Dev.	T-Test
IROE	9.04	6.00	8.60	6.19	9.48	5.76	-0.74
IGRO	0.18	0.45	0.23	0.44	0.12	0.45	1.15
FRMS	6.79	8.52	7.75	8.51	5.84	8.42	1.13
FDIL	3.60	3.71	4.84	4.36	2.36	2.33	3.54
FPOD	56.71	18.19	54.76	16.48	58.65	19.57	1.07
FJTV	0.24	1.01	0.29	1.33	0.18	0.51	0.58
FSZS	2.18	0.63	2.30	0.69	2.05	0.54	2.03
FDIV	0.62	0.32	0.58	0.34	0.66	0.28	-1.36
FWOA	40.73	19.10	47.32	18.10	34.15	17.76	3.67
COUNT	102.00	102.00	51.00	51.00	51.00	51.00	102.00

YEAR 5	ALL FIRMS		SURVIVORS		FAILURES		DIFF.
	Mean	St.Dev.	Mean	St.Dev.	Mean	St.Dev.	T-Test
IROE	8.61	6.03	9.86	6.78	7.37	4.87	1.98
IGRO	0.19	0.34	0.26	0.36	0.12	0.29	2.05
FRMS	8.75	8.83	9.50	8.60	8.00	8.99	0.80
FDIL	4.55	3.87	6.02	4.09	3.08	2.97	3.86
FPOD	56.60	19.10	58.75	14.98	54.45	22.28	1.06
FJTV	0.18	0.69	0.24	0.76	0.11	0.60	0.91
FSZS	2.42	0.65	2.50	0.67	2.34	0.63	1.11
FDIV	0.54	0.31	0.53	0.32	0.55	0.30	0.40
FWOA	40.59	16.35	46.60	14.96	34.59	15.44	3.70
COUNT	90.00	90.00	45.00	45.00	45.00	45.00	90.00

APPENDIX TWELVE

LIST OF SAMPLE FIRMS

FIRMS EMPLOYED IN THE ONE YEAR PREDICTION MODEL

Failing Companies	Data Year	Target Year	Surviving Companies	Data Year	Target Year
Advent Corp.	1980	1981	A C Nielsen Co.	1980	1981
Altec Corp.	1982	1983	Allied Farm Equipment	1980	1981
Barclay Industries	1980	1981	Cities Service Co.	1980	1981
Dalco Petroleum	1982	1983	Clabir Corp.	1982	1983
First Hartford Corp.	1980	1981	Claire's Stores Inc.	1980	1981
Flame Industries Inc.	1982	1983	Commercial Shearing Co.	1982	1983
Gateway Sporting Goods	1980	1981	Continental Group Inc.	1982	1983
Geophysical Systems	1982	1983	Fleming Companies Inc.	1980	1981
Goldblatt Brothers	1980	1981	G & K Services Inc.	1980	1981
Hardwicke Companies	1982	1983	Getty Oil Co.	1982	1983
Horn & Hardart co.	1980	1981	Glenmore Distilleries	1982	1983
Itel Corporation	1980	1981	Haverty Furniture	1982	1983
John F.Lawhon Furniture	1980	1981	Keithly Instruments	1980	1981
Leisure Dynamics Inc.	1982	1983	La Quinta Motor Inns	1980	1981
Lynnwear / Lily Lynn	1980	1981	Lamson & Sessions Co.	1980	1981
Magnuson Computer Sys.	1982	1983	Mark Controls Corp.	1980	1981
Marion Corp.	1982	1983	Medex Inc.	1982	1983
Maxon Industries	1980	1981	Merck & Co. Inc.	1980	1981
Mclouth Steel	1980	1981	Midland Glass Co Inc.	1980	1981
Meridian Industries	1980	1981	Milton Bradley Co.	1982	1983
Mesta Machine Co. Inc.	1982	1983	Minnesota Fabrics Inc.	1982	1983
Northwest Engineering	1982	1983	Pepsico Co.	1980	1981
Rath Packing Co. inc.	1982	1983	Philip Morris Inc.	1980	1981
Reading Industries Inc.	1980	1981	Publicker Industries	1980	1981
Richmond Tank Car Co.	1982	1983	Rockaway Corp.	1980	1981
Roberts & Porter Inc.	1982	1983	Rollins Inc.	1982	1983
Robintech Inc.	1982	1983	S. E. Nichols Inc.	1980	1981
Sambos Restaurants Inc.	1980	1981	Southern Film Extruders	1982	1983
Steelmet Inc.	1982	1983	Standard Register Co.	1980	1981
Stevcoknits Fabrics	1980	1981	Technical Tape Inc.	1982	1983
Tobin Packing Co Inc.	1980	1981	United Industrial Corp.	1980	1981

NOTE: Firms listed here are in alphabetical order and this order is not intended to show that these firms were in some way matched.

FIRMS EMPLOYED IN THE TWO YEAR PREDICTION MODEL

Failing Companies	Data Year	Target Year	Surviving Companies	Data Year	Target Year
A I C Photo Inc.	1982	1984	Allied Stores Corp.	1982	1984
AM International Inc.	1982	1984	American Biltrite Inc.	1980	1982
ATI Inc.	1982	1984	Axia Inc.	1982	1984
Beehive Intl. & Beehive	1982	1984	B. F. Goodrich Co.	1980	1982
Berry Industries Corp.	1982	1984	Barber-Greene Co.	1980	1982
Bobbie Brooks Inc.	1980	1982	Beeline Inc.	1980	1982
Charter Company	1982	1984	Brunos Inc.	1980	1982
Consolidated Petroleum	1982	1984	Caressa Inc.	1982	1984
Cook United	1982	1984	Central Soya Co. Inc.	1980	1982
Crompton Co.	1982	1984	Clark Consolidated Ind.	1982	1984
CS Group Inc. / Sue-Ann	1982	1984	Donaldson Co. Inc.	1982	1984
Dant-Russell Inc.	1980	1982	Genesco Inc.	1980	1982
Data Access Systems	1982	1984	George Banta Co. Inc.	1980	1982
Edmos Corp.	1982	1984	Grand Auto Inc.	1982	1984
Gilman Services Inc.	1980	1982	H. B. Fuller Co. Inc.	1982	1984
Henry Gilpin Co. Inc.	1980	1982	Hazeltine Corp.	1980	1982
Heywood Wakefield	1980	1982	Health Information Sys.	1982	1984
HRT Industries Inc.	1980	1982	Health-Chem Corp.	1980	1982
J. W. Mays Inc.	1980	1982	Hungry Tiger Inc.	1980	1982
KDT Industries / Kings	1980	1982	Interpublic Group	1980	1982
Koss Corp.	1982	1984	Jacobs Engineer. Group	1982	1984
K-Tel International	1982	1984	King Kullen Grocery Co.	1980	1982
Lionel Corp.	1980	1982	Levi Strauss & Co. Inc.	1982	1984
Manville/Johns Manvile	1980	1982	Liberty Homes Inc.	1982	1984
Mego International Inc.	1980	1982	Optical Coating Lab.	1980	1982
MGF Oil Corp.	1982	1984	Outboard Marine Corp.	1980	1982
Mobile Home Industries	1982	1984	Philips Industries Inc.	1982	1984
Morton Shoe Companies	1980	1982	Pier 1 Imports Inc.	1982	1984
Nicklos Oil & Gas Co.	1980	1982	Pittston Co.	1980	1982
Nucorp Energy Inc.	1980	1982	Polyplastex United Inc.	1982	1984
Pizza Time Theatre Inc.	1982	1984	R. R. Donnelley & Sons	1980	1982
Pubco Inc.	1980	1982	Realex Corp.	1980	1982
Revere Copper & Brass	1980	1982	Russell Corp.	1980	1982
Rusco Inc.	1980	1982	Sedco Inc.	1980	1982
Saxon Industries	1980	1982	Suave Shoe Corp.	1982	1984
Shelter Resources Corp.	1980	1982	Sykes Datatronics Inc.	1982	1984
Standard Metals Corp.	1982	1984	Synalloy Corp.	1982	1984
Tomlinson Oil Co.	1982	1984	U S Leasing Interntl.	1982	1984
Towner Petroleum Co.	1982	1984	Union Camp Corp.	1982	1984
Transcontinental Energy	1982	1984	United States Gypsum	1980	1982
UNR Industries / UNARCO	1980	1982	Wausau Paper Mills Co.	1982	1984
Wickes Corp. Inc.	1980	1982	Wellco Enterprises Inc.	1982	1984

FIRMS EMPLOYED IN THE THREE YEAR PREDICTION MODEL

Failing Companies	Data Year	Tar-get Year	Surviving Companies	Data Year	Tar-get Year
A. H. Robins Co. Inc.	1982	1985	American Microsystems	1977	1980
Allied Technology	1977	1980	Atwood Oceanics Inc.	1982	1985
Altec Corp.	1980	1983	Autotrol Corp.	1982	1985
Amfesco Industries Inc.	1982	1985	Ball Corp.	1977	1980
B. Brody Seating Co.	1977	1980	Beeline Inc.	1977	1980
Berven Carpets Corp.	1982	1985	Central Soya Co. Inc.	1977	1980
Commodore Corp.	1982	1985	Clabir Corp.	1980	1983
Consolidated Packaging	1982	1985	Commercial Shearing Co.	1980	1983
Continental Steel Corp.	1977	1980	Continental Group Inc.	1980	1983
Dalco Petroleum	1980	1983	Country Miss	1977	1980
Evans Products co.	1982	1985	Eastern Co Inc.	1977	1980
Flame Industries inc.	1980	1983	Economics Laboratory	1982	1985
Flanigan's Enterprises	1982	1985	General Binding Corp.	1977	1980
Garland Corporation	1977	1980	Genesco Inc.	1982	1985
Glover Inc.	1977	1980	Getty Oil Co.	1980	1983
Hardwicke Companies	1980	1983	Gleason Corp.	1977	1980
Kelly Johnston Entrprs.	1982	1985	Glenmore Distilleries	1980	1983
Keydata Corp.	1977	1980	Haverty Furniture	1980	1983
Lafayette Radio Elect.	1977	1980	Health-Chem Corp.	1977	1980
Leisure Dynamics Inc.	1980	1983	Hill Brothers Inc.	1982	1985
Magic Circle Energy	1982	1985	Kay Corporation	1982	1985
Magic Marker Corp.	1977	1980	Litton Industries Inc.	1982	1985
Mesta Machine Co. Inc.	1980	1983	Mark Controls Corp.	1982	1985
National Paragon Corp.	1982	1985	Medex Inc.	1980	1983
National Shoes Inc.	1977	1980	Merck & Co. Inc.	1982	1985
New England Fish Co.	1977	1980	Milton Bradley Co.	1980	1983
Nexus Industries Inc.	1982	1985	Milton Roy Co.	1977	1980
Northwest Engineering	1980	1983	Minnesota Fabrics Inc.	1980	1983
Opelika Mfg. Corp.	1982	1985	Mitchell Energy & Devl.	1982	1985
Rath packing Co. Inc.	1980	1983	National Can Corp.	1982	1985
Richton International	1977	1980	Oil Dri Corp.of America	1982	1985
Roberts & Porter Inc.	1980	1983	Oscar Mayer & Co. Inc.	1977	1980
Robintech Inc.	1980	1983	Pep Boys Manny Moe Jack	1982	1985
Roblin Industries Inc.	1982	1985	Rohm & Haas Co.	1982	1985
SAL Cable Communication	1982	1985	Rohr Industries	1977	1980
Salant Corp.	1982	1985	Rollins Environmental	1982	1985
Sam Solomon Co. Inc.	1977	1980	Rollins Inc.	1980	1983
Schaak Electronics Inc.	1982	1985	Sanders Associates Inc.	1982	1985
Spiral Metal Co. Inc.	1980	1983	Sheller Globe Corp.	1982	1985
Steelmet Inc.	1980	1983	Southern Film Extruders	1980	1983
Storage Technology	1982	1985	Southwest Factories	1977	1980

THIS LIST IS CONTINUED ON THE NEXT PAGE.

FIRMS EMPLOYED IN THE THREE YEAR PREDICTION MODEL (Continued)

Failing Companies	Data Year	Target Year	Surviving Companies	Data Year	Target Year
Tacoma Boatbuilding Co.	1982	1985	Standard Register Co.	1982	1985
Texscan Corp.	1982	1985	Steego Corp.	1982	1985
Tidwell Industries Inc.	1982	1985	Technical Tape Inc.	1980	1983
Travel Equipment Corp.	1977	1980	Texas Industries Inc.	1982	1985
Upson Co.	1977	1980	W. W. Grainger Inc.	1977	1980
Vector Graphic Inc.	1982	1985	Wendy's International	1977	1980
Wheeling Pittsburgh	1982	1985	West Co. Inc.	1977	1980
Whippany Paper Board	1977	1980	Western Co.of N.America	1977	1980

FIRMS EMPLOYED IN THE FOUR YEAR PREDICTION MODEL

Failing Companies	Data Year	Target Year	Surviving Companies	Data Year	Target Year
A I C Photo Inc.	1980	1984	Allied Farm Equipment	1977	1981
Advent Corp.	1977	1981	Allied Stores Corp.	1980	1984
AM International Inc.	1980	1984	Axia Inc.	1980	1984
Ati Inc.	1980	1984	Badger Meter mfg. Co.	1982	1986
Barclay Industries	1977	1981	Banner Industries Inc.	1982	1986
Beehive Intl. & Beehive	1980	1984	Caressa Inc.	1980	1984
Berry Industries Corp.	1980	1984	Claire's Stores Inc.	1977	1981
Birdview Satellite Com.	1982	1986	Diagnostic Products	1977	1981
Charter Company	1980	1984	Donaldson Co. Inc.	1980	1984
Cook United	1980	1984	ERO Industries Inc.	1982	1986
Crompton Co.	1980	1984	Fleming Companies Inc.	1977	1981
Crutcher Resources	1982	1986	G & K Services Inc.	1977	1981
Crystal Oil Co.	1982	1986	Grand Auto Inc.	1980	1984
CS Group Inc. / Sue-Ann	1980	1984	Gulf Corporation	1977	1981
Data access Systems	1980	1984	H. B. Fuller Co. Inc.	1980	1984
Eastmet Corporation	1982	1986	Harsco Corp.	1982	1986
Edmos Corp.	1980	1984	Internatnl. Game Tech.	1982	1986
First Hartford Corp.	1977	1981	J L G Industries Inc.	1982	1986
Gateway Sporting Goods	1977	1981	Jacobs Engineer. Group	1980	1984
General Exploration Co.	1982	1986	Keithly Instruments	1977	1981
Global Marine Inc.	1982	1986	King Kullen Grocery	1977	1981
Goldblatt Brothers	1977	1981	La Quinta Motor Inns	1977	1981
Great Outdoor American	1982	1986	Lamson & Sessions Co.	1977	1981

THIS LIST IS CONTINUED ON THE NEXT PAGE.

FIRMS EMPLOYED IN THE FOUR YEAR PREDICTION MODEL (Continued)

Failing Companies	Data Year	Target Year	Surviving Companies	Data Year	Target Year
Horn & Hardart Co.	1977	1981	Levi Strauss & Co. Inc.	1980	1984
Imperial Industries	1982	1986	Martin Processing Inc.	1982	1986
Itel Corporation	1977	1981	Merck & Co. Inc.	1980	1984
John F.Lawhon Furniture	1977	1981	Midland Glass Co. Inc.	1977	1981
Koss Corp.	1980	1984	Newcor Inc.	1982	1986
K-Tel International	1980	1984	Niagara Frontier Serv.	1982	1986
Ltv Corp.	1982	1986	Ohio Mattress Company	1982	1986
Lynnwear / Lily Lynn	1977	1981	Parker Drilling Co.	1982	1986
Macrodyne Industries	1982	1986	Pep Boys Manny Moe Jack	1980	1984
Maxon Industries	1977	1981	Pepsico Co.	1977	1981
Meridian Industries	1977	1981	Philips Industries Inc.	1980	1984
Mobile Home Industries	1980	1984	Publicker Industries	1977	1981
Monolith Portland	1982	1986	Resorts International	1977	1981
Natpac Inc.	1982	1986	Rockaway Corp.	1977	1981
Oxoco	1982	1986	S. E. Nichols Inc.	1977	1981
Pettibone Corp.	1982	1986	Seligman & Latz Inc.	1982	1986
Reading Industries Inc.	1977	1981	Stuart Hall Co. Inc.	1982	1986
Sambos Restaurants Inc.	1977	1981	Suave Shoe Corp.	1980	1984
Seiscom Delta Inc.	1982	1986	Sykes Datatronics Inc.	1980	1984
Smith International	1982	1986	Synalloy Corp.	1980	1984
Spencer Companies Inc.	1982	1986	Sysco Corp.	1982	1986
Steiger Tractor Inc.	1982	1986	Tenney Engineering Inc.	1982	1986
Stevcoknits Fabrics	1977	1981	U. S. Leasing Interntl.	1980	1984
Tobin Packing Co. inc.	1977	1981	Union Camp Corp.	1980	1984
Transcontinental Energy	1980	1984	Uniroyal Inc.	1982	1986
U N A Corp.	1982	1986	United Industrial Corp.	1977	1981
Victoria Station Inc.	1982	1986	Visual Technology Inc.	1982	1986
Winn Enterprises	1982	1986	Wausau Paper Mills Co.	1980	1984

FIRMS EMPLOYED IN THE FIVE YEAR PREDICTION MODEL

Failing Companies	Data Year	Target Year	Surviving Companies	Data Year	Target Year
A. H. Robins Co. Inc.	1980	1985	American Biltrite Inc.	1977	1982
Allis-Chalmers Corp.	1982	1987	Atwood Oceanics Inc.	1980	1985
American Monitor Corp.	1982	1987	Autotrol Corp.	1980	1985

THIS LIST IS CONTINUED ON THE NEXT PAGE.

FIRMS EMPLOYED IN THE FIVE YEAR PREDICTION MODEL (Continued)

Failing Companies	Data Year	Target Year	Surviving Companies	Data Year	Target Year
American Monitor Corp.	1982	1987	Autotrol Corp.	1980	1985
Amfesco Industries inc.	1980	1985	B. F. Goodrich Co.	1977	1982
Argo Petrolem Corp.	1982	1987	Barber-Greene Co.	1977	1982
Berven Carpets Corp.	1980	1985	Bristol Corp.	1982	1987
Bobbie Brooks Inc.	1977	1982	Curtis Publishing Co.	1982	1987
Connor Co.	1982	1987	Economics Laboratory	1980	1985
Consolidated Packaging	1980	1985	George Banta Co. Inc.	1977	1982
Dant-Russell Inc.	1977	1982	Hajoca Corp.	1980	1985
Evans Products Co.	1980	1985	Hazeltine Corp.	1977	1982
Flanigan's Enterprises	1980	1985	Hill Brothers Inc.	1980	1985
Gilman Services Inc.	1977	1982	Home Depot Inc.	1982	1987
Hecks Inc.	1982	1987	Hungry Tiger Inc.	1977	1982
Henry Gilpin Co. Inc.	1977	1982	Interlake Inc.	1982	1987
HRT Industries Inc.	1977	1982	Interpublic Group	1977	1982
J. W. Mays Inc.	1977	1982	Kasler Corp.	1982	1987
Kaiser Steel Corp.	1982	1987	Kay Corporation	1980	1985
KDT Industries / Kings	1977	1982	Lightolier Inc.	1980	1985
Leslie Fay Co.	1982	1987	Litton Industries Inc.	1980	1985
Lionel Corp.	1977	1982	Marion Laboratories	1982	1987
Macmillan Ring-Free Oil	1982	1987	Millipore Corp.	1982	1987
Manville/Johns Manvile	1977	1982	Mine Safety Appliance	1982	1987
Mego International Inc.	1977	1982	Mitchell Energy & Devl.	1980	1985
Michigan General Corp.	1982	1987	National Can Corp.	1980	1985
Morton Shoe Companies	1977	1982	Northrop Corp.	1982	1987
Mister Steak / Jamco	1982	1987	Oil Dri Corp.of America	1980	1985
National Paragon Corp.	1980	1985	Olin Corp.	1982	1987
Newbery Energy Corp.	1982	1987	Optical Coating Lab.	1977	1982
Nexus Industries Inc.	1980	1985	Outboard Marine Corp.	1977	1982
Opelika Mfg. corp.	1980	1985	Pittston Co.	1977	1982
Pubco Inc.	1977	1982	R. R. Donnelley & Sons	1977	1982
Revere Copper & Brass	1977	1982	Realex Corp.	1977	1982
Roblin Industries Inc.	1980	1985	Rohm & Haas Co.	1980	1985
Salant Corp.	1980	1985	Russell Corp.	1977	1982
Schaak Electronics Inc.	1980	1985	Sanders Associates Inc.	1980	1985
Shelter Resources Corp.	1977	1982	Sedco Inc.	1977	1982
Storage Technology	1980	1985	Sheller Globe Corp.	1980	1985
Texaco Inc.	1982	1987	Steego Corp.	1980	1985
Texscan Corp.	1980	1985	Swedlow Inc.	1982	1987
Tidwell Industries Inc.	1980	1985	Tab Products Co. Inc.	1982	1987
Todd Shipyards Corp.	1982	1987	Texas Industries Inc.	1980	1985
UNR Industries / UNARCO	1977	1982	United States Gypsum	1977	1982
Wheeling Pittsburgh	1980	1985	United Technologies	1977	1982
Wickes Corp Inc.	1977	1982	Victory Markets Inc.	1982	1987

VITA

JERRY PAUL SHEPPARD

EDUCATION

Aug. 1989   Ph.D.   University of Washington, Seattle, WA.
Majors: Business Policy,
Business, Government and Society.

June 1984   M.B.A. Indiana University, Bloomington, IN.
Majors: Management Information Systems,
International Business.

June 1980   B.S.   Pennsylvania State University,
State College, PA.
Major: Accounting.

CERTIFICATION

July 1988   Certificate of Candidate in Philosophy.
University of Washington, Seattle, WA.

June 1983   Certificate in European Studies.
Tilburg University, Tilburg, Netherlands. Graduate work in "International Environment of Enterprises in Western Europe".

May 1982   Certified Public Accountant.
Licensed in Pennsylvania. Passed May 1981 CPA Exam.

EXPERIENCE

Oct. 1984 –
June 1989   University of Washington School of Business.
Taught junior/senior level Business & Society and Organization & Environment classes.

June 1985 –
Aug. 1985   University of Washington.
Research Assistantship.

Oct. 1987 –
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Taught senior level Marketing Research class.

Aug. 1983 –
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Instructed Introductory Financial Accounting class.

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Audited, reviewed, and prepared taxes for small and large manufacturing, wholesale and sales firms.