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City University of New York PH.D. 1983

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DETERMINANTS OF MERGER-BANKRUPTCY CHOICES IN FINANCIALLY TROUBLED FIRMS

by
ZAKARIA MOHAMED EL-SADEK ISMAIL

A dissertation submitted to the
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To my late mother, my late father, my mother-in-law and my late father-in-law.

For my wife, Soad, and my children, Wafaa, Eman and Apair, for their love and understanding during the coursework and dissertation preparation.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

CHAPTER I

Introduction

In recent years, the Financial Accounting Standards Board (FASB) emphasized the usefulness of accounting numbers to decision making. For example, paragraph 52 of the Statement of Financial Accounting Concepts No. 1 [FASB, 1978, p.25] concluded that: "Financial reporting should provide information that is useful to managers and directors in making decisions in the interests of owners." Also, the accounting profession focused recently on the importance of reporting cash flow, liquidity, and financial flexibility. Such information will help investors, creditors and managers in their decisions.

In light of these objectives, questions can be raised as to the usefulness of accounting information for assessing corporate management decisions. This study examines the usefulness of this information for merger-bankruptcy decisions of financially troubled firms.

In this study, a financially troubled firm is either a firm which filed for Chapter XI of the Federal Bankruptcy Act of 1898, as amended by the Act of 1938, or a firm on the road to bankruptcy before it merged into stronger financially healthy firms. The latter firms are identified by using Z - Score Model [Altman, 1968].

Corporate bankruptcy and merger have long been studied in both accounting and finance literature. Now,

they are timely subjects since the failure rate and merger movement are accelerating rapidly. Dun's Failure Index (see Appendix 1) shows the failure trend from 1920 through 1980 in the U.S.A. The failure peaked in 1922 (pre-depression period) and peaked to its highest rate in this period to a maximum of 154 failures per 10,000 firms as a result of the Great Depression in 1932. Then it dropped to four failures per 10,000 firms in 1945 as a result of the Second World War when there was increased demand for commodities and many industries transferred to military production. Recently, the failure rate has climbed. It soared from 24 per 10,000 in 1978 to 42 per 10,000 in 1980.

On the other hand, the 1960's can be called the merger decade. The number of mergers peaked to its highest point in 1969 (more than 6,000 mergers). In the 1980's, a great deal of cash has been spent on mergers. As reported in The New York Times [May 3, 1982, p. 1D], "Last year alone a record $82.6 billion was invested in the merger mania, and in what some analysts were calling the year of the 'mega deals,' 12 transactions came to more than $1 billion each."

Framework of the Merger-Bankruptcy Choices Available to Financially Troubled Firms

Practice and academic literature has proposed choices which are available to managements of financially troubled firms. This section will discuss briefly some of these strategies and also discuss in depth two choices: bankruptcy and merger choices.

Temporary Strategies:

First, the corporate management can solve the temporary problem by seeking to cut and/or freeze wages. For example, 10 or 15 percent of salaries of all firms' employees are put through "voluntary contribution," a series of special funds to meet such a problem. Recently, many firms used this strategy as an initial step to solve their financial crisis. Braniff International Corporation used this strategy more than once and also Pan American's employees accepted wage cuts and froze their wages until January 1, 1983.

Second, to meet the current debt obligation, the corporate management may seek to sell some of the firm's assets and unprofitable segments. The proceeds from a sale of the assets in the secondary and imperfect market will bring less than the assets are worth in the firm because it will be sold at distress prices [e.g., Scott, 1976].

Third, the corporate management can elect to work with the creditors to restructure the current debt obligations. FASB Statement No. 15 establishes reporting standards by the debtor and by creditors for a troubled debt restructuring. The statement mentions four examples of modification of terms of a debt [FASB, 1977, par. 5C]:

1. Reduction (absolute or contingent) of the stated rate for the remaining original life of the debt.

2. Extension of the maturity date or dates at a stated interest rate lower than the current market rate for new debt with similar risk.

3. Reduction (absolute or contingent) of the face amount or maturity amount of the debt as stated in the instrument or other agreement.

4. Reduction (absolute or contingent) of accrued interest.

The creditors with large loans not only can agree to restructure the terms of a debt but also can provide the firm with sufficient credit to permit continuation. The main disadvantage of this choice is that the creditors with large loans hold the power for this decision and, also, they will be acting in their self-interests.

Voluntary Bankruptcy Choice:

The purpose of bankruptcy proceedings is to collect and distribute all available assets of the bankrupt debtor among his unsecured creditors after payment to all priority creditors. There are two types of bankruptcy proceedings with respect to the agent which initiated them:

(1) involuntary bankruptcy (Chapter X), that is, unsecured creditors filing a petition in Bankruptcy Court against the debtor and (2) voluntary bankruptcy (Chapter XI), that is, the debtor filing a voluntary petition in the appropriate Bankruptcy Court.

The analysis of voluntary bankruptcy given in this study is the Chapter XI of the old Bankruptcy Act (Federal Bankruptcy Act of 1898, as amended in 1938). This study focused on the old law since the new Bankruptcy Act passed in 1978 and actually took effect in October 1979, so the study's data consists of firms which filed under the old Bankruptcy Act. In addition, for this study's objectives, the differences between the old Bankruptcy Act and the new Bankruptcy Law are minor.

White [1981, pp. 8-9] sees the Bankruptcy Courts and Congress having two contradictory goals in Chapter XI. He stated that:

> "The first is to treat creditors fairly by paying them as much as they would receive in liquidation. The second is to maximize the probability that the reorganization will succeed and the firm's jobs saved. . . the two goals are clearly contradictory, since the more that is paid to creditors, the less is left to finance the firm's recognized operations. . .the more that is paid out, the more that must be borrowed and the more risky is the reorganization effort itself."

Chapter XI sets forth the provisions of the arrangement plan which should be proposed by the insolvent debtor. The proposed plan is always sent to all unsecured creditors

(e.g., trade creditors) with the recommendation of the Creditors' Committee. Acceptance of an arrangement plan must be by a majority in number and amount of all creditors who file claims. If the creditors do not accept the debtor's plan, the firm can be forced to accept their plan or to convert Chapter XI to Chapter X proceedings or even to liquidation. The Bankruptcy Court shall confirm an arrangement plan if it satisfies the provisions of Chapter XI, for the best interests of the unsecured creditors and, also, if the debtor "has not been guilty of any of the acts or failed to perform any of the duties which would be a bar to the discharge of a bankrupt." [Section 336]. After the plan of arrangement has been filed, the Court holds a first meeting of creditors to elect a Creditors' Committee.

During arrangement proceedings, the firm prepares its financial statements based on the going concern concept. However, the arrangement plan may change both liability and capital structure of the firm. The common changes include:

1. Split of common stock.
2. Conversion of the convertible preferred stocks to shares of common stock.
3. Issuance of common stock for claims of unsecured creditors.
4. Issuance of notes payable to bankruptcy costs.

In recent years, the filing for Chapter XI accelerated rapidly. A first reasonable explanation is that the arrangement procedures give the firm a protection to reach agreement with its unsecured creditors for an extension of the debt period or scaling down of debt or both. A second reasonable explanation is that Chapter XI allows the debtor to continue its operations during the Court arrangement. The arrangement plan which is proposed by corporate management can specify which segment(s) of the firm will be continued and which will be shut down or sold. Usually, the corporate management keeps the most profitable segments. The allowance to the debtor to continue its operation is subject to legal and financing constraints.

The legal constraints of Chapter XI include:

1. The allowance to debtor is subject at all times to "the control of the Court and to such limitations, restrictions, terms and conditions as the Court may from time to time prescribe." [Section 342]
2. Upon application of a party in interest the Court may appoint a receiver to take charge of the debtor's property and operate his business. [Rule 11-18(b)]

3. The creditors have the opportunity to present their view and to allow the debtor to continue its business. [Section 326]
4. Authorization to operate business is only to operate "usual and normal course," and unusual transactions, e.g., encumbering debtor's assets, long-term contracts, sales of property, etc., require specific authorizations from Court [In Re Avorn Dress Co., Inc.].

The allowance to run bankrupt firms also subject to financing constraints. Such firms must be able to raise cash and increase their working capital. One financing strategy is to sell some of its assets and unprofitable segments - assuming the Bankruptcy Court gives the bankrupt debtor a specific authorization to sell its assets - the proceeds from a sale of the assets will bring less than the assets are worth in the firm because they will be sold at distress prices [e.g., Jensen and Meckling, 1976; Scott, 1976].

Another financing strategy is that the corporate management may attempt to obtain new credit especially from banks with large loans. However, this is not an easy way because such firms are running at a loss, have high debt-to-equity ratios, and also have low ratings from the leading financial services. In addition, the

bank with large loans has the power to extend new credit or not for such firms.

Merger Choice:

The merger wave in the 1960's motivated a number of authors to find possible gains from mergers. The first explanation is the synergy theory. According to this theory, the value of the new firm exceeds the value of individual firms brought together by mergers. Synergistic effects can arise from three sources [Brigham, 1979, p.681]: (1) operating economies resulting from economies of scale in production or distribution; (2) financial economies, including either a higher P/E ratio or a lower cost of debt, or both; and (3) increased market power due to reduced competition. The empirical evidence of synergy theory studies is often contradictory.

The second explanation is agency cost theory. The essence of this theory is that the corporate management is using mergers to its own benefit. A growing body of accounting literature concludes that the managers' incentive compensation is positively correlated with firm size, net income, and RoI. This explanation is based on many theoretical studies which point out that the equity holders may reduce their risk through portfolio diversification rather than merger [e.g., Alberts, 1966;

Levy and Sanet, 1970]. Also, it is based on, at least, one empirical study [e.g., Amihud and Lev, 1981].

The third explanation is the avoidance bankruptcy theory. Dewey [1968, p.257] argued that "most mergers have virtually nothing to do with either the creation of market power or the realization of scale economies. They are merely a civilized alternative to bankruptcy or the voluntary liquidation that transfer assets from failing to rising firms." Conn [1976, p.182] stated that "acquiring firms near bankruptcy or in a declining industry may wish to use mergers as the vehicle for entering more profitable or growth-oriented industries."

In practice, some regulatory agencies usually allow financially troubled firms to merge into stronger firms instead of declaring bankruptcy (e.g., Civil Aeronautics Board and Federal Savings and Loan Insurance Corporation).

Mergers of competitors are often in violation of anti-trust laws. One of the few exceptions is the Failing Company Doctrine (FCD). This Doctrine is applied in two uncertainties [Blum, 1974, pp. 1-2]: (1) the point at which a company is considered failing and (2) the manner of ascertaining absence of good-faith purchasers for the failing company.

As a primary hypothesis, this study will test empirically the validity of bankruptcy avoidance theory as a motive to merger movement in recent years.

However, this study is based on a new understanding of the merger movement, i.e., mergers as one of the choices available to corporate managements of financially troubled firms.

An Analysis of Merger-Bankruptcy Choices Within the Agency Theory Framework

A recent contribution to the behavioral analysis of the firm is agency theory. This theory views the firm as a set of contracts among groups, which are factors of team production. These groups are all motivated to maximize their own utility functions which in part is determined by the performance of the firm. The agency problems arise because the utility functions of principal and agent are not identical. The agent seeks to use inside information to his self-interest by increasing his wealth and reduce the risk which he bears. The principal will attempt to reduce or prevent this moral hazard problem by establishing contracts within the firm (e.g., compensation plan and debt covenant).

In recent years, the agency theory becomes increasingly important in analysis of some accounting questions such

as: (1) why does corporate management lobby for or against a specific accounting proposal? [e.g., Watts and Zimmerman, 1978], (2) what are the corporate management incentives to select alternative accounting standards? [e.g., Lilien and Pastena, 1982] and (3) what are the corporate management incentives to hire an external auditor? [e.g., Chow, 1982].

This section examines the agency problems which arise from merger-bankruptcy choices and the effect of such decisions on the firm's claims holders.

The previous theoretical studies [e.g., Bulow and Shoven, 1978] argue that a bankruptcy decision should be based on equity holders-creditors coalitions. Preis [1982] found that there is little evidence to indicate that these unions occurred. The current models will be based on four relating and conflicting parties: corporate management, equity holders, secured creditors, and unsecured creditors. The corporate management will be assumed to be the decision maker.

Despite the unsecured creditors having received a great deal of attention in the Federal Bankruptcy Act, Preis [1982, p.213] pointed out that "unsecured creditors received less cash immediately than secured creditors and waited longer for deferred payments. Of the nine firms offering deferred payments, four had deferral periods of

seven or more years, with a range of 6 months to 180 months." In addition, White [1981, p. 10] stated that "...their claim in that case is subjected to manipulation by the manager, who faces a cash squeeze, and by new lenders, who provide the needed cash."

On the other hand, Smith and Warner [1979] pointed out that mergers is one of debt restrictions. However, the merger can be permitted under certain requirements. For example, if the merging firm assumes all the obligations in the initial indenture. Thus, if the financially troubled firm selects the merger choice, the unsecured creditors will be in a better position because they will receive more cash under the merger choice than under voluntary bankruptcy.

On the other hand, the unsecured creditors are the troublemakers for the other parties in the firm. If they expect their claims' value under liquidation to be greater than under arrangement proceedings, clearly, they will vote to convert Chapter XI proceedings to liquidation. If arrangement proceedings convert to liquidation, the Bankruptcy Court will appoint a trustee who will have full power to manage the firm. Consequently, the corporate management will lose its power and if the labor market is efficient [Fama, 1980] that will reflect in its future employment. For example, Preis [1982] pointed out that half of the firms filed for Chapter X and XI, subsequently

liquidated either by conversion to straight bankruptcy or with the reorganization chapter and, consequently, the corporate management lost its job. Ang and Chua [1981] found that 35 out of 52 firms were eventually liquidated and, consequently, only 5.8 percent of the managers of those firms retained their jobs in the six years following bankruptcy.

It is true that, under Chapter XI, claims of the equity holders are still maintained. However, the harm that will be borne by them comes from two different sources: (1) stop receiving dividends while the firm is under arrangement proceedings and (2) the sharp decline in their stock prices. In addition to that, they have the risk of the conversion of Chapter XI to liquidation. If that happened, equity holders will be the "residual claimants" and they will be the losers in the bankruptcy game. Then, the equity holders are better off in the case of merger choice; however, it is of concern to them for at least two reasons [Stiglitz, 1972]: (1) the possibility of increasing the rate at which the firm must pay on its bonds in the case of merger and (2) the minority valuation of stocks may be greater than the market price.

In bankruptcy, the agency problems arise, also, between corporate management and equity holders. Pries

[1982] found that 19 out of 21 (90 percent) displayed at least one of the agency problems (e.g., stockholders' suits against management, management fraud suits, and replacement of management).

Finally, the agency problems arising between the creditors themselves. Preis [1982, p.170] found after the petition had been filed that ". . . secured and unsecured creditors cooperated in forming a committee in only 4 cases, although creditors committees of one group or the other were organized in 27 cases. In 11 cases, creditors were openly hostile toward each other."

The above description and analysis creates the following framework:

(1) Despite the legal and financing constraints of Chapter XI, the filing for voluntary bankruptcy is increasing rapidly in recent years and this is clear evidence that Chapter XI is one of the choices available to many financially troubled firms. As will be discussed in Chapter III, there are some accounting and economic incentives for financially troubled firms to select Chapter XI rather than merger. For example, larger firms suffer less risk under arrangement proceedings than smaller firms. Larger firms can recover from Chapter XI since they have more diversified investments and economics scale and have more power to renew or even open new credit lines.

(2) Chapter XI does not give the bankrupt firm complete protection against its creditors. Not every firm under arrangement proceedings can easily restart or continue its operations because some firms (e.g., smaller firms) are subject to more legal and financing constraints than others (e.g., larger firms). Such constraints lead to at least three outcomes for the firms filing for Chapter XI:

A. If the bank with large loans agrees to extend new credit to the firm or if the firm finds other means to increase its cash flow and, consequently, succeed in continuing its operations, then the firm in this case may seek recovery from arrangement proceedings.

B. As developed previously, under certain circumstances, Chapter XI proceedings may be converted to reorganization proceedings. In this case, the Bankruptcy Court has to confirm if the firm is insolvent or not. If the firm is insolvent, the equity holders will not participate in the reorganization and their interests will be extinguished. In contrast to Chapter XI, straight bankruptcy contemplates liquidation rather than rehabilitation of the debtor, equity holders are entitled to share only in any liquidation proceeds remaining after creditors have been paid in full.

Also, under Chapter X, the corporate management loses its control. A trustee will be appointed by the Bankruptcy Court and the trustee will bear full power, control, and authority to manage the operations of capital.

C. The firm during Court administration is seeking to merge into another financially healthy firm. Such decision required some legal procedures. The Bankruptcy Court decision depends on the trustee's plan and the Securities and Exchange Commission.

The Objectives, Research Approaches and Importance of this Study

The previous studies in corporate bankruptcy attempted to build optimal models to predict financial failure [e.g., Beaver, 1966; Altman, 1968; Blum, 1974]. Other literature used these models to study other aspects of the problem. For example, Beaver [1968b] used the univariate model to examine the stock market reaction to the failed firms. Altman and Brenner [1981] assessed the stock market response to information about firms whose future is assessed to be extremely problematic.

On the other hand, the merger movement in the 1960 decade motivated a number of authors to analyze theoretically and test empirically the merger motivations.

These motivation theories include synergy theory [e.g., Mossin, 1973], agency cost theory [e.g., Amihud and Lev, 1981] and bankruptcy avoidance theory [e.g., Shrieves and Stevens, 1979].

Very few studies [e.g., Bulow and Shoven, 1978; Ang and Chua, 1980] examined the bankruptcy decision. All of these studies are based on normative financial policy arguments. The decision maker in these studies is the creditor rather than corporate management.

To date, no study has examined the corporate management motivations to select merger-bankruptcy decisions of financially troubled firms. To correct the perceived deficiencies in the prior literature, the present study provides a theoretical and empirical analysis of accounting and economics incentives which motivate corporate management to select merger-bankruptcy decisions of financially troubled firms.

Thus, the objectives of this study are to analyze theoretically and test empirically the following three important research questions:

1. To what extent, the avoidance bankruptcy theory is the rational explanation to merger movement in recent years?
2. Given the validity of the avoidance bankruptcy theory as motivation to merger movement, what

are the accounting and economics determinants of merger-voluntary bankruptcy choices for the financially troubled firms?

3. Given the legal and financing constraints of Chapter XI, what are the accounting and economics determinants of Chapter XI firms outcomes?

By implementing these objectives, this study is assessing the usefulness of accounting numbers to economics decisions (in this study, merger-bankruptcy decisions of financially troubled firms) in internal organization.

To provide adequate coverage, an eclectic approach will be used:

1. 10-Ks and proxy statements of some financially troubled firms will be reviewed and analyzed.
2. Relevant anecdotal reports of relevant mergers and bankruptcies will be reviewed.
3. Develop models of managerial motivation of merger-bankruptcy choices. This part represents a theoretical basis of this study.
4. Given the nature of data required for this study, the N-Chotomous Probit Analysis (NPA) seems to be a superior technique to test empirically the models of management motivation

of merger-bankruptcy choice models. The Multiple Discriminant Analysis (MDA) will be used also as an additional test.

The results of this study can serve some useful functions which include:

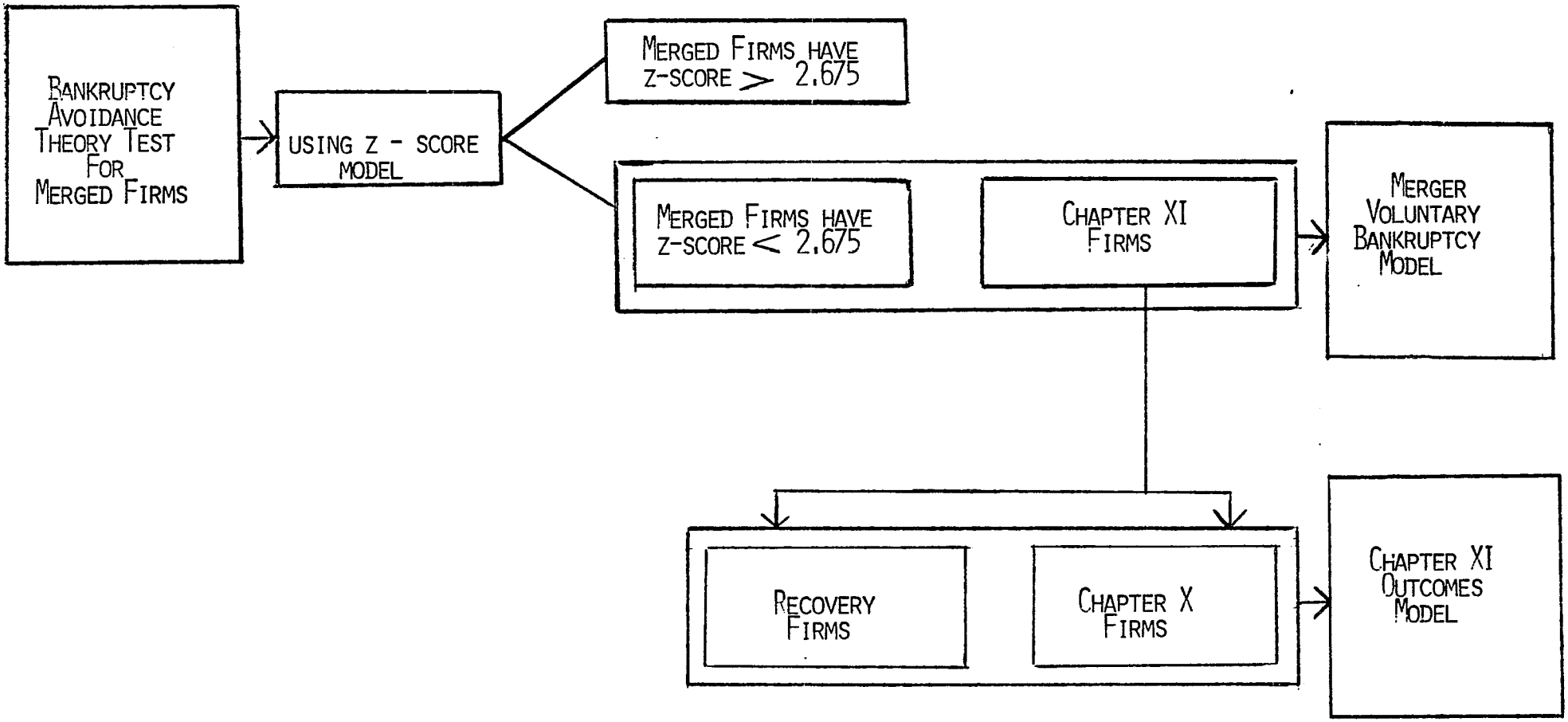
1. They can provide logically consistent explanations of merger-bankruptcy choices for financially troubled firms.
2. It may be useful in predicting which financially troubled firm will seek to merge into a stronger firm or will select voluntary bankruptcy. It is also useful in predicting the outcome of Chapter XI firms.
3. It is possible to use such models by investors and creditors in investment and credit decisions.

Organization of this Study:

This study is divided into six chapters. In the next chapter, the existing academic literature is reviewed. The prior literature is largely composed of three streams: (1) corporate bankruptcy prediction models; (2) the analytic and empirical studies of merger motivations; and (3) merger-bankruptcy choice models. In Chapter III, some accounting and economic determinants of merger-bankruptcy choices models are examined. This chapter represents the theoretical basis for this study and also

provides the testable hypotheses for managerial motivations of merger-bankruptcy choices. Chapter IV describes the construction of samples, the data used for the empirical analysis and the specification of both the N-Chotomous Probit and Multiple Discriminant procedures employed. The details of the empirical results for the models are reported in Chapter V. Finally, conclusions, limitations, implications and future research are considered in Chapter VI.

Figure 1 illustrates the framework of the current study.



STUDY FRAMEWORK

Figure 1

Chapter II

Related Prior Research

The existing academic literature relating to this study is largely composed of three streams: (1) corporate bankruptcy prediction models; (2) the analytic and empirical studies of merger motivations and (3) merger-bankruptcy choices models.

Corporate Bankruptcy Prediction Models

A prediction of corporate bankruptcy using accounting numbers is considered only one of the many possibilities for studying the ability of accounting data to predict a future event, e.g., financial failure. Statement of Financial Accounting Standards Board Concepts No. 2 [FASB, 1980] mentioned the predictive value of accounting information as one of the qualitative characteristics of accounting information.

The ability to predict corporate bankruptcy is important from a social and private point of view, since corporate bankruptcy is obviously an indication of resource misallocation [Lev, 1974].

The society's concern is represented in many examples. First, the major motivation for both the Metcalf and Moss Committees to begin their inquiry into the accounting profession is that a series of unexpected failures by major

corporations took place in the early 1970's.[1] Second, the U.S. Government's guarantee of a loan to Lockheed Corporation several years ago illustrates society's concern over the solvency of at least one major corporation [Heath, 1978, p.3].

The financial statement users are concerned because the bankruptcy directly effects the creditors, equity-holders and market value of the firm. Heath [1978, p.2] says "other financial statement users are, also, concerned with a firm's solvency, such as employees, suppliers and customers. They are concerned because of the loss of jobs, loss of customers, and distribution of sources of supply."

The empirical and theoretical analysis of corporate bankruptcy prediction models have been performed at length in the literature. Since there is, unfortunately, little interaction between these empirical and theoretical studies, they are discussed separately in the following two sub-sections.

Empirical Studies of Corporate Bankruptcy Prediction:

In the last 15 years or so, univariate and multivariate models have been used in the empirical studies of corporate bankruptcy. A univariate approach to predict financial failure attempts to identify a single financial ratio that could classify failed and nonfailed firms. There are two

[1]Another major reason was the dislosures of widespread questionable and illegal activities by the managements of many publicly owned corporations.

key assumptions in this approach [Foster, 1978, p.463]: (1) the distribution of the variables for distressed firms differs systematically from the distribution of the variables for the nondistressed firms and (2) these systematic differences can be capitalized on for prediction purposes.

Beaver [1966] conducted a paired analysis. His sample included 79 failed firms and 79 nonfailed firms. A firm was designated as failed when any one of the following events occurred in the 1954-1964 period: bankruptcy, bond default, an overdrawn bank account, or nonpayment of a preferred stock dividend. Beaver [1966] computed the mean of 30 financial ratios for each of the failed and nonfailed groups in each of the five annual financial statements issued prior to failure. His best ratio was cash flow to total debt. The overall accuracy was 87 percent for one year before the bankruptcy.

In a subsequent paper, Beaver [1968a] used the dichotomous classification test for the same sample and also for the same period. Fourteen financial ratios were calculated for each firm. The overall sample of firms was then divided into two subsamples, each consisting of about half of the pairs of firms. The firms in each subsample were ranked by the values of their financial ratios. The value of each variable in one subsample which showed the smallest number of misclassifications was then used as the critical value of the ratio for classifying the firms in the second subsample. The number of errors resulting from

the use of each of the financial ratios in each of the five years before bankruptcy was calculated, and the better predictors were deemed to be chosen if it showed the smallest classification error rate. Deakin [1972, p.162] indicated that

> Beaver included firms which defaulted on loan obligations or missed preferred dividend payments. But unless the nonbankrupt firms were matched by debt structure as well as by size and industry, there could be a potential bias in certain of the ratios.

Deakin [1972] replicated Beaver's analysis by using the same general procedures. The findings of Deakin's study were quite similar to those reported by Beaver [1966].

The stock market reaction to the failed firms was examined by Beaver [1968b]. He conducted a test to see if the stock market would predict corporate bankruptcy before the financial failure and found that the stock market won by a slight margin. Beaver's conclusion [1968, p.182] was "investors appear to adjust to the new solvency positions of the failed firms continuously over the five-year period, but the largest unexpected deterioration still occurs in the final year before failure."

One basic limitation of the univariate approach is that it can consider only one aspect of the firm at a time. Since the firm has multidimensional characteristics, this constitutes a severe restriction in the use of information. In an attempt to improve the efficiency of information used,

a Multiple Discriminant Analysis (MDA) was developed by Altman [1968] and later modified by many other authors.

Altman [1968] used the MDA to predict bankruptcy. In his study, the initial sample was composed from 66 firms. The sample of firms included 33 firms that filed a bankruptcy petition under Chapter X of the Bankruptcy Act during the 1946-1965 period. The firms were stratified by industry and by size. Firms in group two were still in existence in 1966. For the initial sample test, the data was derived from financial statements reported the period prior to bankruptcy. A list of 22 variables was compiled for evaluation. The variables were classified into five standard ratio categories, including liquidity, profitability, leverage, solvency, and activity ratios. The ratios were chosen on the basis of "popularity in the literature" and "potential relevance to the study." From the original list of variables, five independent variables were selected as doing the best overall job together in the prediction of corporate bankruptcy. These five variables were: working capital to total asset (X_1), retained earnings to total assets (X_2), earning before interest and taxes to total assets (X_3), market value of equity to book value of debt (X_4), and sales to total assets. Altman's model was an accurate forecaster of bankruptcy up to two years prior to bankruptcy and the prediction ability was a decreasing function for the year

before bankruptcy. In the second year through the fifth years prior to bankruptcy, the Altman model led to more misclassification than did Beaver's model, using only a cash flow to total debt ratio.

Altman [1973] developed a special bankruptcy model for the railroad industry. His sample was 21 railroads that went bankrupt between the years 1939-1970. Two types of information were gathered two years prior to bankruptcy, i.e., accounting information and financial statistics for the industry as a whole. Altman compared failed firms ratios statistically to the average railroad industry ratios. The empirical classification results of the original two-group sample one year prior to bankruptcy are extremely accurate. Only one bankrupt firm was misclassified as healthy while every other observation on average was correctly classified. Only one firm failed of its group space.

Deakin [1972] tried to modify the Altman [1968] model by increasing the number of independent variables. He used Beaver's 14 financial ratios as input to the discriminant analysis program. Deakin's model correctly identified a large number of potential failures as far as three years before the firm filed for bankruptcy. In this respect, Deakin's model is superior to Altman's model.

Blum [1974] constructed a model, based on accounting and financial market data, to be used as a defense in

anti-trust cases under the "Failing Company Doctrine" (FCD). The FCD differs from models previously discussed in the literature in that most of the variables incorporate changes over time, such as investors' return from selling a security six years after purchase; and it included variability of accounting data, e.g., the standard deviation of net income. Data were collected for the entire population (115 firms) of industrial firms which failed from 1954 to 1968, and were paired with 115 non-failed firms. The matching was based on four variables, utilized in the following order: industry, sales, employees, and fiscal year. Data up to eight years prior to bankruptcy were collected when available; however, five years of data prior to failure were found optimal. Based upon validation sample tests, Blum concluded that predictive accuracy of the FCD is 93-95 percent of the first year before failure. In the first year before bankruptcy, predictions of failed firms not to fail (Type II error) are more rare than predictions of nonfailed companies to fail (Type I error).

Table 1 shows the main methodologies and conclusions of the most important studies discussed above.

One study [Altman and McGough, 1974] developed criteria to aid the auditor in identifying situations where the status of a company as a going concern is in doubt. A major conclusion was that the statistical model can predict a going concern problem earlier than an auditor's opinion

Table 1

The Methodologies and Conclusions of the Most Important Five Studies in Bankruptcy Prediction Models

	Univariate Approach			Multiple Discriminant Analysis		
	Beaver (1966)	Beaver (1968a)	Deakin (1972) First Part of Paper	Altman (1968)	Deakin (1972) Second Part of Paper	Blum (1974)
Research Sample	79 failed firms; 79 nonfailed firms	79 failed firms; 79 nonfailed firms	32 failed firms; 32 nonfailed firms	33 failed firms; 33 nonfailed firms	11 failed firms; 13 nonfailed firms	115 failed firms; 115 nonfailed firms
Variables	30	14	14	5	14	12
Statistical Methods	Univariate Approach	Univariate Approach	Univariate Approach	Discriminant Analysis	Discriminant Analysis	Discriminant Analysis
Best Ratio or ratios	CF/TD			WC/TA RE/TA EBIT/TA E/D S/TA	WC/TA	NWC/TA CF/TD TBNQA/I ROT/CS
Accuracy 1	87%			95%	97%	83-95%
2	79%			72%	95-1/2%	80%
3	77%			48%	95-1/2%	70%
4	76%			29%	79%	70%
5	78%			36%	83%	70%
Lead Time	Five Years		Three Years	Two Years	Five Years	Five Years

in a company that eventually enters bankruptcy.

Katz, Lilien and Nelson [1983] provide further evidence. They explored the association between signals of distress emerging from bankruptcy models [Altman model and Wilcox model] and security behavior around detection events. Their results are that the Altman model does have predictive qualities; however, substantial anticipation exists prior to the event. The cumulative residuals suggest that for those firms identified by the model as shifting from distress to healthy, the market response is substantial. For the 15-month period prior to the issuance of the annual report (on the average three months subsequent to the fiscal year-end), S & P 400 securities appreciate by approximately 37% relative to the market and those outside S & P 400 by 50%. These results are consistent with the notion that the market anticipates good news. However, in both groups, there are additional price movements of 8.3% from the S & P 400 and 10.4% from their NYSE companies. For the securities identified by the Wilcox model of recovery candidates, the results are mixed and not as distinct. For both S & P 400 and non-S & P 400 NYSE securities, there is an appreciation during the 15 month period prior to the public disclosure of the financial statements of 12.9% and 15.8%, respectively. After the public disclosure, the price appreciation relative to the market is mixed and small.

Ketz (1978) provides an empirical evidence on the utility of general price-level information as compared to the utility of historical cost information for corporate bankruptcy prediction. Seventy-five failed firms were chosen from 1979-1975. The conventional statements and the general price-level statements were prepared two years prior to the financial failure. From those statements, 16 financial ratios were computed. For nonfailed firms, the data chosen for 597 nonfailed observations were obtained from the historical cost group and 585 nonfailed observations for the price-level group. The conclusion drawn by the author was:

> the methods are equivalent from the criteria of R^2, the overall error rates, and the error rates of misclassifying nonfailed firms, but that the general-price procedure performs better in terms of the error rate of misclassifying failed firms and the expected costs of misclassifications.

Theoretical Analysis of Corporate Bankruptcy Prediction:

The motivation for the theoretical analysis of corporate bankruptcy prediction is that the empirical studies are based only on statistical analysis, no implicit underlying theory as Foster [1978] claimed. The selection of the variables is arbitrary and there is no basic theoretical analysis behind the causes of corporate bankruptcy. These studies ignored many important variables associated with the bankruptcy, such as the firm's age.

Resolving the bankruptcy prediction problem requires adequate theoretical development to improve the descriptive, predictive ability, and also to study the economic and behavioral factors that have an effect on corporate bankruptcy. Without these developments, the empirical studies of corporate bankruptcy are considered as "measurement without theory." In the literature, there are at least three theoretical approaches:

First, Models based on Gambler's ruin process:

Tinsley [1970] and Wilcox [1971, 1973, and 1976] are examples of this approach. Wilcox [1971] constructed a probabilistic model of financial ruin. The problem is depicted as a Markov process in the form of a one-dimensional random walk with an absorbing barrier at the lower boundary and no upper boundary. This is similar to Tinsley's [1970] random walk model with the expectation that the latter included an upper boundary. Both are modeled after the gambler's ruin process. Wilcox chose as a unit of measurement the standard deviation (σ) of gains and losses. He stated that, suppose there exists a firm of wealth C, which every year plays a game which nets it a gain or loss of constant size $\pm\sigma$, where the probability of a gain equals p, and of a loss, q, and suppose $p > q$, then the probability of this firm's ultimate failure is:

p (ultimate failure) = $(q/p)^{c/\sigma}$

Where c/σ = number of losses z the firm can take in a row before being ruined

q and p as defined before

In his model, the random walk has a drift rate which is an average tendency to gain or loss during sequential trials. The drift of the random walk is represented as the average rate of return on total capital invested.

Wilcox's model emphasized developing a model which will enable calculation of the probability of ruin rather than the effect of failure risk on the value of the firm. In a subsequent paper, Wilcox [1973] tested the above model using industrial firms. Failure was defined as filing either Chapter X or XI of the Bankruptcy Act. Wilcox [1973] used the same criteria, matched pairs of firms in the same industrial classification and similar asset size. Wilcox selected an alternative approach with financial variables that are analogous to the information in the model used to set up to be essentially the same as the discriminant analysis approaches, except that the discriminant function was derived from theoretical analysis rather than from the empirical assignment of weights according to discrimination power.

Second, Models with perfect access to external market:

The stock variable in the gambler's ruin model is the stockholders' equity. In contrast, in Scott [1976,

1977], the market value of the equity is the stock variable. The difference between both models with respect to this point represent two different views of the firm's value. Under the traditional accounting model, the difference between assets and liabilities in the balance sheet represents the stockholders' equity. Under the economic's view, the stock variable is market value of the firm.

Scott [1976, 1977] assumed that the firm can meet losses by selling debt or equity in an efficient market without incurring flotation costs. It can also sell assets, but does not choose to do so because it assumes that the secondary market for assets is imperfect and that the initial level of assets is optimal. Thus, a sale of assets will bring less than the assets are worth to the insolvent firm. The major assumption of these models is that a firm remain in business as long as the market value of the firm remains positive. Scott is using the low stock market value not only to predict corporate bankruptcy but also to calculate the probability of bankruptcy.

Third, Models with imperfect access to external capital:

The assumption of "perfect" is not valid. For example, a firm may incur flotation costs when it sells securities, or there may be a personal tax system that favors corporate investments that are internally-funded. Or systematic imperfections in the market's pricing of

securities may hinder corporate access to external capital [Scott, 1979, p.20]. Scott [1979] makes six generalizations in his model [Scott, 1979, pp. 25-30]. They will be discussed here briefly.

1. Fixed flotation costs. According to ZETA [Altman, Haldeman, and Narayaman, 1977], firms with larger total assets tend to have lower probabilities of financial failure. Scott [1979] argued that if there are flotation costs, a firm will pay for small losses by liquidating assets. However, if losses are sufficiently large, the firm will bear the fixed flotation costs, sell equity, and use the proceeds to help pay the losses. According to this analysis, the bankruptcy predictor should be smaller for large firms and should have lower probabilities of bankruptcy.

2. Imperfect secondary market for assets. Using the traditional measure of corporate liquidity, the current ratio in the ZETA model and some empirical research tend to discriminate between failed and nonfailed firms. Scott's theoretical justification, in addition to flotation costs, is that the secondary market for assets is imperfect.

3. Differences between accounting and economic values. Because historical costs are used in determining accounting values, the use of accounting values requires a slight change in the value-of-equity function. When gross investment is positive, no change is necessary. [Scott,

1979, pp. 28-29].

4. Risk aversion. If the investors are risk averse, the value-of-equity (S_1) will equal the market-certainty-equivalent of period 2 cash flow discounted by the interest free rate.

5. Personal taxes. If there is personal tax on dividends, and there are no personal taxes on capital gain, no changes are required in financial failure environment. Scott's analysis is incomplete because it does not tell us what is the case if there are personal taxes on capital gains.

6. Debt and multi-dimensional production function. If, for a specific firm, the debt has lower flotation costs than equity, firms that experience a sequence of losses will find it optimal to issue more and more debt. However, there is a probability of bankruptcy. The second dimension mentioned by Scott [1979] is that if the firm output is a function of several different kinds of assets, firms with poor earnings are likely to develop input imbalances as they sell off their more liquid assets. Such imbalances may lead to higher probabilities of bankruptcy, but whether they do or do not depends on the nature of the firm's production function.

To sum up, the above studies attempt to build optimal prediction models for corporate bankruptcy or using these models to study other aspects of the problem. However,

there is no underlying theory to those models. For example, there is no theoretical justification to the variables which are included or excluded from the model. As a result of this, the same variable may have high predictive ability in one study and a low predictive ability in another study.

The theoretical analysis of corporate bankruptcy is limited and has several shortcomings. The emphasis has primarily been on classification of the Modigliani-Miller controversy rather than optimal debt capacity. The gambler ruin models implicitly assume the firm is completely cut-off from the capital market. That is, it must fund its losses by selling assets, and cannot sell either debt or equity [Scott, 1979].

The Scott models [1976 and 1977] are based on unrealistic assumptions because the author assumed the market is perfect and it is obviously not. Scott also assumed the firm can sell debt, and he ignored the consequences of the optimal capacity of debt. Also, if the capital market is efficient in the semi-strong form, all public information is available, the market will reflect any unfavorable information. Consequently, there are limitations to financially troubled firms to sell more debt. However, Scott did not suggest any alternative to his analysis in case the market values of the firms are reduced to reflect the costs of formal bankruptcy. Barnea,

Haugen, and Senbet [1981, p.12] suggested that "...it is in the interests of outsiders to take over the firm and initiate an informal reorganization."

The Analytic and Empirical Studies of Merger Motivations

The study of the characteristics of merged versus nonmerged firms has received some attention. Most of the earlier studies focused on the financial characteristics of firms merged in the 1960's [e.g., Stevens 1973; and Monroe and Simkowitz 1971]. Very few studies focus on the characteristics of firms acquired in the 1970's [e.g., Harris, Stewart and Carleton, 1982].

Stevens [1973] used MDA to analyze a group of acquired firms and a group of nonacquired firms in the 1960's to determine the financial characteristics of acquired firms. The sample was matched by size distributions of assets. Stevens' conclusion is that the acquired firms tended to be more liquid, have lower levels of leverage, and there are very little group differences between acquired firms and nonacquired firms in sales-assets ratio.

There is a more recent study by Harris, Stewart and Carleton, [1982]. They examined the financial characteristics of acquired firms in the mid-1970's. Their study's objective was to determine if (1) such characteristics differ markedly from the characteristics of nonacquired firms and (2) such

characteristics might be useful in predicting which companies will be acquired. The authors used the probit model to estimate the relationship between dependent variables (i.e., merged firms and nonmerged firms) and independent variables (i.e., financial ratios).

Specific conclusions reached by the authors are as follows:

> Statistical models (probit) to estimate the probability do achieve statistical significance. These models indicate that smaller firms and firms with lower price-earnings ratios are more likely to be acquired. Other factors (for example, liquidity and indebtedness) have effects that change over time.
>
> Despite this statistical significance (99 percent level), only a very small portion of the factors contributing to acquisition is captured by the statistical models based only upon acquired-firm characteristics. p.224

Higgins and Schall [1975] examined the benefits of conglomerate merger. Under the unrealistic assumptions that there is neither bankruptcy cost nor taxes, they concluded that while the conglomerate merger does not effect the value of the firm, the equity value is likely to decline. Under the bankruptcy cost assumption, Higgins and Schall [1975, p.111] concluded that: "...the effects of conglomerate merger on aggregate firm value depends upon the nature of the costs, their probability of occurrence and the manner in which investors value risky streams."

Levy and Sarnat [1975] have analyzed the portfolio diversification inherent in a conglomerate merger. They found that in case of a perfect capital market assumption,

the conglomerate merger does not create additional diversification over what was possible to investors. Under the assumption of imperfect capital market, however, the conglomerate does allow a degree of additional diversification to the investor. Similar results are reached by Kim and McConnel [1977]. The authors found that the total value of the merging firm's common stock must decline in a perfect market. Consequently, the merger leads to transfer wealth from equity holders to debt holders.

A study by the Federal Trade Commission (FTC) [1972] presented the result of an empirical analysis of nine large, active, acquiring firms. The FTC used a questionnaire to collect data about the organizational changes made by the acquiring companies specifically the changes in management after acquisition, changes in advertising, investment in new plant and equipment, and new product development and also the market positions of firms acquired by conglomerates, both in terms of size and in terms of industry concentration levels. The authors reach four principal conclusions.

1. An examination of the changes in management after acquisition revealed that, 51 percent of the management of the acquired units stayed on indefinitely. Another 39 percent remain initially, but later retired, resigned, or moved to other positions within the conglomerate. Only

10 percent of the management left immediately after the acquisition.

2. The study found no evidence that the merger made many improvements in the operations of acquired firms.
3. With respect to the market position of acquired firms, the study revealed that 127 of the 218 acquired market positions, for which data were available, showed declines between the time of acquisition and 1969.
4. An analysis of post-merger profits revealed that no systematic tendency for profits of firms acquired by conglomerates to increase after acquisition vis-a-vis other firms in the same industry.

Lev and Mandelker [1972] focused on the long-run effects of merger on acquiring firms. Their analysis is based on paired sample techniques. The experiment (merging firms) and control groups (nonmerging firms) are matched by industry and by asset size. The data were collected for eleven years for each firm in both groups. The effect of merger on profitability, risk reduction, financial leverage, and growth were examined. The author's major conclusions can be summarized in the following points:

1. The five-year return to stockholders of merging firms was probably higher than the return to stockholders of control samples.

2. Mergers had no clear effect on the riskiness of the merging firms as measured by beta.
3. The average annual growth rate of merging firms was smaller than that of nonmerging firms.
4. There was no clear distinction between the capital structure of merging firms and that of control groups.
5. The measurement of liquidity (i.e., working capital ratio) showed a slight advantage in liquidity for the control groups.

Falk and Gorden [1979] tested empirically the multiple motives behind U.S. and Canadian business combination decisions in the 1960's. The study was based on extensive review of the literature and on questionnaire analysis. The authors found the following seven variables that motivate corporate management to make a business combination decision: (1) managerial performance, (2) increase in the firm's general competitive positions, (3) operating economics, (4) internal relations and organization design, (5) increased liquidity, (6) increased external relations, and (7) indirect financial incentives.

The conclusion of the literature on the diversification and mergers motivated Amihud and Lev [1981] to provide new explanations to conglomerate mergers based on agency theory framework. Their hypothesis is that conglomerate mergers may be motivated by managers' own preferences. The

authors examine this hypothesis in two different ways: (1) by using actual number of mergers performed by each firm as a measure of the propensity to diversify. This test implemented by cross sectional relationship between the number of corporate acquisitions by specific firms within ten years (as dependent variable) and type of control and size (as independent variables). In the second test, the authors examined the relationship between control type and the extent of income diversification regardless of the means by which such diversification was achieved. The second test used the following linear model:

$$X_{it} = \alpha_i + \beta_i X_{mt} + \mu_{it}$$

Where,

X_{it} = income/equity as an accounting measure of the rate of return.

X_{mt} = the corresponding average rate of return for all the firms in the economy.

μ_{it} = a factor unique to firm i, uncorrelated with X_{mt}.

The authors measured the diversification by the coefficient determination, R^2, from the above model. Since the greater the R^2, the more closely does the firm's return move with the economy's return, a fact which reflected the essence of diversification. Their conclusions are:

> First, manager-controlled firms were found to engage in more conglomerate acquisitions that owner-controlled firms were found to be more diversified than those of owner-controlled firms. Second, regardless of the means by which a firm achieves diversification, the operations of manager-controlled firms were found to be more diversified than those of owner-controlled firms. p.615

Amihud and Lev's conclusion is consistent with prior authors' conclusions. For example, Reid [1968] concluded that the managerial firms have a greater propensity to merge than do nonmanagerial ones. Also, it is consistent with some critics, it was reported in Fortune Magazine [May 3, 1982, p.48] that: "...these mergers represent a socially unproductive use of capital, and suggest that the executives may simply be indulging their egos, jeopardizing the shareholders' money to inflate their own importance in the business world."

The above studies reveal that no single conclusion can be drawn either for the characteristics of merged firms or the benefits of merger. As Segall [1968, p.1] correctly wrote:

> there is no single hypothesis which is both plausible and general and which shows promise of explaining the current merger movement. If so, it is correct to say that there is nothing known about mergers; there are no useful generalizations."

Merger-Bankruptcy Decision Models

Since the late 1950's the literature addressed the question of optimal financial policy in a world of taxation and bankruptcy costs [e.g., Kraus and Litzenberger, 1973; Scott, 1976]. The major thrust of these studies is that there is an optimal capital structure either as a result of the tax-advantage-bankruptcy cost trade-off or as a result of other causes such as agency relationship cost.

Within the optimal financial policy literature framework, there are very few studies attempting to develop a model for bankruptcy decision [e.g., Stiglitz, 1972; Bulow and Shoven, 1978]. Most of these studies considered theoretically merger into another healthy firm as "an efficient alternative to bankruptcy." Stiglitz [1972, p.460] viewed bankruptcy conditions as "at some time at some state of nature the firm is unable to meet its debt obligations; the value of equity is zero." Under these conditions, bankruptcy is possible and has very strong implications for firm behavior. Since avoiding bankruptcy cost is interesting to all parties in the firm, he suggested two strategies to avoid bankruptcy: (1) the parties choose a debt-equity ratio which avoids the high expectation of bankruptcy and (2) take-overs or mergers. Such strategy also will avoid the bankruptcy costs. However, there are some limitations to choose merger

strategy such as firm size.

In a more recent study, Bulow and Shoven [1978] suggested another model. Their model focused on the conflicts of interest among various claimants to the assets and income flows of the firm, i.e., the stockholders, bondholders, and bank lenders. The decision maker in their model was the bank with large loans. Bulow and Shoven's model is completely different than Stiglitz's [1972]. They showed that a negative net wealth is not a sufficient condition to force a firm into bankruptcy. The authors mentioned some cases in which a firm continues in business even though its liquidation value is greater than its expected going concern value, and then they illustrate the opposite case. In their view:

> The bankruptcy choice depends on several variables in addition to the firm's net worth position and the costs of bankruptcy. The decision maker (in our model, the bank lender) must also take into account the maturity structure, priority structure, and the ownership of the firm's debt. Further, the choice is affected by the composition of the firm's asset portfolio and by the variability in the returns to that portfolio should the firm remain in business... p.454

Bulow and Shoven also consider merger into a healthy firm as an alternative to bankruptcy. They show that the tax system has an important effect on the choice between merger and bankruptcy.

Ang and Chua [1980] is another example of such studies. The authors suggested another model based on me-first rule

rather than the formation of coalition that affects the bankruptcy decision. By including the me-first rule in the analysis, the traditional bankruptcy rule may be properly qualified and restated as:

> Proposition 1: When the me-first rule applies the decision criterion for liquidation is whether or not liquidation value exceeds going concern values.
>
> Proposition 2: When the me-first rule is not observed, the traditional liquidation rule does not apply. p.356

As Bulow and Shoven's study indicated, the merger is considered as an alternative to bankruptcy. They also examine the effect of present tax loss carryovers on the merger-bankruptcy decision.

The above studies are based on purely normative economic arguments. The event (i.e., bankruptcy vs. merger) in this type of literature is not testable. The decision maker in the formation of coalition model is a bank with large loan. Both traditional models and formation of coalition models do not include corporate management either as a decision maker or as a party that has self-interest to avoid bankruptcy costs. Both Bulow and Shoven and Ang and Chua studies examined mathematically only one incentive variable to select merger choice rather than bankruptcy choice, i.e., operating tax loss carry over.

The next chapter will discuss the accounting and economics determinants of merger-bankruptcy choices models and also provide the testable hypotheses for the empirical tests.

CHAPTER III

Management Choices and Factors Which Motivate Choice

The issue of choices available to the financially troubled firms has been introduced in the finance literature [e.g., Altman, 1971; Stiglitz, 1972]. For example, Altman [1971, p.105] advises that "management should develop the ability to forecast impending problems early enough in order to effect a merger before bankruptcy and/or liquidation becomes the only alternative." In line with this reasoning, the current study assumes that any failing firm can find a merger partner if the decision to merge is made on a timely basis and the asking price is realistic given the firm's economic problems. Obviously, if management delays the decision to merge on reasonable terms until the firm has lost its economic viability, the option to merge will be lost. Thus, having lost economic viability, the firm's only choice will be to risk and probably suffer bankruptcy. The point that is emphasized in this study is that given the decision is made on a timely basis the management of a financially troubled firm does have the opportunity to merge.

If the financially troubled firm does not merge, it will continue to risk bankruptcy. Since the criteria for classifying a firm as troubled is that the very accurate Altman [1968] predicts bankruptcy for the firm, there is a

very high probability that the firm will file for Chapter XI within a year or so. In the context of the current study, financially troubled firms which do not merge are defined as being willing to risk bankruptcy. It should be noted that for most firms (Manville and Wilson Foods are exceptions) actual Chapter XI bankruptcy is not a desirable choice; rather, management is maintaining its independence even if it must operate as a distressed firm to do so. The tactics of such distressed firms may consist of voluntary debt restructuring by lenders, negotiating wage concessions with unions, bailouts or favors from government at various levels or continuing to operate as usual if management anticipates a cyclical turnabout.

In summary, this study frames the choices available to management of a financially troubled firm as merging or continuing to risk bankruptcy. The relevant decision period for this choice is while the firm has continued economic viability in that a merger partner can be attracted. By definition, all troubled firms which merged chose the merger option. A key assumption is that those firms which did not merge but instead suffered bankruptcy did have a chance to merge if the decision to merge on reasonable terms had been made on a timely basis.

Factors Which Motivate Managements' Choices:

While previous research such as Altman [1971] and Stiglitz [1972] has suggested that the management of

financially troubled firms can preserve some corporate assets through merger, previous research has not explored which factors would motivate the management of the troubled firm to merge while still viable rather than continue to risk bankruptcy. A theoretical paper, Bulow and Shoven [1978], considered the bankruptcy decision from the viewpoint of claimants and others who are in a position to force a firm into bankruptcy. This study showed that tax considerations such as the existence of transferable tax credits can make bankruptcy less attractive (and merger more attractive) for the firm's claimants. (When carryforwards are lost to liquidation, a potential asset is sacrificed and nothing is gained in return.)

As mentioned earlier, a large body of positive theory literature has dealt with management's motivation for choosing one method of external reporting versus another. In general, there is very strong evidence that a firm's debt status affects its choice of accounting principles or procedures. Size as a surrogate for political costs successfully explains accounting choices in politically sensitive industries such as oil and gas. Evidence for some studies, such as Watts and Zimmerman [1978] indicates that the existence of managerial incentive plans or significant managerial ownership can affect the choice of accounting principles and procedures.

The managerial choice to merge or risk bankruptcy is very different than the choice of accounting principles and procedures which was the focus of previous studies. Since the merger/risk bankruptcy choice determines whether the firm will exist in the future and whether shareholders will get anything form their investment, every motivational and economic factor which affects the firm also affects this choice. Also, as pointed out above, we do not have a direct record of management's choices in the sense that a firm's statement of accounting policies and footnotes disclose choices in respect to depreciation, pension accounting, investment tax credit treatment, etc. Rather, in the current study one must infer what management's choices were from the results of choices, merger or bankruptcy. Finally, one should be cognizant of several variable proxies for the motivation both of the management of the troubled company and the management of a potential merger partner. For example, very high debt on the part of the troubled company will both discourage a potential suitor and provide some motivation for a Chapter XI filing so some of the unsecured debt might be converted to equity or otherwise restructured while the troubled company is under the protection of Chapter XI. Similarly, the size of the troubled company and the extent of its tax credit carryforwards affect the motivation of

both the financially troubled firm and its potential suitor. On the other hand, the extent of managerial ownership of the financially troubled firm and the existence of stock compensation plans affect the management of the financially troubled company only so the discussion of variables which motivate the merger/risk bankruptcy choice will include the existence of stock options and managerial ownership.

The Firm Size Hypothesis:

In a number of positive accounting studies, size has surrogated for political costs. In the current study a political interpretation for size is not relevant because given that a firm is financially troubled, regulators, politicians, etc. are not likely to object to a merger or any other strategy which avoids a bankruptcy liquidation. While there are a number of reasons why the management of a larger firm might be less fearful of bankruptcy than the management of a smaller firm, this paper hypotheses that size will be positively correlated with merger rather than bankruptcy.

The managements of larger firms might be less fearful of bankruptcy than the managements of smaller firms because empirical studies have shown that larger firms have a much higher probability of successfully emerging from Chapter XI than do smaller firms. For example, the nation's

largest Chapter XI company, Penn Central, has emerged successfully and the second largest Chapter XI company, Wickes, has been operating profitably in Chapter XI and is scheduled to emerge in early 1984. Also, the costs of administrating the bankruptcy as a percentage of total assets are much lower for the larger firm.

On the other hand, bankruptcy is not likely to be attractive for many firms, large or small. As Altman [1969] illustrates, shareholders (particularly management if they are shareholders) will lose a great deal of incremental wealth if the financially troubled firm files for Chapter XI. In response to job security, the work of Ang and Chua [1981] indicates that the management that brought the large firm into bankruptcy is unlikely to be the management that leads the firm out of bankruptcy years later. Moreover, while FTC [1972] indicates that many managers lose their positions after a merger, a larger firm is more likely to be difficult to integrate with the operations of the purchasers so it is more likely that its management will be retained if they so desire.

Having established that the managements of both large and small firms are typically motivated to avoid bankruptcy, it is important to note that the financially troubled larger firms have an advantage in doing so. The larger firms are likely to have a number of segments or divisions which can be sold to provide operating funds

and satisfying creditors. Also, management, if inclined to do so, may be able to attract a potential merger partner by emphasizing those segments or operations which are profitable. In fact, Burch [1982] points out that many operations of acquired businesses (presumably those less profitable) are discontinued shortly after the merger. Also, when dealing with a larger company where material losses would be suffered in bankruptcy, banks and labor unions may be more willing to grant restructuring of loans and labor contracts in order to avoid massive highly publicized losses that would cast aspersions on the bankers or labor leaders involved in prior negotiations with the company.

Hypothesis 1A[2] = Ceteris paribus. Size of a financially troubled firm is positively correlated with the merger choice as an alternative to voluntary bankruptcy.

Also based on the above analysis, it is hypothesized that the larger firms, after filing for Chapter XI, are more likely to recover from the arrangement proceedings.

[2]"A" refers to the first model (merger-voluntary bankruptcy choices model) hypotheses and "B" refers to the second model (Chapter XI outcomes model) hypotheses.

Hypothesis 1B = Ceteris paribus. Size of a firm filed for Chapter XI is positively correlated with recovery outcome as an alternative to Chapter X outcome.

Previous studies have utilized many surrogates of firm size (e.g., total assets, revenues, market value of the firm, number of employees). This study rejected the total assets as a measurement of firm size because firms may use different depreciation methods for similar assets. Also, similar assets purchased at different points in time could have very dissimilar carrying values. Therefore, the book values of fixed plant assets generally do not reflect current values.

As a result, revenues tend to be more uniform and to provide a better measure of the firm's present profit-generating capacity [Reed, 1982, p.36]. Furthermore, Shabit and Sanker [1977] found a strong correlation between revenues and other possible measures of firm size. For example, the authors found the correlation coefficient between revenues and total assets to be 94 percent, between revenues and total number of employees 90 percent, and between revenues and the market value of the firm 74 percent.

Firm size in the current study was surrogated by the logarithm of adjusted revenues. Revenues were

adjusted by Consumer Price for Urban Consumers (CPI) because the study covers a 10-year period (1969-1978) in which different inflation rates existed. The transformation standard log is used in the most previous studies because as Eisenbeis [1977, p.877] writes:

> It gives less weight to equal percentage changes in a variable when the values are larger than when they are smaller. If, for example, the variable was firm size, the implication would be that one does not believe that there is as much difference between a $1 billion and a $2 billion size firm as there is between a $1 million and a $2 million size firm. The percentage difference in the log will be greater in the latter than in the former cases.

Financial Leverage Hypothesis:

Both firm size and financial leverage are important determinants of risk [e.g., Ben-Zion and Shalit, 1975]. If firm size is an important determinant of business risk, the leverage is an important determinant of financial risk. Under the Modigliani-Miller [1958] assumption of costless bankruptcy, the value of levered firm, V_L - as shown in Figure 2 - increases linearly with debt, D, by tax savings, TcD, where Tc the marginal tax rate is uniform across all firms. If bankruptcy costs exist, the value of the levered firm, V_L^*, is - shown in the same figure - as a concave function of the amount of debt employed. Then the present value of expected

The Analysis of the Effect of Debt on the Firm Value

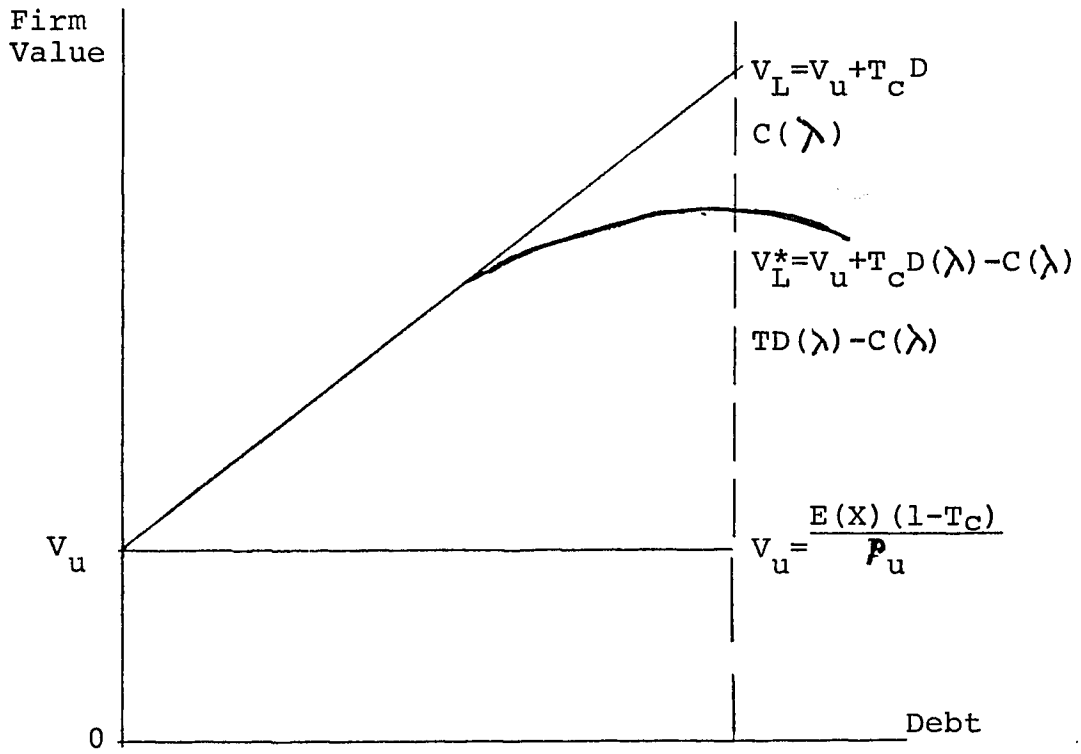


Figure 2

bankruptcy costs, C, is an increasing function of the leverage , while the tax savings $T_c D(\lambda)$ is also increasing with debt.

Baxter [1967] found a direct relationship between leverage and probability of bankruptcy. He concluded that when there is considerable debt in the capital structure, any increases in leverage are likely to have a much greater effect on the cost of capital. The risk of bankruptcy thus becomes increasingly important as the proportion of debt in the capital structure increases. Thus, bankrupt firms have more leverage. Fisher and Jorden [1979, p.114] explain the effect of financial leverage on the common stock holders. According to their analysis, debt finance (1) increases the viability of their returns; (2) affects their expectations concerning their returns, and (3) increases their risk of being ruined.

It is assumed that there are different degrees of financial crisis. Thus, bankrupt firms have higher leverage than nonbankrupt firms. This statement is consistent with the above analysis and also with empirical evidence [e.g., Altman, 1968].

In this study, it is hypothesized that the financially troubled firm which has a low debt-equity ratio is more likely to select merger as an alternative to

voluntary bankruptcy because such a firm will be more attractive to acquisition by stronger firms. In contrast, the financially troubled firm which has high leverage, will be riskier and, consequently, more likely to select Chapter XI.

Hypothesis 2A = Ceteris paribus. Financial leverage of financially troubled firm is negatively correlated with merger choice as an alternative to voluntary bankruptcy.

Based on the above analysis and also based on White's [1982] empirical evidence that "firms liquidating on average have liabilities equal to 194% of assets, while firms reorganizing on average have liabilities equal to 155% of assets," it is hypothesized that the firm with low leverage which files for Chapter XI is more likely to recover from the arrangement proceedings while operating under the bankruptcy court. In contrast, the firm with high leverage which files for Chapter XI is more likely to file for Chapter X.

Hypothesis 2B = Ceteris paribus. Financial leverage of firm which filed for Chapter XI is negatively correlated with recovery as an alternative to Chapter X outcome.

Tax Loss Carryovers Hypothesis:

Congress made some changes in the 1950's and 1960's with respect to operating loss carryovers and investment tax credit, respectively. Section 381 of the 1954 Code permits the transfer of operating loss carryovers to a successor firm in the following transactions:

1. A statutory merger of consolidation.
2. Acquisition of substantially all assets solely in exchange for voting stock.
3. Transfer of assets to a controlled corporation in exchange for stock and transfer corporation be liquidated.
4. Change of identity, etc.

However, there are limitations on the amount of tax loss carryovers. Under the IRS regulation, the amount of a net operating loss which can be carried to the first year ending after the merger date is limited to a percentage representing the remaining days in that tax year.

Another aspect of tax saving is the carryovers of investment tax credit. The Internal Revenue Act of 1962 permits firms to reduce their federal income tax by an investment credit equal to a specified percentage of the certain depreciable properties acquired after January 1, 1962. The provisions of the investment tax credit were significantly amended in the last twenty years. The Code contains a limitation on the amount of investment

credit available in any given year. If the firm has an investment tax credit greater than the amount allowable under this limitation, the excess will be carried back and carryovers in the same way as operating losses.

The investment tax credit applies to property defined by the tax regulations as "section 38 property" as property which has a useful life of three years from the time the property is put in service. Also, according to IRS regulations, if the useful life of assets is three but less than five years, one-third of the property is treated as qualifying. If at least five but less than seven years, two-thirds is treated as qualifying and finally, if seven or more years, the entire amount of property is considered.

The above codes may encourage the financially troubled firms which have relatively large amounts of tax loss carryovers to select the merger choice as an alternative to voluntary bankruptcy. Some authors [e.g., Altman, 1971; Bulow and Shoven, 1978; Preis, 1982] recognized the importance of the presence of operating loss carryovers as a motivation to financially troubled firms to select the merger choice rather than declaring bankruptcy.

Unfortunately, these authors do not fully develop this point. If the financially troubled firm has a

relatively large amount of tax loss carryovers, the corporate management of such a firm is more likely to select the merger choice rather than the voluntary bankruptcy choice. It is true, as developed in Chapter I, that the firm can frequently continue or restart its business under Chapter XI, after elimination of unprofitable segments. Consequently, the firm may be forced to convert to liquidation. Also, as Preis [1982, pp.190-91] pointed out: "even if the firm continues to operate under the arrangement proceedings, the use of loss carryovers is dependent on the generation of earnings, sub-optimal decisions of the trustees or debtor in possession while in bankruptcy may destroy the value of tax shelter."

In both the above cases, the firm has a risk of losing millions of dollars if it selects voluntary bankruptcy. As Preis [1982, p.190] points out "if the firm is disqualified from using net operating loss carryforwards, the shareholders lose valuable future cash flow." In addition to that, if the financially troubled firm has a relatively large amount of tax loss carryovers, it will be more attractive to be acquired by other firms because such firms will benefit from the large amount of tax loss carryovers and that will increase their cash flow. For example, Textron

is often cited as the classic example of using tax loss carryovers to finance a great diversification. Steiner [1975, p.80] stated that "between 1952 and 1959 it paid only $634,000 in corporate income taxes despite an aggregate net income of nearly $55 million; an effective rate of 1.2 percent, still below the corporate average."

On the other hand, if the financially troubled firm has a relatively small amount of tax loss carryovers, the corporate management of such a firm is more likely to select the voluntary bankruptcy choice rather than the merger choice. One justification for this hypothesis is that the less accumulated tax loss carryovers is an indicator of less losses realized in the prior years by the financially troubled firm and, consequently, such a firm is more likely to succeed under the arrangement proceedings.

It is hypothesized that the financially troubled firm which has a higher tax loss carryover to total assets ratio is more likely to select a merger as an alternative to voluntary bankruptcy.

Hypothesis 3A = Ceteris paribus. Tax loss carryovers to total assets ratio of financially troubled firm is positively correlated with merger choice as an alternative to voluntary bankruptcy.

Also, based on the above analysis, it is hypothesized that the financially troubled firm which has higher tax loss carryovers to total assets ratio is more likely to recover from the arrangement proceedings.

Hypothesis 3B = Ceteris paribus. Tax loss carryovers to total assets ratio of financially troubled firm is positively correlated with recovery outcome as an alternative to Chapter X outcome.

Executive Stock Options Hypothesis:

Executive incentive compensation plans have grown rapidly in recent years in number and variety. The Conference Board [1981] reported that there is a continuing trend toward providing corporate management with one or more benefits in addition to dollar compensation.

The incentive compensation plans can be classified into two categories: (1) forms tied to accounting numbers (e.g., profit-sharing plans) and (2) forms tied to market value of the firm shares. Miller and Scholes [1982, p.180] say, "Compensation in stock options intended to identify the managers' interests more closely with those of the stockholders may also thereby create or exacerbate conflicts between the stockholders and other supplies of resources to the firm, notably the firm's creditors."

The executive stock options are riskier than some other forms [e.g., Ellis, 1982; Hit and Long, 1981]. The source of risk is that after the exercise of an option, the underlying stock market price may decline for one reason or another.

The risk underlying stock options has an implication on merger-bankruptcy choices. If corporate management selects the bankruptcy choice, the stock price of the firm will sharply decline in an efficient capital market. This conclusion is consistent with some empirical evidence. For example, Altman [1969] concludes that the stock price just before bankruptcy was found to be much greater than the price of the same security after bankruptcy. Another study [Aharony, Jones, and Swary, 1980] found that a sharp decline in returns occurred seven weeks prior to bankruptcy. Thus, the bankruptcy choice has a negative outcome on managers' wealth because they will lose the difference between stock options before and after filing for bankruptcy.

In contrast, in case of the merger choice, the empirical evidence tells us that, on the average, there is a positive abnormal return for common stocks for both merging and merged firms [e.g., Dodd and Ruback, 1977; Bradley, 1978]. Thus, the choice of merger rather than

declaring bankruptcy is more likely to be consistent with maximization of corporate management's wealth.

In this study, it is hypothesized that the financially troubled firm which has relatively high executive stock options to total outstanding common stock ratio (SO/TOCS ratio) is more likely to select the merger choice.

Hypothesis 4A = Ceteris paribus. The executive stock options to total outstanding common stocks ratio of financially troubled firm is positively correlated with the merger choice as an alternative to voluntary bankruptcy.

Also, based on the above analysis, it is hypothesized that the Chapter XI firms which have high ratios of SO/TOCS are more likely to recover from the arrangement proceedings.

Hypothesis 4B = Ceteris paribus. The executive stock options to total outstanding stocks ratio of Chapter XI firms is positively correlated with recovery outcome as an alternative to Chapter X outcome.

The SO/TOCS ratio has been selected as a proxy to this variable because it represents the interests (as incentive compensation plan) of corporate management in total outstanding common stock. Given the above analysis, the higher SO/TOCS ratio, the more positive (e.g., if the

choice is merger) or negative (e.g., if the choice is Chapter XI) is the effect on the corporate management wealth. The executive stock options used in this study include those granted to corporate management to purchase stocks at the end of one year before the event.

Stock Ownership Hypothesis:

Agency problems arise among firm parties because utility functions of both principal (e.g., equity holders) and agent (e.g., corporate management) are not identical. The agent seeks to use the inside information to his self-interest by increasing his wealth and reducing the risk he bears.

The impact of interests on corporate decision is based on two fundamental assumptions: "First, owners and agents behave according to their self-interest; and second, each of the participants in the activities of the firm is rational and capable of forming unbiased expectations regarding the future wealth." [Barnea, Haugen and Senbet, 1981, p.8].

These assumptions have an impact on merger-bankruptcy decision of financially troubled firm. The hypothesis is that firms which have a higher ownership percentage are more likely to select the merger choice rather than voluntary bankruptcy. As discussed in the

previous hypothesis, if the firm declared bankruptcy, the stock market of its common stock will sharply decline in an efficient capital market and, consequently, the bankruptcy choice has a negative effect on insiders' wealth because they will lose the difference between their stocks before and after filing for bankruptcy.

Another reason is that "in case of bankruptcy, owners managers not only lose wages but also lose their investment in the firm. Whereas, the managers of firms owned by outside shareholders lose their wages only temporarily." [Kim and Sorensen, 1982, p.8].

In contrast, in the case of the merger choice, there is a positive abnormal return for common stocks for both merged and merging firms [e.g., Bradley, 1978]. Thus, the merger choice is more likely to be consistent with corporate management behavior.

Hypothesis 5A = Ceteris paribus. Largest percentage of ownership of common stock of insiders is positively correlated with merger choice as an alternative to voluntary bankruptcy.

Also based on the above analysis, it is hypothesized that the firms which have a higher percentage of common stock ownership are more likely to recover from the arrangement proceedings.

Hypothesis 5B = Ceteris paribus. Largest percentage of ownership of common stock of insiders is positively correlated with recovery outcome as an alternative to Chapter X outcome.

In contrast to most (if not all) accounting studies, this study is using the largest percentage of common stock owned by insiders rather than a dummy variable (0 and 1) approach to test this hypothesis.

Chapter IV will describe the construction of samples, the data used for the empirical analysis and the specification of both the N-Chotomous Probit and Multiple Discriminant procedures employed.

CHAPTER IV

Research Design

Introduction:

The major difficulty in the research design of the current study is the construction of samples for the models. While sufficient merged firms may be found in one sample source (e.g., COMPUSTAT Industrial Annual Research Tape or Federal Trade Commission Publication), no single comprehensive sample source is available for bankrupt firms. For example, COMPUSTAT Industrial Annual Research Tape (CRT) includes only a few of these firms under DATA ITEM 35-Code 2 (Bankruptcy or Liquidation) without any specification under which bankruptcy chapters the firm filed. As an alternative source, Dun & Bradstreet Co. was contacted. A telephone conversation revealed that it is its policy not to release the names of firms which filed for bankruptcy. As an additional source for Chapter XI firms, the final choice was The Wall Street Journal Index (WSJI).

Two difficulties or disadvantages of using CRT are (1) this tape evidenced substantial missing data before and after the firms filed for bankruptcy or merger completion date and (2) in some firms, there is a difference between the deletion date of the firm from regular COMPUSTAT tape and filing date for bankruptcy or merger completion date.

In the second model (Chapter XI Firms Outcomes Model), the construction of samples is more difficult. This difficulty is attributed to the fact that no public records are available as to the outcome of Chapter XI firms. However, four sample sources were under consideration in the second model:

1. The SEC's Annual Report. The problem with this sample source is that the SEC is interested only in those cases which effect the interests of equity holders who may not otherwise be represented effectively.
2. 10-K Reports. Searching the 10-K Report for every bankrupt firm from the filing date through 1982.
3. Financial Press. Follows the history of Chapter XI firms from the filing date through 1982 or 1983 (if the data is available) in the WSJI and New York Times Index (Business Section).
4. Bankruptcy Courts. This sample source requires examination of every single case in bankruptcy courts across the country. This source was rejected as a sample source for the following two reasons: (1) since the Chapter XI sample in this study was derived from all U.S. District Courts, the time and financial resources needed

to use this source are not feasible and (2) as Pries [1982, p.13] pointed out, "there is ample reason to question the accuracy of reports prepared in the Clerk's offices."

Thus, the sample source of the second model is the first three sample source as will be fully described in this chapter.

Sample and Collection of Data

The source of the financially troubled firms is the COMPUSTAT Annual Research Tape (CRT). One hundred ninety out of 648 firms are excluded because their merger completion date falls in the non-study period (1979-1982). Finally, 59 merged firms are excluded because of missing accounting data to compute Z-Score. The final sample was composed of 399 merged firms. [Table 2].

To test the avoidance bankruptcy theory, the Z-Score Model [Altman 1968] was used as it applied to data one year prior to the merger. Altman [1968] used the MDA for a list of 22 variables. Five financial ratios were selected as doing the best overall job in the prediction of corporate bankruptcy.

The accounting data collected were those necessary to computer a Z-Score Model as follows:

Table 2

Summary of Merged Firms

Total of merged firms in the COMPUSTAT		648
Less:		
• Merged firms in non-study period (1979 through 1981)	190	
• Merged firms with missing data for computing Z-Score	59	249
Total of merged firms used to test the avoidance bankruptcy theory		399
Less:		
Merged firms having Z-Score greater than 2.675		293
Financially troubled merged firms (these firms have Z-Score less than 2.675)		106
Less:		
Merged firms with insufficient data for computing the independent variables		40
Final sample to test merger-voluntary bankruptcy choice model		66

$$Z = 1.2\,X_1 + 1.4\,X_2 + 3.3\,X_3 + 0.6\,X_4 + X_5$$

where,

Z = Overall index

X_1 = Working capital/total assets

X_2 = Retained earnings/total assets

X_3 = Earnings before interest and income tax/ total assets.

X_4 = Market value of equity/book value of total debt.

X_5 = Sales/total assets.

Each firm's Z-Score was compared to Altman's cutoff point $Z_{crit} = 2.675$. If a firm's Z-Score (Z_i) was greater than 2.675 (Z_{crit}) that indicated a healthy firm and the merger choice was for reason(s) other than bankruptcy avoidance. On the other hand, if a firm's Z-Score (Z_i) was less than 2.675 (Z_{crit}), that indicated a sick firm and it was in poor financial condition before the merger. Such a firm used the merger as an alternative to voluntary bankruptcy.

By utilizing the Z-Score Model [Altman, 1968], the null hypothesis was rejected. One hundred and six out of the 399 firms (26.6 percent) which completed their mergers from 1969 through 1978 were found to be failing firms one year before the mergers. The 26.6 percent in this sample is significantly greater than, not only the highest population failure rate in the same period (44

failures per 10,000 firms in 1970), but also greater than the highest failure rate in the period from 1920 through 1980 (154 failures per 10,000 firms in 1932). Finally, this 26.6 percent is greater than the 15.2 percent in the Shrieves and Stevens study [1979].

The implication of this empirical result is that more than one-fourth of the firms which completed their merger from 1969 through 1978 were financially troubled firms at the time of the merger. Thus, the avoidance bankruptcy theory is a rational explanation of the merger movement in recent years.

The second implication is that traditional historical accounting information is useful data to explain and predict economic events (merger decision in this study) in the internal organization.

The most recent ten years prior to the effective date of the new Bankruptcy Act - 1969 to 1978 - was chosen as the sample period. Two sources were used to obtain a sufficiently large group of bankrupt firms. The first source, the COMPUSTAT Industrial Annual Research Tape, yielded only 49 firms which had dropped out of COMPUSTAT because of bankruptcy. An additional 162 Chapter XI firms were obtained from The Wall Street Journal Index providing a total of 202. Unfortunately, insufficient data for computing the independent variable was a problem with 94 firms so they were eliminated, giving a final total of 117 Chapter XI firms. [Table 3].

Table 3

Summary of Chapter XI Firms

Sample firms identified from COMPUSTAT	49
Sample firms identified from the WSJI	162
Total of initial sample	211
Less:	
Firms with insufficient data for computing the independent variables	94
Final sample to test merger-voluntary bankruptcy choice model	117

The Chapter XI firms are divided into two subsamples to test Chapter XI firms outcomes model, as follows:

1. Recovery from arrangement proceedings. In this study, recovery has been defined as acceptance of arrangement plan by a majority in number and amount of all creditors who file claims and such plan must be confirmed by the Bankruptcy Court. This group includes only 11 firms.
2. Firms converted from Chapter XI to Chapter X (Reorganization Proceedings). The final sample for this group includes only 13 firms.

These firms were identified by searching the financial press (WSJI and Business Section of The New York Times), the SEC's Annual Reports and 10-K Reports.

Tables 4 and 5 provide samples classified by year and by capital market listing respectively. Figure 3 illustrates the construction of the samples.

The data used in this study was obtained from COMPUSTAT Annual Research Tape, 10-K Reports and Proxy Statements (1968-1978).

The Models

Both N-Chotomous Probit Analysis (NPA) and Multiple Discriminant Analysis (MDA) have been used in this study. The probit analysis was first developed by Finney [1952]. It was used to determine the relationship between the probability that an insect will be killed and the strength

Table 4

Sample Composition By Year

Year	Financially Troubled Merged Firms	Chapter XI Firms
1969	1	1
1970	3	7
1971	8	11
1972	4	3
1973	2	15
1974	1	8
1975	4	16
1976	7	20
1977	14	11
1978	22	15
Total	66	107

Table 5

Sample Composition By Capital Market Listing

Capital Market Listing	Financially Troubled Merged Firms	Chapter XI Firms
NYSE	25	23
AMEX	32	58
Other	9	26
Total	66	107

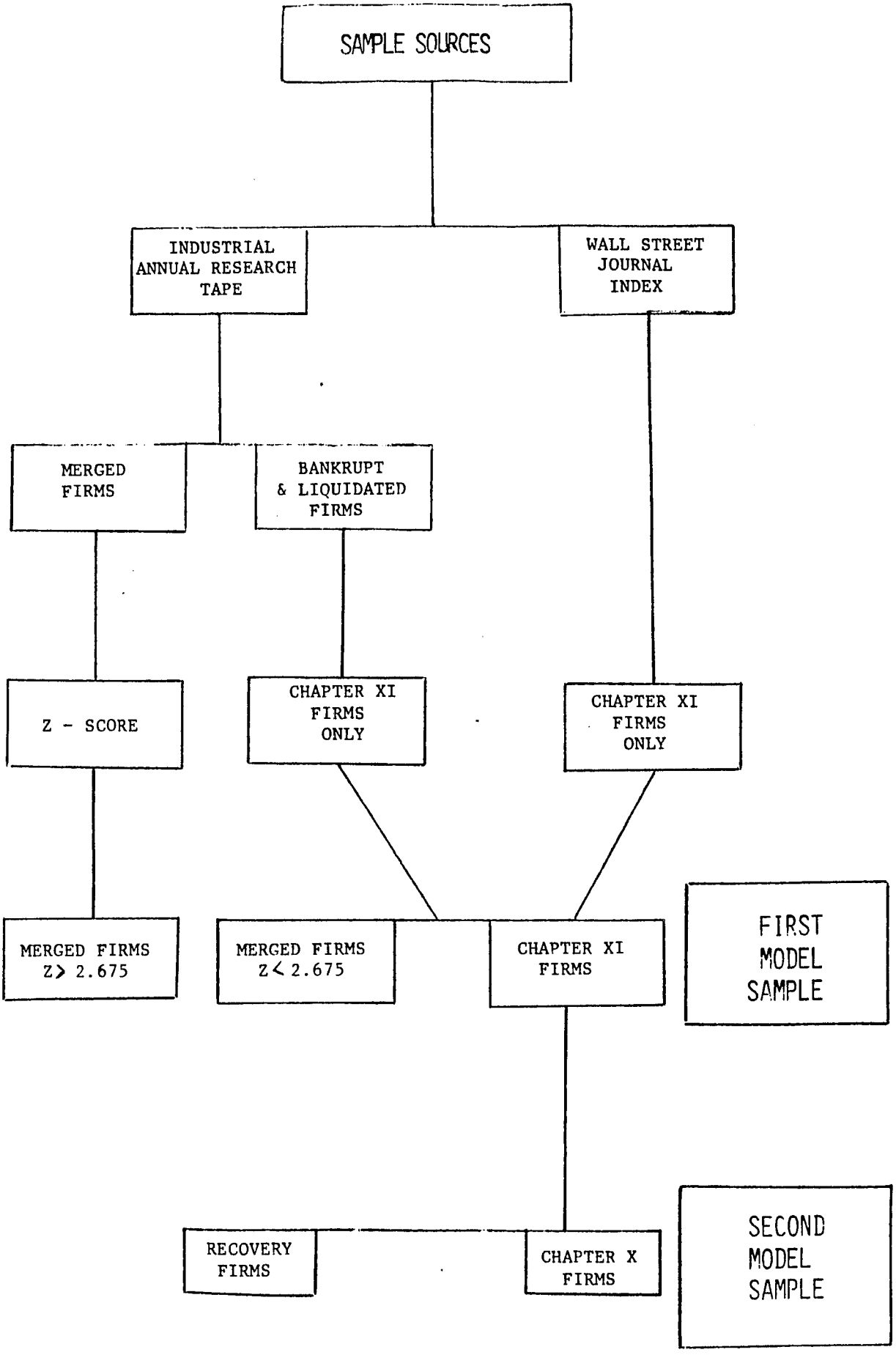

SAMPLE SOURCES
INDUSTRIAL ANNUAL RESEARCH TAPE
WALL STREET JOURNAL INDEX
MERGED FIRMS
BANKRUPT & LIQUIDATED FIRMS
Z - SCORE
CHAPTER XI FIRMS ONLY
CHAPTER XI FIRMS ONLY
MERGED FIRMS Z> 2.675
MERGED FIRMS Z< 2.675
CHAPTER XI FIRMS
FIRST MODEL SAMPLE
RECOVERY FIRMS
CHAPTER X FIRMS
SECOND MODEL SAMPLE

Figure 3

of the choice of poison administered. Recently, probit analysis has been applied successfully in political science [e.g., Wolfinger, 1978] and to demand forecasting [e.g., Daganzo, 1979]. In the accounting literature, the probit analysis has been applied to accounting choice studies [e.g., Hagerman and Zumijewski, 1979; Lilien and Pastena, 1982], to bond rating decisions [e.g., Kaplan and Urwitz, 1979] and also applied to a loan decision [e.g., Grablowsky and Talley, 1981].

The regression analysis was eliminated in this study as a statistical technique for the following reasons:

1. Usually, the Ordinary Lease Square (OLS) is used to estimate the parameters of the regression function. As a result of econometric problems (e.g., heteroscedasticity), the OLS of B's is unbiased but no longer efficient. Also, the estimation of the α and B's are not distributed normally [e.g., Grablowsky and Talley, 1981, p.255].
2. Since this study has used a dummy dependent variable, the restriction of the managerial choice interval (0, 1) may not hold.

The NPA is one approach to restricting the range of E (Y_i) that lies between the (0, 1) interval for all independent variables. This analysis is associated with

the cumulative normal probability function. To understand the NPA, assume that there is a theoretical dummy dependent variable Z_i which measures the probability of the choice of one policy and eliminates another for financially troubled firms which can be determined by the independent variables.

The theoretical variable Z_i is assumed to be a continuous variable which is random and normally distributed for the usual econometric reasons [e.g., Pindyck and Rubinfeld 1981]. This dummy dependent variable can be interpreted as it has two values: high value of Z_i (e.g., merger decision firms) and low value of Z_i (e.g., voluntary bankruptcy decision firms). The theoretical dependent variable is not actually measured; instead the data which is available can estimate a version of Z_i. Let Y_i be assigned to a version of Z_i.

Thus, the general form of the models can be determined as follows:

$$Y_i = \alpha + \beta_i X_i + \varepsilon$$

Where,

Y_i = 1 if the corporate management's choice is Chapter XI.

Y_i = 2 if the corporate management's choice is merger.

β_i = a vector of coefficients.

X_i = a vector of the independent variables describing the relevant determinants of firm i.

ε = a random variable assumed to be independently distributed with mean zero and variance.

Since the NPA assumes that Z_i is a normally distributed random variable, then it is possible to use the cumulative normal probability function [e.g., Pindyck and Rubinfeld, 1981, p.283]. This can be written as follows:

$$P_i = F(Z_i) = \frac{1}{\sqrt{2\pi}} \int_{-a}^{Z_i} e^{-s^2/2} ds$$

Where $S \sim N\ (0, 1)$

P_i must lie in the (1, 0) interval

$P_i = P_o, P_1$

P_o in this study is the probability of Chapter XI choice and P_1 is the probability of merger choice.

Because the cumulative normal transformation is non-linear, OLS cannot generally be applied to estimate the NPA [e.g., Pindyck and Rubinfeld 1981]. This study will use the Maximum-Likelihood Estimation (MLE) to obtain values for α and β's.

Theil [1971) shows that the MLE yields an estimator which is not only consistent for the parameters but also asymptomatically normally distributed. This property of

the MLE is frequently described as asymptomatic efficiency. Let n be a random sample size from a normal distribution with unknown mean μ and unknown variance σ^2. The likelihood function can be expressed as follows:

$$L\ (X_1,.....,X_n;\mu,\ \sigma^2) = \frac{1}{(2\sigma^2)n/2}\ \exp\left|-\frac{1}{2\ 2}\ \sum_{i=1}^{n}(X_i-\mu)^2\right|$$

The above equation has the following logarithm:

$$\text{Log } L\ (X_i,...,X_n;\mu,\sigma^2)$$
$$= -\frac{n}{2}\log 2\pi - \frac{n}{2}\ \log\sigma^2 - \frac{1}{2\sigma^2}\ \sum_{i=1}^{n}(X_i-)^2$$

To find the MLE of parameters, it is necessary to find the values of the parameters which maximize the log of L. By setting partial derivatives of Log L with respect to μ and σ^2.

$$\frac{\partial \log L}{\partial \mu} = \frac{1}{\sigma^2}\ \sum_{i=1}^{n}(X_i-\mu)$$

$$\frac{\log L}{\sigma^2} = \frac{n/2}{\sigma^2} + \frac{\sum_{i=1}^{n}(X_i-\mu)^2}{2\sigma^4}$$

By equating the derivative to zero, then X is the maximum-likelihood estimator of . Also, by the same token:

$$w = \frac{1}{n}\sum_{i=1}^{n}(X_i-X)^2$$

is the maximum likelihood estimator of σ^2.

Finally, the statistical significance of the NPA will be tested by looking at the negative ratio of logarithm of likelihood function times two.

To sum up, the NPA is superior to the regression analysis especially in case of the dummy dependent variable as in this study for at least two reasons: (1) Since the cumulative normal transformation is nonlinear and the MLE will be used to estimate values for α and β's and that is superior to OLS; (2) The NPA can restrict the range of $E(Y_i)$ for all independent variables.

The NPA, also, has advantages over the MDA. Grablowsky and Talley [1980, p.260] recognize these advantages. They conclude:

> Probit Function Coefficients are unique and can be tested individually for significance using a likelihood ratio test; discriminant function coefficients are not unique and cannot be tested individually for significance. Lacking uniqueness, discrimant function coefficients cannot be interpreted as partial derivatives (as in regression analysis). Probit Function Coefficients can be interpreted in this manner, but the interpretation is more difficult than that of regression function coefficients.

There are other statistical problems illustrated by Eisenabeis [1977]. These problems include the failure to relate the estimates of the prior probabilities to the population priors, normality, the selection of subset variables and reducing dimensions, and interpreting the significance of individual variables. Finally, Chow [1982]

rejected using DMA because one of his study's independent variables is dichotomous.

Despite the MDA's disadvantages, this statistical analysis is still widely used in accounting, financial theory and economics literature.

In the present study, the MDA will be used as an additional test. In particular, to test why management of financially troubled firms select one choice and eliminate another.

The general discriminant function for all models can be expressed as follows:

$$Z_i = \beta_i X_i$$

Where,

Z_i = 1 if the corporate management's choice is Chapter XI.
Z_i = 2 if the corporate management's choice is merger

β_i = a vector of coefficients

X_i = a vector of the independent variables describing the relevant determinants of firm i.

The next chapter will report the details of empirical results of this study.

CHAPTER V

Analysis of Data

Chapter IV described the construction of samples, the data used in this study and the specification of both the N-Chotomous Probit Analysis (NPA) and the Multiple Discriminant Analysis (MDA) employed. The current chapter reports analysis of data for all tests achieved. Table 6 summarizes the framework of the empirical tests. These tests include:

1. Tests of Avoidance Bankruptcy Theory results.
2. Tests of Merger-Voluntary Bankruptcy Choices Model results:
    a. By using the entire sample and only testing four hypotheses.
    b. By using a subsample and testing all hypotheses.
3. Tests of Chapter XI Outcomes Model results.

First: Test of Avoidance Bankruptcy Theory Results:

The first objective of this study is to determine whether or not bankruptcy avoidance theory is the rational explanation of the merger movement in recent years. As reported in the prior chapter, by utilizing Z-Score Model [Altman, 1968], the data indicated that 106 out of 399 (26.6 percent) of the firms which completed their mergers from 1969 through 1978 were found on the road to bankruptcy one year before mergers. Thus, as expected, the avoidance

Table 6

Framework of the Analysis of Data

Test	Sample	Hypotheses Tested	Statistical Analysis Used
Avoidance Bankruptcy Theory Test	399 merged firms	H_o: Bankruptcy avoidance theory is not a rational explanation for the merger movement in recent years H_1: Bankruptcy avoidance theory is a rational explanation for the merger movement in recent years	Z-Score Model Altman [1968]
Merger-Voluntary Bankruptcy Model:* First Test	Entire sample (173 firms) Chapter XI Firms = 107 firms Merged Firms=66 firms	1. Size hypothesis 2. Financial leverage hypothesis 3. Tax loss carryovers hypothesis 4. Executive stock options hypothesis	NPA MDA
Second Test	Subsample (80 firms) Chapter XI Firms=54 Merged Firms=26	1. Size hypothesis 2. Financial leverage hypothesis 3. Tax loss carryovers hypothesis 4. Executive stock options hypothesis 5. Stock ownership hypothesis	NPA MDA

Table 6 (continued)

Test	Sample	Hypotheses Tested	Statistical Analysis Used
Chapter X Outcomes Model**	Sample=24 firms Chapter X Firms=13 firms Recovery firms=11 firms	1. Size hypothesis. 2. Financial leverage hypothesis 3. Tax loss carryovers hypothesis 4. Executive stock options hypothesis	MDA

*Chapter XI Firms are coded as '0' and financially troubled merged firms are coded as (1)

**Chapter X Firms are coded as '0' and recovery firms are coded as (1)

bankruptcy theory is a rational explanation of the merger movements in recent years.

Second: Test of Merger-Voluntary Bankruptcy Choices Model Results:

Merger-voluntary bankruptcy choices model is based on a new understanding of the merger movement, i.e., mergers as one of the choices available to corporate managements of financially troubled firms.

Two multivariate statistical analysis were used to test this model. Both the NPA and the MDA have been employed. Under each multivariate statistical approach, two separate tests were performed. The first test includes the entire sample (173 firms) and only four out of five hypotheses. The hypotheses tested are size, financial leverage, tax loss carryovers and executive stock options. The second test includes subsample (80 firms) for all the hypotheses which are discussed in Chapter III.

The reasons for two separate tests for this model are (1) that the stock ownership data for 93 financially troubled firms is missing and (2) that there is a need to determine whether there is any effect for the stock ownership on the economics decision (in this study, merger-voluntary bankruptcy choices) in internal organization.

One of the interesting points in the empirical studies which use financial ratios is distributional properties of

ratios [e.g., Lev and Sunder, 1979; Deakin, 1976; Foster, 1978; Frecka and Hopwood, 1983; Cochran, 1963]. For example, Frecka and Hopwood [1983, p.155] noted that "...most ratio distributions, are either highly skewed, flat, and/or dominated by outliers." Outliers have a serious effect on increasing the sample variance and decreasing precision [Cochran, 1963]. As in most previous studies, this study selects the technique which is somewhat ad hoc to cope with outliers problem. Changing the outliers' value to that of the closet nonoutliers (10 percent) was used.

Tests of Probit Analysis Results:

The objective of using NPA is to find (1) individual significant levels of the independent variables, (2) overall significant level of the model, (3) overall accuracy of the model and (4) value of R^2.

The empirical tests predict whether financially troubled firms choose voluntary bankruptcy or merge into strongly financially healthy firms. Choice is the dependent variable, and is defined in the context of Chapter XI firms and financially troubled merged firms. In these tests, the independent variables are managerial motivation variables which are developed in Chapter III.

First Test:

This test used the entire sample (173 firms) and tested size, financial leverage, tax loss carryovers and executive stock options hypotheses. The following model has been tested using the NPA:

$$Y_i = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$$

Where,

Y_i = 0 if the corporate management's choice is Chapter XI.

1 if the corporate management's choice is merger.

X_1 = Debt/shareholders equity (financial leverage variable)

X_2 = Adjusted (log) revenue (size variable)

X_3 = Tax loss carryovers/Total Assets (tax loss carryovers variable).

X_4 = Executive stock options/total outstanding common stocks (executive stock options variable)

β_1, β_2, β_3, and β_4 = independent variables coefficients.

ε = a random variable assumed to be independently distributed with mean zero and variance one.

Table 7 provides the statistical description of variables included in the analysis of this test. Given the nature of financially troubled firms, both the sample mean and variance of financial leverage are high. They are

Table 7

Merger-Voluntary Bankruptcy Choices Model

Summary of Statistics of Variables in the Probit Model
(First Test)

Variable Name	Sample Mean	Sample Variance
Dependent Variable	1.3860	0.2370
Financial Leverage	4.4315	13.0244
Revenue	2.3692	0.5122
Tax Loss Carryovers	0.2131	0.2694
Executive Stock Options	0.1015	0.5842

4.4315 and 13.0244 respectively. This statistical evidence is consistent with the previous literature which found a direct relationship between financial leverage and the economic failure [e.g., Baxter, 1967].

Table 8 illustrates the NPA results obtained when the choice of Chapter XI versus merger is the dependent variable and the four managerial motivations variables as defined above are the independent variables. As expected, revenue, tax loss carryovers and executive stock options are positively correlated with merger choice while financial leverage is positively correlated with voluntary bankruptcy choice. Revenue is significant at the level of .025. Financial leverage is significant at the level of .001, and the executive stock options is significant at the level of .042. Tax loss carry-overs have expected sign but not significant. Finally, the intercept of -1.214 is not significant at the .10 level.

In spite of the fact that the estimated R^2 is very high (87 percent) in this test, this by itself does not prove that the overall model is significant [Chow, 1982, p.286]. Such a test can be constructed by multiplying (-2) by the log-likelihood ratios. The resulting statistic is distributed as a Chi-square with degrees of freedom equal

Table 8

Probit Analysis of Merger-Voluntary Bankruptcy Choices Model Results*
(First Test)

Expected sign of independent variables	-	+	+	+
Independent variables	Leverage	Revenue	Tax Loss Carryovers	Stock Options
Maximum Likelihood Estimate	-0.16421	0.30143	0.15619	3.23185
t-statistic	-4.634	1.943	0.672	1.861
Significant Level**	.001	.025	***	.042

*Chapter XI firms were assigned a dependent variable of '0' and financially troubled merged firms a dependent variable of '1'

**The intercept of -1.214 is not significant at the .10 level

***Tax loss carryovers of 0.672 has expected sign but not significant

to the independent variables. As reported in Table 9, the Chi-square of 41.8407 with 4 degrees of freedom is significant at the .001 level or better. Thus, the probit model is extremely significant at the highest level.

The overall accuracy of the merger-voluntary bankruptcy model is 73 percent in this test. Pinches [1978, p.32] points out "in assessing the significance of this result, it is important to compare the total classification accuracy versus the proper number of correct classifications that are expected by chance." Pinches [1978] provides insight as to what would be achieved under naive classification schemes given the propulation prior to that. Approximately 62 percent of the financially troubled firms are Chapter XI firms and 38 percent are merged firms. The naive classification method which maximizes correct classification is the maximum chance criteria under which all firms are classified in the larger group (i.e., Chapter XI firms). Under this naive criteria, all firms would be classified as Chapter XI firms, and this would produce a correct classification rate of 62 percent.

This current study is concerned with the ability to correctly classify overall groups simultaneously. Thus, the proportional chance criterion is most appropriate for establishing the number of correct classifications expected by chance. Under the proportional chance criterion,

Table 9

Merger-Voluntary Bankruptcy Choices Model

Some Other Probit Analysis Measurements
(First Test)

Statistical Measurement	Value
X^2	41.8407*
R^2	.87
Overall Accuracy	.73

*The X^2 of 41.8407 with 4 degrees of freedom is significant at the .001 level or better

the expected probability of correct classification over two groups is equal to $(P_1)^2 + (P_2)^2$ where P_1 equals the prior probability in the population of an observation belonging to the first group (i.e., Chapter XI firms), and P_2 equals the prior probability of a given observation belonging to the second group (i.e., merged firms). The proportional chance method would achieve only a 52.9 percent success. The current probit model results exceed those achieved under either a naive model at the .001 level of significance.

Second Test:

This test used only a subsample (80 firms) and tested all hypotheses developed in Chapter III. The following model is tested using the NPA:

$$Y_i = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 \beta_4 X_4 + \beta_5 X_5 + \varepsilon$$

Where,

X_5 = stock ownership (total outstanding of common stocks (stock ownership variable)

Other notions are as defined in previous test.

The statistical description of variables included in this test are illustrated in Table 10. Sample mean and variance of financial leverage are higher than in previous test. They are 5.0488 and 14.3727 respectively.

Table 10

Merger-Voluntary Bankruptcy Choices Model

Summary of Statistics of Variables in the Probit Model
(Second Test)

Variable Name	Sample Mean	Sample Variance
Dependent Variable	1.3418	0.2250
Financial Leverage	5.0488	14.3727
Revenue	2.2540	0.5009
Tax Loss Carryovers	0.2802	0.3272
Executive Stock Options	0.0363	0.0039
Stock Ownership	0.3586	0.0876

Table 11 provides the NPA results when the choice is dependent variable and is defined in the context of Chapter XI versus merger. All managerial motivations variables as developed in Chapter III are the independent variables. As expected, revenue, tax loss carryovers, executive stock options, and stock ownership are positively correlated with merger choice, while the financial leverage is positively correlated with Chapter XI choice. Revenue is significant at the .10 level. Financial leverage is significant at the .01 level, tax loss carryovers at the .045 level and stock ownership at the .001 level. The executive stock option of .452 level has an expected sign but is not significant. Finally, the intercept of -2.420 is not significant at the .005 level.

Table 12 provides some other important statistical measurements. The estimated R^2 is much less than in the first test but is still high (55 percent). As in the previous test, the Chi-square with degrees of freedom equal to the independent variables can prove whether the model is significant or not. The Chi-square of 34.1558 with five degrees of freedom is significant at the .001 level or better. Again, the probit model is extremely significant at the highest level.

Table 11

Probit Analysis of Merger-Voluntary Bankruptcy Choices Model Results*
(Second Test)

Expected sign of independent variables	-	+	+	+	+
Independent variables	Leverage	Revenue	Tax loss carryovers	Stock options	Stock ownership
Maximum Likelihood Estimate	-0.14629	0.35482	0.49916	1.35266	2.53155
t-statistic	-2.651	1.323	1.712	0.452	3.594
Significant Level**	0.01	0.10	.045	***	0.001

*Chapter XI firms were assigned a dependent variable of '0' and financially troubled merged firms a dependent variable of '1'

**The intercept of -2.420 is not significant at the .005 level

***The stock option of 0.452 has expected sign but not significant.

Table 12

Merger-Voluntary Bankruptcy Model

Some Other Probit Analysis Measurements
(Second Test)

Statistical Measurements	Value
X^2	34.1558*
R^2	.55
Overall Accuracy	.80

*The X^2 of 34.1558 with 5 degrees of freedom is significant at the .001 level

The overall accuracy of this analysis is much better than in the previous test (80 percent). Under the naive criteria, all firms would be classified in the larger group (i.e., Chapter XI firms), and this would produce a correct classification rate of 65 percent. Finally, the proportional chance method would achieve only a 54.5 percent chance of success. The current probit model results exceed those achieved under either the naive model at the .001 level of significance.

Multiple Discriminant Analysis Results:

Multiple Discriminant Analysis (MDA) has been performed by using BMDP Stepwise Discriminant Analysis. The objectives of using this statistical package are: (1) to find overall efficiency of the classification scheme for merger-voluntary bankruptcy choices model and (2) to determine the relative importance of individual independent variables.

The first objective is achieved by finding the classification matrix and jackknifed classification. Both classifications reveal the overall successful classification rate of the model and also this rate within groups. The purpose of the hold-out sample technique is to control the attendant problems of over-fitting the data [Ball and Foster, 1982].

The present study has been used stepwise forward to determine the relative importance of individual variables.[3] The BMDP Stepwise Discriminant Analysis computes single predictor variable F ratio and then enters that variable with the largest F-value in the discriminant function. The second predictor variable is the second most important variable, given that the first is already included. Successive steps added or deleted new predictor variables based on their F-values conditioned on these predictors already made a part of the system.

First Test:

The purpose of this test is to find the discriminant power of the size, financial leverage, tax loss carryovers and executive stock options variables by using the entire

[3]Eisenbeis [1977, p.883] mentioned a number of methods which have been proposed in the literature to determine the relative importance of individual variables. There were to rank variables on the basis of (1) their univariate F-statistic, (2) their scaled discriminant function coefficients which were weighted by the appropriate diagonal elements of the pooled with groups deviation sums of squares matrix, (3) stepwise forward methods based on the contribution to the multivariate F-statistic, (4) stepwise forward methods as in (3), and (5) a conditional deletion method which removed each variable in turn from the m-variable set, with replacement, and ordered variables according to the resulting reduction in overall discriminatory power as measured by the (m-1) variable F-test.

sample. As reported in Table 13, data analysis by using .62/.38 prior probabilities indicates a successful classification rate of 72.5 percent and within group correct classification of 80 percent for the Chapter XI firms and 60.6 percent for financially troubled merged firms respectively.

The MDA classification success is almost exactly the same as that achieved in probit analysis. This overall accuracy exceeds that achieved randomly under both naive and proportional chance criteria of 62 percent and 52.9 percent correct respectively at the .001 level.

The same table proves the relative importance of individual independent variables. In this test, financial leverage has the largest approximate F-statistic (35.986). Then, revenue, executive stock options, and tax loss carryovers are consequently entered in the MDA model.

Second Test:

Table 14 provides the MDA results. The overall accuracy by using .65/.35 prior probabilities is 79.7 percent and within group correct classification of 88.5 percent for the Chapter XI firms and 63.0 percent for

Table 13

Merger-Voluntary Bankruptcy Choices Model

Summary of Multiple Discriminant Analysis Results*
(First Test)

Group	Classification Matrix			Jackknifed Classification			Summary of the Predictors Variables	
	% Correct	Chapter XI Firms	Merged Firms	% Correct	Chapter XI Firms	Merged Firms	Predictor Variables**	Approximate F-Statistic
Bankrupt Firms	80.0	84	21	79.0	83	22	Financial leverage	35.986
							Revenue	19.093
Merged Firms	60.6	26	40	60.6	26	40	Executive stock options	13.413
							Tax loss carryovers	10.083
TOTAL	72.5	110	61	71.9	109	62		

*Chapter XI firms were assigned a dependent variable of '0' and financially troubled merged firms a dependent variable of '1'

**These independent variables are ranked according to their contribution to the model

Table 14

Merger-Voluntary Bankruptcy Choices Model*

Summary of Multiple Discriminant Analysis
(Second Test)

Group	Classification Matrix			Jackknifed Classification			Summary of the Predictors Variables	
	% Correct	Chapter XI Firms	Merged Firms	% Correct	Chapter XI Firms	Merged Firms	Predictor Variables**	Approximate F-Statistic
Bankrupt Firms	88.5	46	6	86.5	45	7	Stock ownership	32.294
							Financial leverage	19.962
Merged Firms	63.0	10	17	59.5	11	16	Tax loss carryovers	13.905
							Revenue	10.921
							Executive stock options	8.628
TOTAL	79.7	56	23	77.2	56	23		

*Chapter XI firms were assigned a dependent variable of '0' and financially troubled merged firms a dependent variable of '1'

**These independent variables ranked according to their contribution to the model

financially troubled merged firms. The MDA classification success is almost exactly as that achieved in probit analysis. Finally, this overall accuracy exceeds that achieved randomly under both the naive and proportional chance criteria of 65 percent and 54.5 percent correct respectively at the .001 level. Jackknifed classification for this test is 77.2 percent and within the group is 86.5 percent for Chapter XI firms and 59.3 percent for financially troubled merged firms.

As reported in the same table, in this test the stock ownership has the largest approximate F-statistic. Then financial leverage, tax loss carryovers, size, and executive stock options consequently entered the model. The approximate F-statistic range from 32.294 (stock ownership) to 8.628 (executive stock options).

Third: Test of Chapter XI Outcomes Model Results.

Since there are some legal and financing constraints for Chapter XI, this study tested the outcomes of Chapter XI firms. Unfortunately, this test is using only 24 firms. Choice or dependent variable is defined as Chapter X outcome versus recovery outcome and the managerial incentive variables are the first four hypotheses developed in Chapter III.

Table 15 illustrated the MDA result. The overall accuracy of the model is 75.9 percent and this rate is 76.9 percent within Chapter X firms and 72.7 percent within recovery firms. The jackknifed classification is 54.2 percent and within group are 46.2 percent and 63.6 percent respectively. The overall accuracy success exceeds those achieved by naive scheme (54.2 percent) and also by the proportional chance method (50.0 percent). Finally, all the independent variables (i.e., revenue, tax loss carryovers, executive stock options and the financial leverage, respectively, entered the model.

Discussion

The present study analyzed three unanswered questions in the financially troubled firms studies area: (1) To what extent the avoidance bankruptcy theory is a rational explanation for the merger movement in recent years? (2) Given the validity of the avoidance bankruptcy theory as a motivation for the merger movement, what are the accounting and economics determinants of the merger-voluntary bankruptcy choices for the financially troubled firms? (3) Given the legal and financing constraints of Chapter XI, what are the accounting and economics determinants of Chapter XI firms outcomes?

Table 15

Chapter XI Outcomes Model

Summary of Multiple Discriminant Analysis Results*

Group	Classification Matrix			Jackknifed Classification			Summary of the Predictors Variables	
	% Correct	Chapter X Firms	Recovery Firms	% Correct	Chapter X Firms	Recovery Firms	Predictor Variables**	Approximate F-Statistic
Chapter X Firms	76.9	10	3	46.2	6	7	Tax loss carryovers	3.854
Recovery Firms	72.7	3	8	63.6	4	7	Revenue	2.868
							Executive stock options	2.618
							Financial leverage	1.894
TOTAL	75.0	13	11	54.2	10	14		

*Chapter X firms were assigned a dependent variable of '0' and recovery firms were assigned a dependent variable of '1'

**These independent variables are ranked according to their contribution to the model

With the exception of Shrieves and Stevens study [1979], no other study tested empirically the avoidance bankruptcy theory. By utilizing the Z-Score Model [Altman, 1968], the null hypothesis of avoidance bankruptcy theory is not a rational explanation for the merger movement in recent years but was rejected. The data indicated that 106 out of 399 firms from 1969 through 1978 were found to be failing firms one year before mergers. This 26.6 percent is greater than the 15.2 percent in the Shrieves and Stevens study [1979].

To date, no study has examined the corporate management motivations to select merger-voluntary bankruptcy decision of financially troubled firms. The empirical results of this model, when the choice was defined in the context of Chapter XI firms versus financially troubled merged firms, and the managerial incentive variables were size, financial leverage, tax loss carryovers and executive stock options, were the following:

1. Revenue, tax loss carryovers and executive stock options were positively correlated with merger choice while financial leverage was positively correlated with voluntary bankruptcy choice. Financial leverage, size, and

executive stock options are significant at the level of .042 or better. Finally, the intercept of -1.214 is not significant at the .10 level.

2. The probit model is significant at the .001 level or better. The overall accuracy of the model is 73 percent in the probit analysis and is almost the same as achieved by the multiple discriminant analysis. This predictive accuracy exceeds those achieved under either naive model at the .001 level of significance.

In the second test, when the choice defined as above and the managerial incentive variables include all hypotheses developed in Chapter III, the empirical results were as follows:

1. As expected, revenue, tax loss carryovers, executive stock options and stock ownership are positively correlated with merger choice while the financial leverage is positively correlated with voluntary bankruptcy choice. Revenue, financial leverage, tax loss carryovers and stock ownership are significant at .10 or better. Finally, the intercept of -2.420 is <u>not</u> significant at the .005 level.

2. The probit model is significant at the .001 level. The overall accuracy of the model is 80 percent in the probit analysis and almost the same achieved by the MDA. This overall accuracy exceeds those achieved under either naive model at the .001 level of significance.

In the merger-voluntary model results, revenue, financial leverage, tax loss carryovers, executive stock options and stock ownership were consistent with the hypotheses developed in Chapter III.

Revenue was found positively correlated with merger choice. Larger firms have an advantage of avoiding bankruptcy because such firms are more likely to have a number of segments or divisions which can be sold to provide operating funds and satisfy creditors. Also, management, if inclined to do so, may be able to attract a potential merger partner by emphasizing those segments or operations which are profitable. Leverage as a surrogate to financial risk was found positively correlated with voluntary bankruptcy choice. Financially troubled firms, which have relatively higher leverage, will be riskier and, consequently, more likely to file for Chapter XI. In contrast, the financially troubled firms which have lower leverage are more likely to select merger choice. One justification for the latter case is

that such firms will be more attractive to be acquired by stronger firms. The former case is consistent with most of the capital structure studies [e.g., Baxter, 1967].

Tax loss carryovers was found positively correlated with merger choice. Thus, the changes which were made by the Congress in the 1950's and 1960's with respect to operating tax loss carryovers and investment tax credit respectively have effected the corporate management decisions. These codes may encourage the financially troubled firms which have relatively large amounts of tax loss carryovers to select the merger choice rather than voluntary bankruptcy choice. This result is consistent with the conclusions of other studies which discussed this point normatively [e.g., Altman, 1971; Bulow and Shoven, 1978].

The management variables (i.e., executive stock options and stock ownership) were found positively correlated with merger choice. The results are consistent with the general conclusions of the effect of separation theory on corporate management behavior [e.g., Palmer, 1973; Kamin and Ronen, 1978; Pastena and Ronen, 1979; Amihud and Lev, 1981; Dhaliwal, Salamn, and Smith, 1982].

This result, also, is consistent with recent accounting choice studies which are based on agency theory

[e.g., Watts and Zimmerman, 1978; Zmijewski and Hagerman, 1981].

In both the NPA tests, the intercepts are not significant at .005 or better. This result is comparable to the result found in studies of agency theory, giving due recognition to differences in nature of the study, sample size and group structure.[4]

In the Chapter XI outcomes model, when the choice as dependent variable was defined in the context of Chapter X outcome versus recovery outcome and the managerial incentive variables were size, financial leverage, tax loss carryovers and executive stock options, all these variables entered the MDA model. The overall accuracy was 75.0 percent.

[4]For example, in Zmijewski and Hagerman [1981], the constant of their models are ranged from 3.03283 to 3.10356.

CHAPTER VI

Conclusions and Implications

In recent years, the accounting policymakers (e.g., FASB) emphasized the usefulness of accounting numbers to equityholders, creditors and to managements in making decisions in the interests of owners. Previous studies have dealt with the usefulness of accounting numbers to equity holders and creditors (e.g., efficient market hypotheses studies).

Recent developments in the economics of internal organization (e.g., agency theory) motivated a number of authors to analyze some accounting questions based on positive economics paradigm. Previous bankruptcy and merger studies attempted to build optimal prediction models. A contribution of this study is to test the ability of accounting numbers for economic decisions in internal organization. However, this study is based on a new understanding of the merger movement, i.e., merger as one of the choices available to managements of financially troubled firms.

Analysis of data for the sampled firms led to the following conclusions and implications.

First, 106 out of the 399 firms (26.6 percent) which completed their mergers from 1969 through 1978 were found to be failing firms one year before merger. The implication of this result is that the avoidance bankruptcy theory is a rational economic explanation for the merger movement in recent years.

Second, where the choice was defined in the context of Chapter XI firms and financially troubled merged firms and the managerial incentive variables consisting of revenue, tax loss carryovers, executive stock options and stock ownership were positively correlated with merger choice while financial leverage was positively correlated with Chapter XI choice. The overall accuracy of the model was 73 percent or better. Three implications can emerge from the above conclusions: (1) tax regulations not only can effect accounting choice decisions but also economics decisions in internal organization (in this study, merger-voluntary bankruptcy decision), (2) even the managements of financially troubled firms can act in their self-interests and (3) there are different degrees of financial crisis and these degrees are positively correlated with voluntary bankruptcy choice rather than merger choice.

Third, in the second model, the choice was defined in the context of Chapter X outcome versus recovery outcome and managerial incentive variables were size, financial leverage, tax loss carryovers and executive stock options and all these independent variables entered the MDA model. Unfortunately, because of the small sample used in this model, it is not possible to generalize the results. Further development needs a larger sample and more outcomes (e.g., merger outcome after filing for Chapter XI) to Chapter XI outcomes model as developed normatively in Chapter I of this study.

Fourth, the general conclusion of this study is that the accounting number based on traditional historical approach is useful to managers and directors in making decisions in their organizations.

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Dun's Failure Index

Business Failures include those businesses that ceased operations following assignment or bankruptcy; ceased with loss to creditors after such actions as execution, foreclosure or attachment; voluntarily withdrew leaving unpaid obligations; were involved in court actions such as receivership, reorganization or arrangement; or voluntarily compromised with creditors.

Liabilities as used in this publication, refer to current liabilities, and have a special meaning: they include all accounts and notes payable and all obligations, whether in secured form or not, known to be held by banks, officers, affiliated companies, supplying companies or the government. Long-term, publicly-held obligations are not included and offsetting assets are not taken into account.

Total Listed Concerns represent the total number of business enterprises listed in the Dun & Bradstreet Reference Book. This Book includes manufacturers, wholesalers, retailers, building contractors and certain types of commercial services including public utilities, water carriers, motor carriers and airlines. This count by no means covers all the business enterprises of the country. Specific types of business not listed are: financial enterprises including banks, mortgage, loan and investment companies; insurance and real estate companies; railroads; terminals; amusements; and many small one-man services. Neither the professions nor farmers are included.

Appendix B

Breakdown of Merger Voluntary Bankruptcy Model Sample

1. Financially Troubled Merged Firms in the Sample (n=66 firms)

Firm Name	Date of Completion
Allied Artists Pictures Corp.	1/76
American Air Filt	10/78
American Recreation Group	1/76
Anaconda Co.	1/77
Aurora Products Corp.	5/71
Avis Inc.*	7/77
BALI Inc.*	12/71
Brewer (C) & Co. Ltd.	8/78
Byers (AM) Co.	11/70
Campbell Chain Co.*	5/78
Case (JI) Co.*	8/70
Castleton Industries Inc.*	1/78
Cinerama Inc.*	5/78
Coburn Corp. of America	4/72
Collins Radio Co.*	11/73
Conductron Corp.	5/71
Copper Range Co.	5/77
Cox Cable Communication Inc.*	7/77
DHJ Industries*	10/75
Diamond M. Co.	5/78
Dynell Electronics	12/77
Electric Hose and Rubber Co.	5/78
Electronic Arrays*	12/78
Executone Inc.	/78
Fibreboard Corp.	6/78
Granite City Steel Co.*	8/71
Greyhound Computer Corp.	8/76
Hallcraft Homes Inc.	5/78
Head Ski Co. Inc.	5/71
Hillhaven Inc.*	3/78
Howmet Corp.	8/75
Hycel Inc.*	12/78
Hycon Mfg. Co.	5/71
Inspiation Consol	7/78
Interpool Ltd.	9/78
Jeannette Corp.	8/78
Leadership Housing Inc.	12/73

Firm Name.	Date of Completion
Lee National Corp.*	8/78
Leeds & Northrup	10/78
Lehigh Portland CE	9/77
Leonard Refineries Inc.	10/70
Louis Sherry Inc.	12/78
Lykes Corp.	12/78
Madison Square Garden*	8/77
Mann MFG. Inc.*	2/77
Marquette Co.	9/76
Martin Marietta Alum Inc.	6/74
Maule Industries Inc.	/76
Milgo Electronic Corp.*	12/77
Mohawk Airlines Inc.	4/72
Molycorp Inc.	7/77
National Alfalfa Dehydrating	5/76
North American Car Corp.*	/72
Offshore Co.*	4/78
Plastiline Inc.	11/77
Risdon MFG Corp.*	12/78
Royal American Industries*	6/75
Saturn Airways Inc.	11/76
Silican Transistor Co.*	12/72
Sinclair Oil*	/69
Standard Kollsman Industries	12/72
Transport Pool Corp.*	6/75
United Piece Dye Works	9/77
Virginia International Co.*	7/77
Walworth Co.	12/71
Western Decalta Petroleum*	3/77

2. Chapter XI Firms in the Sample (n=107 firms)

Firm Name	Petition Date
Abercrombie & Fitch Co.	8/76
Acme-Hamilton Manufacturing Co.	3/78
Allied Leisure Industries Inc.	3/75
Allied Supermarkets Inc.	11/78
American Beef Parkers Inc.	1/75
American Book-Stratford Press Inc.*	6/73
American Girl Fashions Inc.*	/74
American Kitchen Foods Inc.*	10/75
American Training Services Inc.	5/76
Ancorp National Service Inc.	3/73
Applied Health Service Inc.*	4/76
Aristo Foods Inc.	10/73
Arlan's Department Stores Inc.*	5/73
Armac Enterprises Inc.*	5/76
Associated Food Stores Inc.*	6/75
Associated Mortgage Investors*	3/74
Astrodata Inc.	12/70
Avien Inc.*	6/70
Avtex Corp.	6/73
Bermec Corp.	3/71
Botany Industries Inc.*	4/72
Building Systems Inc.	9/73
Cavanagh Communitiers Corp.*	2/75
Chicken Unlimited Enterprises*	3/76
Coit International Inc.*	8/75
Commerce Group Corp.	9/77
Commodore Corp.	2/74
Commonwealth Oil Refining Company Inc.*	3/78
Computer Applications Inc.	10/70
Comtel Corp.	8/70
Continental Investments Corp.	5/76
Continental Mortgage Investors*	3/76
Crown Drug Co.*	4/71
DEI Industries Inc.	9/71
Data Instruments Co.	8/71
Digital Applications Inc.*	8/74
Dominion Mortgage Realty Trust	6/77
Drew National Co.*	8/75
Duddy's Inc.*	5/77
Duplan Corp.	8/76

Firm Name	Petition Date
E.C. Ernst Inc.*	12/78
Easter Freight Ways Inc.	12/73
Elcor Chemical Corp.	7/71
Emersons Ltd.	2/77
Epidyne Inc.*	1/78
Equitable Development Corp.*	6/75
Esgro Inc.*	3/73
Executive House Inc.*	9/71
FAS International Inc.*	2/72
FDI Inc.	/78
Fidelity Mortgage Investors*	1/75
Fields Plastic & Chemicals Inc.*	7/77
Flock Industries Inc.	4/77
Frigitemp Corp.*	3/78
Frier Industries Inc.*	7/78
GAC Corp.	1/76
GAC Properties Inc.	12/75
Gaint Stores Corporation	7/73
Garcia Corp.	8/78
General Recreation Inc.*	12/78
Gilbers Cos.	8/77
Gladding Corp.*	4/77
Gray Manufacturing Co.	10/75
Griffiths Electronics Inc.	9/74
Gruen Industries Inc.	4/77
Guardian Mortgage Investors*	3/78
Harvard Industries Inc.*	11/72
Hydroculture Inc.*	2/75
Interstate Stores Inc.	/74
Jet Air Freight*	1/76
Justice Mortgage Investors*	1/78
Kenton Corp.	1/74
Leader International Industries	12/73
Milo Electronics Corp.*	7/70
Miner Industries Inc.*	8/77
National Mortgage Fund*	7/76
National Radio Co.	8/70
National Video Corp.	2/69
Omega-Alpha Inc.*	9/74
Open Road Industries*	11/76
Optel Corp.	6/76
Osias Organization Inc.	12/70
Pavelle Corp.*	5/73
Penn Fruit Co.	9/75
Permaneer Corp.*	6/76
Plaza Group Inc.*	10/73

Firm Name	Petition Date
Potter Instrument Co.*	4/75
Prel Corp.*	/75
Remco Industries Inc.*	1/71
Rupp Industries Inc.	2/76
St. Paul's C.J. Silver	1/76
Sanits Service Corp.*	5/76
Sensitron Co.*	4/71
Shulman Transport Enterprises*	8/78
Sitkin Smelting & Refining Inc.	3/78
Steller Industries Inc.*	4/75
Straton Group Ltd.	9/73
Super Stores Inc.	1/71
Transogram Corp.	3/71
Unishops Inc.	12/73
Universal Container Corp.*	3/78
Vally-Forge Corp.	5/75
Van Dyk Research Corp.	12/74
Viation Computer Systems Inc.*	2/71
W. T. Grant Company	/74
Washington Group Inc.	6/77
Western Digital Corp.*	11/76

*These firms were utilized in the Second Test of the Merger-Voluntary Bankruptcy Choices Model

Appendix C

Breakdown of Chapter XI Firms Outcome Model Sample

1. Chapter X Firms in the Sample (n=13)

Firm Name

Arlan's Department Stores Inc.
Bermec Corp.
Continental Investments Corp.
Continental Mortgage Investors
Duplan Corp.
GAC Properties Inc.
Interstate Stores Inc.
National Video Corp.
Omega-Alpha Corp.
Permaneer Corp.
Universal Container Corp.
Viation Computer Systems Inc.
Washington Group Inc.

2. Recovery Firms in the Sample (n=11)

American Book-Stratford Press
Astrodata Inc.
Commodore Corp.
Drew National Co.
Frigitemp Corp.
Gray Manufacturing Co.
Gruen Industries Inc.
Guardian Mortgage Investors
Jet Air Freight
Remco Industries Inc.
Valley-Forge Corp.