

# Accounting Information and its Relationship to Corporate Financial Distress Process

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## Abstract

*This article studies the critical chronological stages of the corporate distress process. Principal Factor Analysis is used to identify the underlying factors that influence the conditions of firms, as well as factors that account for intergroup differences. The results indicate that the critical factors associated with financial distress of manufacturing firms differ from those associated with service organizations; these factors also differ among the different groups studied and along the different phases of the financial distress continuum.*

## Introduction

This paper describes a model of the corporate failure process. In this process a failure event may be defined as any economic event which signals that a firm may be experiencing some degree of financial distress. The failure events may range from mild symptoms of danger such as nonrecurring losses to total failure or liquidation of the firm under bankruptcy proceedings (Giroux and Wiggins, 1984, and Pastena and William, 1986). Bankruptcy is a legal event in which a debtor firm petitions for protection from creditors under Chapter 11 (formerly Chapter 10) of the Bankruptcy Code. Generally, firms that file for bankruptcy are technically insolvent or firms that cannot pay their debts when due. Insolvency is an economic event that generally precedes as well as induces the legal event of bankruptcy. Several failing firms experience only temporary failure events and subsequently recover. Other firms merge with or are acquired by more economically viable and often larger firms while still others proceed through the failure process to bankruptcy and to seek the courts' protection of their assets under the bankruptcy code and to eventual liquidation.

This paper consists of five main sections. In the first, the research problem and objectives to which factor analysis is applied are briefly described. Significant prior research is discussed in the second section. In the third, the research methodology is described. In the fourth, the results of the analysis are presented and the interpretation of the resulting statistics is discussed. In the fifth section a discussion of the theoretical implica-

tions of the results and a review of issues concerning the application of factor analysis in Accounting research are presented. This section includes conclusions, limitations of the research and areas for further research.

## I. Research Objective

The purpose of this research is to study the important factors associated with firms under chapter 11 bankruptcy code protection, those that merge with or are acquired by other firms and those that liquidate. A further analysis is done to study the effect of industry on those factors. The critical chronological events or stages of the corporate failure process are examined. This approach has the flexibility of evaluating a firm's financial condition along a continuous scale.

Specifically, the critical events or factors that are unique to: 1. firms that have been acquired by or merged with other firms; 2. bankrupt or firms with chapter 11 protection under the bankruptcy code; and 3. liquidated firms are identified and examined. The study examines if there are any differences between the failure process of manufacturing and service organizations.

The failure process model may be of interest to management and auditors in assessing their exposure risk and to bankers (Giroux and Wiggins, 1984) in appraising the probable success or failure potential of a client firm, given the occurrence of one or more critical event(s) associated with the bankruptcy process.

## II. Significant Prior Research

A few studies on bankruptcy have adequately addressed the issue of corporate financial distress as a process that can be identified as phases on a continuum. A model proposed by Casey et al (1986) identified reorganized and liquidated firms as composite parts of the corporate financial distress process. Giroux and Wiggins (1984) described corporate financial distress as a gradual process of which bankruptcy is categorized into successful reorganization under Chapter 11 and liquidation. The research results, however, are based on a comparative chi-square analysis of bankrupt and non-bankrupt firms. Thus the research compares firms in liquidation and those that operate successfully. Giroux and Wiggins (1984) suggest that "since economic costs and potential rewards can be significantly different under each"...phase of the failure process, a thorough analysis of the entire process seems warranted. Pastena and Ruland (1986) define bankruptcy to include the various phases of corporate financial distress. Their research is limited to the examination of factors associated with the liquidation and merger alternatives. Their emphasis was on shareholders and management preferences and the possible social consequences rather than firm characteristics. Sinkey's extensive studies on bankruptcy is limited to the banking industry (Sinkey, 1975, 1978, 1979, and Sinkey and Walker, 1975). The studies do not address bankruptcy as a process or a continuum.

The predominant analytical tools of empirical study in this research area have been the use of financial ratios to discriminate between bankrupt firms and non-bankrupt counterparts (Altman, 1968, Beaver, 1966, and Ohlson, 1980) and the use of multiple regression, logit, and probit analysis to discriminate between bankrupt and non-bankrupt firms (Altman et al., 1981, Beaver, 1968, Bovenzi et al., 1983, Casey et al., 1986, Collins and Green, 1982, Mensah, 1984, and Pastena and Ruland, 1986).

A study by West (1985) employs factor analysis as the main analytical tool. The study is limited to the banking industry and does not address the issue of bankruptcy as a process. To date there is no study available that compares the important financial distress characteristics of firms under Chapter 11 protection bankruptcy code, with those that merged with or are acquired by more viable firms and those that liquidated on a continuum in such a manner as to help management to recognize and address them on a timely basis to help maintain organizational financial stability. This study seeks to help fill this void.

## III. Methodology

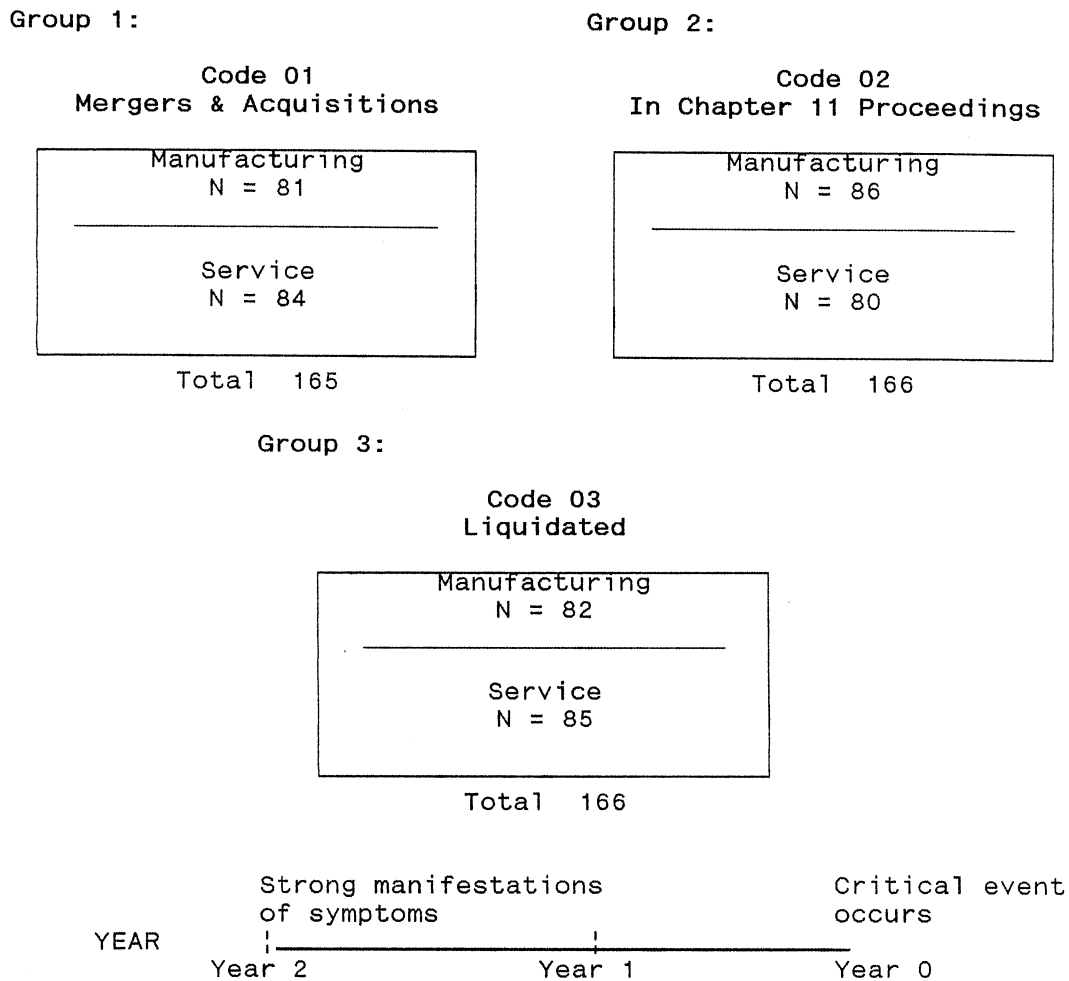
A sample of firms were selected from the Industrial Annual COMPUSTAT Research Tapes for the periods 1974 through 1988. Firms were grouped into those that merged with or were acquired by other firms (firms with 01 codification); those that filed for Chapter 11 protection (firms with 02 codification); and those that were liquidated under Chapter 7 of the bankruptcy code (firms with 03 codification). Selected firms were also regrouped into manufacturing and service organizations based on their Standard Industrial Classification (SIC) Codes. To ensure consistency in the data collection process and the reliability of the data collected, the sample firms were cross-checked with firms listed in the Wall Street Journal Index as merged, acquired, bankrupt and/or liquidated during the period under study, output of similar categories of firms from NAARS, and information obtained from Moody's Industrial Manual. There were 498 usable firms. These consisted of 165 merged firms with 01 code, 166 Chapter 11 firms with 02 code and 167 liquidated firms with 03 code respectively (see Figure 1). Firms in each group were further classified into subsets of manufacturing and service organizations. For each category of firms the last financial statements prior to the occurrence of the major event were obtained together with the two sets of financial statements for the two periods preceding the last statements. These were labelled Year 0, Year 1 and Year 2 respectively. Consequently zeros, ones, and twos were appended to the variable codes for these statements. Thus, three years of data were obtained.

### *Analytical Procedure*

Factor analysis was performed on the data to identify the relevant variables associated with each group in each period of the financial distress process. Factor analysis is a statistical technique used to examine the interrelationships among a number of variables, to categorize the variables according to their common underlying dimensions or factors and to explain the variance in terms of these factors.

Principal factoring with iteration (common factor analysis) using the varimax criterion for factor rotation was performed on the following event related variables: 1. net income, 2. cash flow, 3. after tax profit margin, 4. cash flow margin, 5. debts due in one year, 6. retained earnings, 7. working capital, 8. accounts receivable turnover, 9. inventory turnover, 10. return on net plant assets, 11. return on common equity, 12. interest coverage, 13. order backlog, 14. short term borrowings, 15. working capital trend, 16. cash divi-

**Figure 1**  
Research Plan



dends and, 17. capitalization (see Table 1). There seventeen variables were condensed per factor analysis from fifty-three original variables identified in the compustat tapes.

Factor significance on the condensed variables was established by the eigen value greater than one criterion.

#### IV. Factor Analytic Results

In the interpretation of factor analytic results, three main perspectives may be identified. One perspective considers the factors as descriptive of the interrelationships in the data. The factor structure is then a typology and the factors are classifications to which descriptive names have been assigned (Rummel, 1977, and West, 1985). The second perspective is causal approach, in which the factors are considered as underlying causes of the interrelationships delineated and are causally labelled. The third perspective is symbolic; thus the factors represent new concepts or variables that are designated by algebraic symbols, such as A, B, C, or F1, F2, F3. The second perspective is considered most suitable to this study. However, this is employed in conjunction with the symbolic approach or perspective. Essentially, the patterns of empirical relationships are assumed to reflect a common underlying influence, and the existence of a highly inter-correlated cluster of variables implies a common "factor". The factor analysis is thus believed to delineate causal nexus. The causal approach is to impute substantive form to the underlying and unknown causes.

The results of the study showed strong factor variable correlations for the two years preceding the critical event in year zero in the pattern presented in Table II below.

Table 1  
Variables Used in Study

<u>Variable Description</u>	<u>Abbreviations</u>
Net Income	NI
Cash Flow	CF
After Tax Profit Margin	ATPM
Cash Flow Margin	CFM
Debts Due in 1 year	DD 1yr
Retained Earnings	RE
Working Capital	WC
Accounts Receivable Turnover	A/R Tn.
Inventory Turnover	Inv. Tn.
Return on Net Plant Assets	Ret/NPA
Return on Common Equity	Ret/Com Eq.
Interest Coverage	Int. Cov.
Order Backlog	OB
Short Term Borrowings	S.T.B.
Working Capital Trend (Tr)	WC Tr.
Cash Dividends (Tr)	C Div. Tr.
Capitalization	Cap.

Table 2  
Three Year Trends of Critical Events  
by Group and Industry Type

Group						
YEAR 2:	1A	1B	2A	2B	3A	3B
	S.T.B.	S.T.B.	WC Tr.	S.T.B.	WC Tr.	S.T.B.
	NI	WC Tr.	S.T.B.	Cap	OB	WC Tr.
	OB	DD 1yr	OB	Int. Cov.	S.T.B.	Cap
	CF	WC		WC	CFM	CFM
	WC Tr.	RE	C Div.	C Div.		RE
			Tr.	Tr.		DD 1yr
				Ret/NPA		
YEAR 1:						
	OB	S.T.B.	WC Tr.	S.T.B.	WC Tr.	S.T.B.
	WC	WC Tr.	S.T.B.	Int. Cov.	OB	WC Tr.
	S.T.B.	RE	OB	Ret/NPA	S.T.B.	Cap
	WC Tr.	NI		RE		Ret/Com
	CF	A/R Rn.		C Div.Tr.		Eq
YEAR 0:						
	Cap	WC Tr.	WC Tr.	C Div.	WC Tr.	WC Tr.
	OB	S.T.B.	OB	Tr.	OB	Cap
	WC Tr.	OB	S.T.B.	RE	S.T.B.	Inv. Tn.
	S.T.B.	CFM	CF	CF		RE
		Inv. Tn.	DD 1yr	CFM		ATPM

CODES: 1 = Merged or Acquired Organizations  
 2 = Organizations in Bankrupt Proceedings  
 3 = Liquidated Organizations  
 A = Manufacturing Organizations  
 B = Service Organizations

Please refer to Table 1 for variables names.

*Manufacturing Organizations: Merged and/or Acquired*

Based on the coefficients of the factor loading matrix, the variables that loaded high across factors in year 2 are: short term borrowing, net income, order backlog, cash flow, and working capital trend. Again order backlog, working capital, short term borrowing, working capital trend, and cash flow loaded high in year 1, while capitalization, order backlog, working capital trend, and short term borrowings loaded high in year 0.

*Service Organizations: Merged and/or Acquired*

The coefficients of the following variables loaded high in the respective years studied. The important variables in year 2 are short term borrowings, working capital trend, debts due in 1 year, working capital, and retained earnings. In year 1 the important variables are again short term borrowings, working capital trend, retained earnings, net income, and accounts receivable turnover. In year 0 the important variables are working capital trend, short term borrowings, order backlog, cash flow margin, and inventory turnover.

*Manufacturing Organizations: Bankruptcy Proceedings*

The important variables indicated in year 2 are working capital trend, short term borrowings, order backlog, and cash dividends. In year 1 the important variables are working capital trend, short term borrowings, and order backlog. In year 0 the variables are working capital trend, order backlog, short term borrowings, cash flow, and debt due in one year respectively.

*Service Organizations: Bankruptcy Proceedings*

Short term borrowings, capitalization, interest coverage, working capital, cash dividends, and return on net plant assets were indicated as important variables for service organizations in the bankrupt group in year 2. Short term borrowings, interest coverage, return on net plant assets, retained earnings, and cash dividends were important in year 1 while cash dividends, retained earnings, cash flow, and cash flow margin were characterized as important variables in year 0. The major trend exhibited here appear to be cash flow problems.

*Manufacturing Organizations: Liquidated*

Working capital trend, order backlog, short term borrowings, and cash flow margin loaded high in year 2; working capital trend, order backlog, and short term borrowings loaded high in years 1 and 0 respectively. Thus working capital, order backlog, and difficulties in obtaining short term borrowings are important indica-

tors of a manufacturing concern heading for liquidation. It appears from the indicators that once a manufacturing firm is already in bankruptcy proceedings its ability to bounce back or proceed to total liquidation is not only dependent upon credit availability or factors exogenous to the organization, but also on internal or endogenous factors such as its ability to operate efficiently and generate cash and working capital internally.

*Service Organizations: Liquidated*

The important variables appear to be short term borrowings, working capital trend, capitalization, cash flow margin, retained earnings, and debts due in 1 year in year 2; short term borrowings, working capital trend, capitalization, and return on common equity are important in year 1; again, working capital trend, capitalization, inventory turnover, retained earnings, and after tax profit margin are important in year zero.

## V. Summary and Conclusions

Among the general observations that may be made from the analysis are that trends of critical events over the three year study differ among groups and industry type, despite some underlying factors that were found to be common to all groups (refer to Table II above). In the merger manufacturing group, order backlog coupled with problems regarding short term borrowings and deficiency in working capital appear to be the pervasive problems that could precipitate a firm's financial distress condition if not addressed on a timely basis. The problems depicted by the variables and trend over the period studied tend to reflect serious production bottlenecks, scheduling problems as well as problems in forecasting demand. In the merger service group, the trend shows that working capital and cash flow problems coupled with credit squeeze put a strain on short term borrowing which in turn exacerbates the problems of cash flows and short term debts. For all firms in the merger and acquisition group, working capital and short term borrowing problems seem to be dominant factors that could make such firms become attractive preys for corporate raiders.

In the bankruptcy proceedings manufacturing group, problems relating to order backlog, working capital, and short term borrowing appear to be the most important indicators of financial distress. The bankruptcy proceedings service group is characterized by problems relating to working capital, cash flows, short term borrowing and diminishing cash dividend trends. All firms in the bankruptcy proceedings category tend to exhibit problems relating to inability to borrow for the short term and consequently tend to have cash flow problems.

Firms in the liquidated manufacturing group are characterized by problems relating to working capital trend, order backlog, and short term borrowings. Those in the liquidated service group are characterized by problems relating to short term borrowings, working capital, capitalization, inventory turnover, inability to pay debts due within one year and cash flows. All firms in the liquidated group exhibit acute working capital and cash flow problems.

All firms in all three groups begin by showing operating losses which adversely affect working capital leading to cash flow problems and credit squeeze. Thus, working capital trends and cash flow availability seem to be important to all groups and industry types, whereas order backlog seem to be important to the manufacturing sector in all groups and short term borrowings which signal credit availability appear to be important to the service sector in all groups. The important variables, however, seem to be different between the groups studied.

#### *Implications:*

The surge in corporate failures in recent decades have resulted in loss of several millions of jobs, have cost investors and creditors billions of dollars and have adversely affected the well being of the world economy.

It has been argued that bankruptcy and corporate failures serve a positive function in a free market economy by eliminating inefficient competitors as a result of their own financial weaknesses and by rewarding those competitors that meet the demands of the market and manage their resources efficiently and effectively.

Given the economic hardships created by corporate failures, it seems apparent that any tool or technique that could help avoid such failures would be a valuable aid to business decision makers. A useful technique would be one that would lead to an early identification of the characteristics of those firms at risk of encountering financial difficulties (Debnah, et al, 1987). With the availability of a model capable of identifying early characteristics of corporate financial distress or difficulties, the executives of such companies would have more reaction time in which to determine the causes leading to failure and take appropriate corrective measures, creditors and investors would be in a better position to reduce their exposure risks and have a better assessment of the risk they assume; accountants and auditors would be able to offer timely and relevant advice to their clients and be able to reduce their audit risk as well.

The model being proposed in this study has a major advantage over models that employ financial ratios as a basis for comparison. These models ignore the causal relationships between the financial ratios and failure. Thus, the financial ratios only serve as symptoms of potential failures but do not indicate the causes of such failures (Debnah, et al, 1987). They indicate the existence of a problem but not the underlying cause of the problem. The factor analytic approach serves to identify the problem and its cause at the same time.

The limitations in applying factor analysis in research are that: 1. there are many techniques available for performing the analysis, and opinions differ about which is best; 2. it has subjective aspects, such as the number of factors to extract, which result in differences in opinions; 3. the results of any single analysis are less than perfectly dependable. While it is emphasized that there are many aspects of factor analysis that require judgments based on non-statistical criteria, its use should not be avoided in Accounting Research on this basis. Further research in this area is certainly needed and encouraged. So long as corporate financial failures remain on an upward trend researchers have a responsibility to evolve new models for adequately predicting the early characteristics of corporate failures.

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