MOTIVES FOR CORPORATE MERGERS AND TAKEOVERS: AN INVESTIGATION OF THE "FAILING COMPANY" HYPOTHESIS AND OF POST-MERGER PERFORMANCE

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EBEN O. UKAEGBU

Department of Accountancy
and Business Law
University of Stirling

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ABSTRACT

The overall objective of the study was to determine the financial characteristics of companies involved in merger activity. More specifically, the study aims to determine:

(a) whether acquired companies possessed financial characteristics similar to previous failed companies (the 'failing-company' hypothesis);

(b) whether acquiring companies possessed financial characteristics similar to previous failed companies and

(c) the impact of acquisition on the post-acquisition performance of acquiring companies, and particularly to consider whether their performance differs according to the financial characteristics of the companies they acquired.

A new "bankruptcy prediction" model, contemporary with the acquisition data, was derived, tested for robustness, and applied to samples of acquired and acquiring companies. An indirect test of the 'failing-company' hypothesis was carried out by comparison with the results obtained on application of the model to control groups of non-acquired and non-acquiring companies.

The test indicated that a higher proportion of acquired companies possessed financial characteristics similar to failed companies than the control group of non-acquired companies. This evidence tends to support the 'failing-company' hypothesis as a motive for mergers for acquired companies. Conversely, there was no such evidence in support of the hypothesis for acquiring companies.

The approach adopted also allowed the dichotomy of acquired companies (failing vs. non-failing) which made it possible to test for differential post-acquisition performance of the acquiring companies.

In order to evaluate the post-acquisition performance of acquiring companies, three different measurement criteria were adopted. They were:

(a) accounting-based profitability and gearing ratios

(b) industry-standardardised profitability measure (Meeks (1977)) and

(c) performance analysis-scores (PAS-score) (Taffler (1983)).

The results indicated that the acquiring companies generally incurred a decline in their post-acquisition profitability measures, while they increased their gearing ratios. Generally, the group acquiring potentially failing companies exhibited 'superior' post-acquisition performance compared with the group acquiring "non-failing" companies.

These findings support the managerial motives for mergers since there appears to be little evidence that mergers are undertaken to increase profitability as implied in neoclassical motives. They also suggest the possible need for a review of public policy towards mergers; perhaps mergers ought to be encouraged only if they prevent impending bankruptcy by the acquisition of failing companies.

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CHAPTER ONE

INTRODUCTION

1.1 Study Overview:

Corporate takeovers and mergers are now a common feature of modern business life. They form a major avenue for the growth maximizing firm. The size and intensity of takeover activity in recent time have triggered off varied speculations about the motives of acquisitions. Equally, several new defensive strategies have been adopted to ward off unwanted takeover bids.

The broad goals of this study are to investigate the financial characteristics of the companies involved in takeover activity. The first focus is on determining whether the acquired companies were in danger of failure prior to their acquisition, in other words whether merger route was adopted to avoid bankruptcy. The second focus is determining the post-acquisition performance of the acquiring companies.

1.2 Previous Knowledge:

As the rate of takeover activity continues to rise, several attempts have been made to discover the motivations, financial characteristics and impact of this form of business activity. The bulk of these studies have taken one of two major approaches: (i) to determine the impact of acquisition on the financial performance of the acquiring companies and (ii) the prediction of takeover targets.

The outcome of the studies to determine the impact of acquisition on the performance of the acquiring companies is not unambiguous. Some studies indicate that on average profitability of the acquiring companies declined after the merger (Singh (1971), Meeks (1977)), whilst Cosh, Hughes and Singh (1980) showed that in their sample, acquiring company profitability either increased, or remained the same following the merger.

There are theoretical justifications for these findings. In recent years, many theories for explaining merger motives have been discussed in both finance and economics literature. There is a measure of agreement between the authors that motives for merger can be broadly defined by two theories, 'managerial' and 'neoclassical'. The discussion of these theories and their relevance to the post-acquisition performance of the acquiring companies is undertaken in Chapter 3.

The second approach adopted by previous empirical studies on merger has involved the application of the statistical technique of discriminant analysis to develop a combination of accounting ratios to predict take-over targets (Singh (1971), Stevens (1973)). This approach has had a measure of success. However, while it may be possible to predict takeover targets, it does not follow that the predicted 'targets' are likely to be acquired.

Most previous empirical studies of financial ratios have investigated the behaviour of the ratios of companies during years preceding economic events like corporate bankruptcy, and default on long-term debt (Beaver (1966,1968), Altman (1968), Edmister (1972) and Taffler (1982)). All these studies support empirically the contention of proponents of ratio analysis (e.g. Foulke (1968)), that certain ratios are capable of predicting business failure. However, only two studies have investigated empirically the failing-company doctrine for companies involved in merger activities. There are two versions of the doctrine; the first for the acquired and the second for the acquiring company. The first version of the doctrine views acquisition as a way to avoid bankruptcy for the acquired firm (Dawey (1961)). The second version views acquisition as a 'defensive' strategy for the acquiring company against bankruptcy (Weston and Mansinghka (1971)).

Stevens and Shrieves (1979) used data from U.S.A. companies and Altman's (1968) bankruptcy prediction model to test the first version of the failing company doctrine. The other study was by Taffler and Soper (1983) using data from U.K. companies and Taffler's (1982) model. These studies are discussed in Chapter 4.

The present study is markedly different from the two previous studies. Stevens and Shrieves used U.S.A. data and the outcome of the study cannot be generalized to include U.K. corporate organisations due to institutional and financial accounting reporting differences. Moreover, they used a model which might have been potentially defective. The defective nature of Altman's (1968) model is discussed in Chapter 4. In the case of Taffler and Soper, they used U.K. companies and their sample included all acquisitions of quoted companies in the London Stock Exchange during their study period. This implies that their conclusions relate to both large and small quoted companies during the period. One cannot conclude from the findings of their study that severe financial crises among 'large' quoted companies in the U.K. are resolved through the merger process. This gap in knowledge about large firms is important, because it is this category of firms that are likely to solicit for mergers as they seldom go bankrupt. This study aims to fill that gap.

Other studies, for example, Singh (1971) and Meeks (1977) have sought to test the impact of acquisition on the performance of the acquiring companies. These studies have employed both market and accounting based measures of performance. None of these studies to the knowledge of the present author has split the acquiring companies into two sets according to the financial characteristics of the acquired companies. The grouping of the acquiring companies into two sets according to the financial characteristics of the acquired companies enables the comparative performance of the sets to be made. This approach would enable a statement to be made as to whether the post-acquisition performance of the acquiring companies is a function of the financial characteristics of the companies they acquired.

1.3 Objectives of the Study:

The overall objective of the study is to determine the financial characteristics of companies involved in merger activity. More specifically, the study aims to

1. determine whether acquired firms were in danger of bankruptcy prior to acquisition
2. determine whether acquiring companies were in danger of bankruptcy prior to acquisition
3. determine the impact of acquisition on acquiring companies; and particularly to consider whether their performance differs according to whether or not the companies they acquired appeared to be in danger of bankruptcy.

1.4 Significance of the Study:

It has been suggested that most mergers are merely a civilized alternative to bankruptcy or voluntary liquidation that transfers assets from failing to rising firms (Dawey, (1961)). This suggests a hypothesis that acquisition is a route to avoid bankruptcy[1]. In order to test the hypothesis, it is therefore necessary to determine whether acquired firms would have gone bankrupt. Based on the outcome of hypothesis testing, one might argue whether bankruptcy or acquisition seems 'better' for the benefits of shareholders, management, workers in particular and society in general.

The empirical approach adopted in this study was to derive a bankruptcy prediction model from a group of failed and non-failed companies. The model was applied to a group of acquired and non-acquired companies to determine whether the proportion of firms posessing failing characteristics is higher in the group of acquired firms. The outcome of the empirical approach adopted in this study could provide support for the failing company doctrine for the acquired company. If the bankruptcy prediction model can accurately predict failing companies,

1. Bankruptcy for the purpose of the present study is defined as one of the following: (a) winding-up by Order of the Court; (b) entry into creditor's volunlary liquidation or (c) the appointment of a receiver.

it can provide an 'early-warning' signal to both management[1] and shareholders of an impending danger so that, merger solicitation or other remedial actions can be initiated.

If, acquisition is an alternative to bankruptcy for the acquired firms, it raises additional issue for the acquiring firms. The issue relates to the motive behind the acquisition, given that the acquired companies were potentially failing companies. It has, however, been hypothesized by Weston and Mansinghka (1971) that acquiring companies were potentially 'sick' companies who sought to increase their size, thereby insulating themselves from becoming possible acquisition targets. This suggests a failing company hypothesis for the acquiring companies. The empirical approach of this study could also provide evidence for the failing company hypothesis for the acquiring companies.

1. Under the Insolvency Act 1985, directors can be sued for 'wrongly trading'. Under the Provision, no evidence of dishonest intent need be proved, i.e. incompetence or irresponsible conduct may suffice.

1.5 Post-Acquisition Performance:

Previous studies by Singh (1971), Utton (1974) and Meeks (1977) show that acquisitions do not improve profitability of the acquirer, and in most cases, they suffer a severe decline in profitability subsequent to acquisition. However, these studies treat acquisitions as a homogeneous set. It is hypothesised in the present study, that such an approach might mask differential effects resulting from the nature (failing or not) of the firms being acquired. To investigate this possibility, it is first necessary to split the acquiring companies into two groups - those acquiring others with failure characteristics and those acquiring others with non-failure characteristics - and to measure the post-acquisition performance of each group separately.

There are several possible outcomes for the new group post-combination performance. First, it could be that by acquiring a potentially failing company, the profitability of the acquirer is 'diluted' to a level that a decline in profitability becomes apparent. Alternatively, acquisition of a failing company might allow the purchase of useful assets and companies relatively cheaply; if these can be put to good use by the acquirer, an improved performance might be expected. Acquisition of a profitable company may conversely lead to a relaxation of effort on the part of the management, which in turn may affect the overall group profitability. This study seeks to provide evidence as to the possible outcome.

1.6 Hypotheses:

In order to achieve the objectives of the study, the following testable hypotheses were formulated:

1. H_o: There is no significant difference between the proportion of firms possessing failing characteristics in the sets of acquired and non-acquired firms:

2. H_o: There is no significant difference between the proportion of firms possessing failing characteristics in the sets of acquiring and non-acquiring firms:

3. H_o: There is no difference between the post-acquisition and pre-acquisition performance of the acquiring companies

4. H_o: There is no difference between the performance of the two groups of acquiring companies based on the financial characteristics of the acquired companies.

1.7 Methodology:

This study adopts empirical research methodology to achieve its stated objectives. An alternative methodology which might have been adopted was an 'opinion' approach with or without the use of questionnaires. With the opinion methodology, the outcome of the study would be based on the opinions (sentiments, emotions, etc) of persons, or groups involved in the actual merger execution. The subjective nature of the opinion methodology renders it less appropriate for the overall objective of this study.

The strategy adopted was to derive a reliable bankruptcy prediction model based on financial ratios, following a similar approach to studies by Altman (1968), Taffler (1982) and many others. After testing the model for robustness, it was applied to samples of acquired and non-acquired, acquiring and non-acquiring companies to test hypotheses (1) and (2). This also allowed the dichotomy of acquired companies (failing vs. non-failing) which was required for testing the fourth hypothesis.

The performance measurements used were mainly accounting based including profitability and gearing ratios, the Meeks (1977) industry-standardised profitability measure and Taffler (1983) PAS-score, which seeks to measure relative strength by ranking company 'Z-scores'.

1.8 Research Tools:

The primary analytical technique used to test the failing-company hypothesis was multivariate discriminant analysis (MDA). Using the DISCRIMINANT procedure provided in the Statistical Package for Social Sciences (SPSS-X), and based on the values of the variables (financial ratios) investigated, MDA creates discriminant profiles of known failed and non-failed in the sample of companies analyzed.

Using the SPSS-x FACTOR procedure, factor analysis was employed to lessen the problem of multicollinearity[1] which is coincident with the use of MDA and financial ratios as variables. The application of factor analysis reduced the number of variables from which the discriminant function was constructed.

The derived discriminant function was successful in distinguishing between failed and non-failed companies. Several validation tests were carried out to establish the robustness of the model and to establish whether the derived model was sample-specific. The validated model was used in testing the failing company hypothesis both for the acquired and acquiring companies.

1.9 Data Collection:

Financial statements of companies used in the analysis were obtained from the Extel Cards, Annual Published Statements by the Companies and from the Department of Trade. The Companies were at various relevant periods quoted on the London Stock Exchange.

The set of companies used in the derivation of the bankruptcy prediction model were known to have either failed or survived during the period under review. The

1. Multicollinearity is discussed in Chapter 6 Section 6.3.4

set of companies involved in mergers were listed by the "Times 1000" under the heading 'Largest Acquisitions and Mergers'. The remaining set of companies were not involved in any significant merger activity during the period under review. These companies were used to form control groups.

1.10 Organisation of the Dissertation:

The dissertation is organised into two parts. The first part of the dissertation reviews the literature on which the study is based. The second part presents the empirical results of the study.

In Chapter 2, the current level of merger activity is examined and the reasons often advocated for takeover activity are reviewed. Special attention is drawn to the financial characteristics of the acquired companies which lend credence to the view of acquisition as a route to avoid bankruptcy.

In chapter 3, the acquisition motives from the acquiring companies' point of view are discussed. Both the theoretical and empirical views are presented to generate expectation of the outcome of this study.

The acquisition alternative argument raised in Chapter 2 is developed further in Chapter 4. Both the theoretical and empirical framework are discussed.

Prior research has suggested the usefulness of financial ratios in the prediction of firm failure. This literature is reviewed in Chapter 5.

The second part presents the empirical results of the study. The methodology and detailed research hypotheses of the study are presented in Chapter 6.

In Chapter 7, the bankruptcy prediction model is derived from groups of failed and non-failed companies. In Chapter 8 results of the study relating to the failed company hypothesis are presented.

In Chapter 9 includes the analysis and results relating to the post-acquisition performance of the acquiring companies. The concluding Chapter 10 includes discussion of the study's results, its findings, limitations, implications and areas for further research.

CHAPTER 2

A REVIEW OF MERGER ACTIVITY

2.1 Introduction:

This chapter centres on a discussion of mergers and the reasons often advocated for their popularity. Special attention is drawn to the financial characteristics of the companies acquired during mergers.

2.2. Merger Spate

The recent merger spate is a feature not just confined to the United Kingdom but is found in many advanced industralized nations, for example, the United States of America. The timing of this intensive takeover activity has varied slightly between the economies of the developed countries. However, the main peak of the takeover activity can be identified with the early 1970's (see Table 2.1. relating to the United Kingdom).

TABLE 2.1

MERGER ACTIVITY: INDUSTRIAL AND COMMERCIAL COMPANIES 1969-1984[1]

Year	No of Acquisitions and Mergers		
	No Acquiring	No Acquired	Value (£M)
1969	686	846	1,068.9
1970	629	793	1,122.5
1971	687	884	911.1
1972	928	1,210	2,531.6
1973	929	1,205	1,304.3
1974	427	504	508.4
1975	276	315	290.8
1976	315	353	427.2
1977	427	481	824.0
1978	484	567	1,140.0
1979	447	534	1,656.0
1980	404	469	1,475.0
1981	389	452	1,144.0
1982	399	463	2,206.0
1983	391	447	2,343.0
1984	508	568	5,474.0

Source: HMSO: "Acquisitions & Mergers of Industrial and Commercial Companies" Business Monitor, MQ 7 (various editions).

Note: 1. Mergers within the Financial Sector are recorded in a separate series from the figures given above. Details of Financial Mergers are contained in the Bank of England's Financial Company Series.

In the U.K., merger activity in the years 1959-1972 was probably more intensive than in any other period in industrial history, perhaps the most active since the 1919-1930 merger boom. However, the trend has shown substantial cyclical fluctuation, particularly in 1970-1985. If peak years are to be identified amongst industrial and commercial companies since 1969, the years 1969-1973 stand out clearly. By contrast 1975, was a depressed year but there has been some recovery since then (see also Table 2.1).

2.3 Merger Activity Among Largest Quoted Companies:

This study examined merger activities involving the largest quoted companies on the Stock Exchange for the period 1979 to 1983. The sample chosen represents an important part of takeovers among quoted companies. A criticism of this study is that it examines only a small proportion of overall takeover activity. However, this applies equally to most previous studies, for example, Franks et al (1977). However, the importance of the sample should be judged in terms of value of the acquired companies rather than the number of takeovers examined. For example, in 1982/83 financial year the total number of acquired companies was 463 and the reported expenditure was £2,200m. However, acquisitions with value over £2m were 114 which represents 24% of the total population. This 24% accounted for 92.66% of the total value of acquisition for the period (see Table 2.2)

Table 2.2

SIZE ANALYSIS OF ACQUISITIONS AND MERGERS WITHIN THE UNITED KINGDOM
(1976 - 1982)

Expenditure (£K)	1976		1977		1978		1979		1980		1981		1982	
	No.	£m	No.	£m	No.	£m	No.	£m	No	£m	No.	£m	No.	£m
Total Acquisitions														
Total	353	427.2	481	823.8	567	1139.5	534	1656.4	469	1475.4	451	1143.7	463	2205.5
Over 25	1	47.5	2	60.9	7	347.7	15	851.4	9	823.9	10	341.5	15	1399.5
Over 10 < 25	5	64.2	18	318.4	15	222.3	16	256.5	10	188.3	17	300.6	17	269.1
Over 5 < 10	12	88.7	18	130.9	20	139.2	19	131.8	19	144.4	19	135.6	26	182.5
Over 2 < 5	31	103.3	39	127.9	56	178.6	52	158.0	41	128.6	58	191.1	56	192.7
Over 1 < 2	37	52.2	63	87.6	87	125.0	88	131.5	58	82.9	61	90.5	50	72.2
Over 0.5 < 1	56	38.1	74	54.0	96	71.3	98	72.8	74	54.5	62	95.4	67	49.4
Over 0.1 < 0.5	133	30.4	141	38.5	189	50.4	178	50.8	162	48.2	138	35.2	131	36.9
0.1 or Less	78	2.8	126	5.6	97	5.0	68	3.6	96	4.6	87	3.9	101	3.3

Source: HMSO: "Acquisitions & Mergers of Industrial & Commercial Companies: Business Monitor MQ 7. (Various Issues).

Note: The above table excludes a large number of private family businesses whose assets satisfied the criteria for inclusion into the 'largest acquisitions and mergers' but remain unquoted.

2.4 Distinction Between Takeover and Merger:

Many authors, for example, Meeks and Whittington (1975), have tended to use the terms 'merger', and 'takeover' or 'acquisition' in a completely interchangeable fashion. However, it is important, though not always easy, to draw a distinction between them. 'Merger' is said to occur where a new company is formed to acquire the assets of two or more firms, and where the terms of the amalgamation are more or less equal. It is possible to classify the dominant firm in a merger either on the basis of the composition of the new board of directors, or on the book values or market values of the merging firms.

'Takeover', however, represents the acquisition of the assets of one company by another without the formation of a new company. This distinction is purely legal, and the choice between these two forms of business combination is affected by financial and administrative considerations rather than by broader economic justification (Moon (1968), Singh (1971)).

It is worthy of mention that takeovers are by far the more numerically dominant of the two classifications. The most thorough examination of the quoted manufacturing sector in the United Kingdom available so far shows that of the 1,599 companies which were absorbed through merger in the period 1948-1972, only 77 (or 4.8%) did so because of merger, (Hughes, (1977)). Therefore, in general, the terms 'takeover' or 'acquisition' are preferred, and these terms are used in an interchangeable manner[1]. Similarly, in the present study, the terms are used in an interchangeable fashion.

2.5. Takeover As a Paradox?:

An initial problem to be resolved is why takeovers occur in the first instance. Hindley (1973) asserted that the sale of a business takes place only when the buyer has higher expectations of its future profitability than the seller. The higher expectation of future profitability by the buyer may be a reason for a high bid premium.

1. There is also an accounting distinction between the two forms of business combination - 'merger' and 'consolidation' accounting. This distinction is not pursued in the present study. The accounting guidelines are provided by SSAP 23 'Accounting for Mergers and Acquisitions'.

There are a number of possible reasons for the premium. First, if the merger creates new business opportunities that increase the earning power of the assets, part of the discounted present value of those gains may have to be paid over to the shareholders of the acquired company. For example, if the benefits of the merger can be obtained by many potential acquirers, while there is only one acquiree, competitive bidding may increase the bid premium enough so that a large proportion of the value of the benefits of the merger is paid to the acquired company's shareholders as a part of the bid price.

Franks et al (1985) suggested that where there are no other bidders for a company, it is possible that a successful bid can be pitched more closely to prevailing stock market prices, and the corresponding bid premium will be smaller. They also asserted that if the bid premium were zero, many shareholders would still believe there were merger benefits and would hope for a better future bid from either the current bidder or another.

The bid premium has been described as an enticement given by the acquirer to the seller to ensure the consummation of the merger. (Graham (1966)). Weston (1966) quoted Graham to suggest that:

> "...as a broad empirical matter, an acquiring company must pay a 20% premium to the company it seeks to acquire. The 20% premium must be more than the existing price of the acquired company's stock if it is to provide an inducement for the acquired company's stockholders to approve the sale" ..p 136.

Empirical studies by McCarthy (1963), Walker (1963), Walker and Kirkpatrick (1963), Weston and Brigham (1966) and Gort (1966) have shown that bid premiums range from 15% to 46% to acquired company shareholders.

However, Grossman and Hart (1980) suggested that some shareholders may refuse to sell their shares even when a bid premium is offered because they wish to remain as minority shareholders in the merged company. The purpose of refusing to sell their shares is to enjoy any additional gains that may accrue to them as a result of the merger benefits. If a sufficient number of individual shareholders believe that the value of the merger benefits exceeds the bid premium and behave accordingly, the bid will fail at that price.

Grossman and Hart call this a 'free-rider' problem because some shareholders hope to gain on the backs of other shareholders. This situation arises where delegation of power is made to few individuals. A fundamental problem with this delegation is that no individual has a large enough incentive to devote resources to ensuring that the representatives are acting in the interest of the represented. Grossman and Hart refuted the suggestion that in a company the free-rider problem can be avoided by use of the takeover bid mechanism[1].

However, there may be a situation where each shareholder is so small that his decision will not affect the outcome of the takeover. In such a situation, Grossman and Hart argue that if a shareholder thinks that the takeover will succeed and that the raider will improve the firm, he will not sell his shares, but will instead retain them, because he anticipates a profit from their price appreciation.

1. See Williamson (1964) for a discussion of the separation of ownership and control in the corporation. See also Marris (1964) and Manne (1965) for a discussion of the role of takeover bids in ensuring that a director serves the interests of shareholders.

Grossman and Hart's study is a polemic against conventional wisdom in economics and as such merits some digression from the main theme of this chapter. Suppose V* is the maximum potential value of the acquired firm, V, its current value, P, the bid price, N, the number of shares, and NA, the number of shares purchased by the acquirer. The situation where the bid price falls between the actual and maximum valuation of the firm can be represented as:

$$(1) \qquad \frac{V^*}{N} > P > \frac{V}{N}$$

In this case, the acquiring firm would hope to gain

$$\frac{(V^* - P)}{N} \cdot NA,$$

i.e. the difference between the actual potential value of the firm and the price they pay for the shares. However, existing shareholders would refuse to sell their shares in the hope of making a gain of

$$\frac{V^*}{N} - \frac{V}{N} \quad \text{per share}$$

rather than $P - V/N$ if they sell. Therefore, although a bid is made it is unsuccessful. The bid will succeed when

$$(2) \qquad P > \frac{V^*}{N} > \frac{V}{N}$$

But in this situation, there is no incentive to make a bid which exceeds the maximum potential valuation of the prospective victim. Hence it is concluded that a takeover will never take place.

The empirical evidence generally does not support this piece of economic argument. There are four main reasons advanced for this: the existence of a mechanism to bypass the free-rider problem; the ability for 'covert' purchases of shares to be made; different perception between the acquirer and the acquiror and the dilution of property rights.

In the U.K., for example, there is an institutional mechanism for bypassing the "free-rider" problem. If company ABC acquires 30% or more of the voting rights of Company XYZ, or if ABC in any period of twelve months adds more than 2% to an existing holding of between 30% to 50% in XYZ, then Rule 34 of the Takeover Code obliges Company ABC to make a bid for the remainder of the equity of XYZ. The price will not be less than the highest price ABC paid for any XYZ shares in the previous twelve months. If the bid results in ABC acquiring 90% or more of the shares of XYZ that are not already owned, ABC may force the remaining XYZ shareholders to accept the bid using the procedure laid down in Section 209 of the 1948 Companies Act (and amended by S. 428 and 430 of the 1985 Act).

Under a scheme of arrangement, the 90% requirement could be reduced to 75%. A scheme of arrangement is a system whereby the share capital of one company is cancelled and replaced by new shares issued by the other (Davies,(1976)).

Secondly, where shares are publicly quoted on the Stock Exchange, they may also be purchased in a piecemeal covert fashion[1] without any prior consultation between the directors or shareholders of the companies involved. Given these situations, there may not be any incentive for the minority shareholder to "free-ride".

The Grossman and Hart argument assumes that both the acquiring and the target companies hold the same perception about the value of V*. If however, the management of the bidder is of the view that they are more efficient than the target's management and the target's shareholders do not have information on the managers of the bidder[2], then the acquirer's value of V* will exceed the potential maximum value held by either the victim's

1. Sections 198-220 of the Companies Act (1985) enforce a disclosure. The Act's disclosure provisions make it mandatory for a shareholder to inform a company when a holding exceeds 5 per cent. There is also a provision which deals with concert parties, i.e. where a number of investors agree to act together they must report their stakes as a whole.

2. This position may not hold if the bidder is a "well-known" company.

management or shareholders. A bid in the range:

$$(3) \qquad \frac{V^*A}{N} > P > \frac{V^*D}{N}$$

where A = bidder/acquirer
D = target/acquired

is both feasible and would be successful. Similarly, the acquirer may not be a profit maximizer and thus willing to pay a higher price than V*/N for all the shares.

It could also be that the existing shareholders of the target company, rather than aiming to maximize their benefits, seek to minimize their maximum loss. Suppose a bid is made such that the first inequality relationship holds (1) above. Then if shareholders refuse to accept in the hope of a higher bid, and the bid fails, then a loss of share value P - V/N is experienced.

Finally, if there is a possibility of "dilution" of shares then the Grossman and Hart problem can be overcome. If dilution of equity is entrenched into the Company's Articles of Association, this will enable the acquirer to exclude minority shareholders from the gains in profit. After a successful acquisition, the acquirer has voting control and can vote to liquidate or merge the corporation with a parent wholly owned by the acquirer. By undervaluing the price of the assets transferred, the company is obtained at a discount. The dilution of property rights of minority shareholders will, together with the arguments presented earlier, undermine the strength of the Grossman and Hart's paradox.

2.6 Explanations of Recent Takeover Activity:

The lack of empirical support for Grossman and Hart's analysis leads one to consider some of the explanations for takeover. Evidence suggests that stock market prices are critical in determining the rate of takeover activity. Gort (1969) quoted two studies that tend to support the relation between indexes of stock prices and merger rates. One was carried out by Nelson (1953) who found on the basis of quarterly data for 1895-1904, a strong correlation between an index of industrial stock prices and number of takeovers. The other study by Weston (1953) obtained this same result for the inter-war period using annual data. Thus the association between stock market prices and takeover activities appears to have been established, although a satisfactory explanation for the relation has not been given.

One hypothesis that has been put forward by Hughes *et al* (1980) is the promoters' profits in modern takeover activity. They argued that managers might obtain large financial gains through takeover activities, even though

there were no economic gains to be generated from the takeovers. Mueller (1969) had earlier stated:

> "... while 'synergistic' effects and managerial insights are often said to be present in various merger situations, their existence in sufficient strength to warrant the high premiums paid for other firms, often appears implausible when the merger is between firms in seemingly unrelated or loosely related industries. This is especially true when, as frequently happens, the acquired firm is left to operate as an autonomous division of the larger unit, operated by the same management team that controlled it before the merger"..p.643.

The economic gains to be generated from the mergers could take place, for example, through the speculation on the part of managers of both acquiring and acquired firms in the shares of the acquired before the merger is announced. Since most mergers take place through the payment of a large premium to the shareholders of the acquired company, any individuals who purchased on a high margin the shares in the acquired firms prior to the mergers' announcement would stand to make large gains.

The situations of promoters or insiders raises a possibility of a conflict of interest between inside managers and outside shareholders regarding merger activity[1].

Another explanation for takeover activity is Gort's (1969) "economic disturbance theory of mergers". He argued that discrepancies in valuation for income producing assets arise from differences in expectations about future income streams and the risks associated with expected income. When such discrepancies are characterized by a higher value being placed on the assets of a firm by non-owners than by owners, acquisitions become possible. It is likely that at any given point in time there will be differences in individual expectations about the future profit stream of a firm and thus about

1. Mueller (1977) reviewed the evidence of conflict of interest in the United States. Similarly, the recent investigation of Insider Dealings by the Securities Exchange Commission involving Mr. I. Boesky in USA and the case of Mr. G. Collier of Morgan Grenfell are relevant.

the present value of a firm's shares. Shareholders' differences in opinion will be a function of the quality and quantity of the information held, different evaluations of this information and the varying degrees of optimism and pessimism about the firm's future[1].

Under Gort's economic disturbance theory of mergers, one can expect mergers to take place during periods of either rapidly rising or rapidly falling share prices. In a period of rising share prices, mergers will take place wherever outsiders gather information about the firm's prospects that the present holders do not obtain, if this information leads them to upgrade their evaluation of the firm's prospects on the basis of the information they already hold. Again, these changes must be coupled with a lack of change of optimism on the part of present holders. In a falling stock market the reverse process must take place. The present shareholders must gather information that outsiders do not have, leading them to

1. Beaver (1981) described the information asymmetry in terms of more informed and less informed investors. In this setting, the more informed investors may be either holders or non-holders of the security and may be either potential sellers or buyers. In other words, at some prices (a bid price) an investor is willing to buy shares and at some price (an ask price) is willing to sell shares.

expect a rapid decline in the company's share prices than outsiders expect. Or, the shareholders may be more pessimistic about the future prospects of the firm than outsiders are, again leading them to sell the firm. In either case, there is an asymmetry of expectations leading to merger, in other words, insiders become relatively pessimistic, while outsiders become relatively optimistic.

Information asymmetry is not confined to investors. Although, investors play a significant part in mergers, the key role is played by management. Therefore, for acquisition to take place, managers of the acquiring company must be more optimistic about the acquired firm's future than other parties of the acquired company, assuming rational behaviour.

The interpretation of Gort's theory suggests that increases in merger activity could be associated with both rapid upswings and downswings in stockmarket prices. Thus neither the high nor the low share prices can effectively explain the intensity of merger activity. This conclusion leads one to consider other merger hypotheses that have been put forward.

Merger activity has been seen by some, (Dewey (1961), Marris (1964) and Manne (1965)) as the vindication of neoclassical economics in which the threat of takeover provides a control mechanism on managers separated from effective shareholder control[1]. Neoclassical theories may be consistent with the observed correlation between share prices and takeovers if inefficiencies become conspicuous in a rising stock market. However, this view of takeovers as being 'super-efficient' in controlling managerial discretion is inconsistent with the Grossman/Hart evidence.

However, the neoclassical view of takeovers may not be sufficient to explain the spate in takeover activities. It could be argued at a micro-economic level that takeovers provide a springboard for the growth maximising firm. Such a firm may have a higher

1. The threat of takeover plays an important role in Marris's theory of the firm. This threat will act as a further check on firm managers in their pursuit of their own goals. If they are cautious managers, they will be constrained from being too timid in their pursuit of profit, lest the price of their share fall to a low enough level to tempt some more aggressive management team to take over their firm and put their assets to better use. If the managers are vigorous pursuers of growth, they will be restrained from a too active pursuit of expansion at the expense of their stockholders' interests, out of fear that the price of their share will be driven down far enough to attract other firm to acquire it.

Hindley (1969), p.431 views mergers as ".. the only external constraint upon managerial exploitation of the owners".

expectation about the potential future value of the target firm than its original managers and shareholders. Whether this view supports the managerial hypothesis of takeovers will be examined in the next chapter. But the cause of the spate in takeover activity which generates excitement among the promoters and innocent 'bystanders' remains a controversial issue. However, a feature of takeover activity that is of particular interest to this study is the financial characteristics of firms associated with the event. This aspect is examined in the next section.

2.7. The Characteristics of Firms Associated with Mergers:

A first approach to evaluating either the motivations for, or the consequences of, mergers is to distinguish firms that merged from firms that did not merge. Hughes et al (1980) have advanced reasons why such an approach is necessary. They argued that such comparisons bear directly on a range of issues that are important from the point of view of both economic theory and policy. A major issue is the nature of the selection mechanism generated by the normal workings of competitive markets and its implications for the behaviour of economic agents (Winter (1971), Hahn (1973)). In the real world, takeover assumes a crucial role because of the operation of large management-controlled firms that are characteriszed by the divorce of ownership from control, Manne (1965), Hindley

(1969), Singh (1971), (1975)). The large companies conduct their business in imperfect product markets and seldom go bankrupt, as takeover is their main cause of death[1]. Thus, there is the need to know the kind of companies that are taken over.

A possible reason why the analysis of financial characteristics of the companies involved in merger activity is important is the view held by neoclassical economists[2], for example Meade (1968). They hypothesize that the selection process represented by the takeover mechanism selects the 'efficient', i.e., the profit-maximimising firms, for survival and 'punishes' the inefficient ones by forcing their disappearance through acquisition.

However, the assumption of profit maximisation has been criticized by several economists. It has been argued (Marris (1964)) that because of divorce of ownership from control of modern enterprises, the 'paid' managers

1. Hughes op.cit
Singh (1971) also discussed how takeover provides a market mechanism through which the managers of the large oligopolistic companies could in practice be effectively disciplined.

2. The 'neo-classical' and 'managerial' motives of merger are discussed in Chapter 3.

will be less interested in maximising the profits (or stock-market valuation) of the firm, than they will be in maximising its rate of growth. This is because managerial remuneration as well as other 'perquisites' are related more to the size of the firm than to its profitability. Other writers, (the behavioural school: Cyert and March (1963), Machlup (1967)) have argued that there is no fixed 'objective' of the firm, neither profit nor growth maximisation but a 'satisficing' position to account for the complex internal structure of the firm. The internal structure of the firm is referred to as being complex because an organisation comprises of many social groupings, such as top executives, middle and low-level managers, shareholders and others, whose interests differ and may not be defined in profit or growth maximisation terms.

In spite of the criticisms of profit maximisation, other economists (Alchian (1950), Friedman (1953)) have argued that the facts about separation of ownership and control, or the relation to the social relationships within it, are irrelevant from an economic point of view. According to them, the external environment of the firm, mainly in the form of forces of competition, leave it little room for manoeurve. As Friedman explained:

> "The process of "natural selection" thus helps to validate the maximisation of returns hypothesis - or rather, given natural selection, the acceptance of the hypothesis can be based largely on the judgement that it summarises appropriately the conditions for survival" p. 28.

However, Winter (1964) suggested that the economic natural selection does not imply the survival of profit-maximising firms, and the disappearance of the non-maximisers in the strictest sense. For example, in certain states of the world involving oligopolistic competition, 'barriers' to entry, cost advantages to large scale, it is the firms that seek a balanced rather than optimum solutions that are more likely to 'survive' than the profit-maximisers.

Conversely, managerial economists such as Galbraith (1967), and Mueller (1969) have argued that because of imperfections in the stock market, the takeover process is more likely to favour the survival of large firms or those that pursue fast growth, rather than those that are efficient in the neoclassical sense. A comparison of the financial characteristics of firms involved in merger activity could produce evidence to resolve or clarify the debate. It may indicate on one hand, the extent the takeover process does select the 'efficient' firms for survival and 'punish' the inefficient ones by forcing them out of existence through acquisitions. On the other hand, it could indicate whether the more efficient firms tend to acquire the less efficient ones.

Some authors have taken empirical approaches to compare the financial characteristics of acquired and non-acquired companies. Some of these studies are reviewed in the next section with a view to determining the financial characteristics of acquired companies.

2.8 Empirical Studies:

Singh (1971) studied the financial characteristics of 185 acquired firms in the United Kingdom over the period 1955 to 1960. The purpose of the study was to differentiate between acquired and nonacquired firms, using financial ratios as measurement variables. The detailed statistical analysis of the data was related to takeovers in five industries: food, electrical engineering, non-electrical engineering, drink, and clothing and footwear. Using both univariate and multivariate statistical analyses, Singh found that acquired firms tended to have low profitability, low

growth and low valuation ratios[1] when compared against non-acquired firms. Singh suggested that the major variable influencing takeover incidence was profitability. Singh's results are shown in Table 2.3.

1. Valuation ratio is defined as the ratio of the stock market value of a firm's equity to the book value of its net assets.

   Singh argued that the valuation ratio reflects the past performance of the firm only to the extent that the market judges its future prospects by its past record. He invoked Marris (1964) to argue that for firms of the same size, the higher the valuation ratio of the firm, the smaller the chance that it will be acquired. The hypothesis is based on the notion that the numerator of the valuation ratio (i.e. the stock-market value of the firm's equity shares) represents the price that a 'raider' would have to pay for the acquired firm. However, the bid premium tends to make the acquisition price higher.

Table 2.3

SINGH'S ERROR PREDICTION RATES OF THE CLASSIFICATORY VARIABLES:

Variables	% Misclassified
Pre-Tax Profitability (X1)	39.1
Growth (X9)	44.8
Valuation Ratio (X10)	44.8
Liquidity (X5)	49.4
Gearing (X6)	49.4
All Variables	35.0

Source: Singh (1971) p.113

The percentage of misclassication indicates the extent the acquired firms could be differentiated from the non-acquired firms based on those variables. When Singh tested the variables collectively, he obtained 35% misclassication. This figure appears to represent a slight improvement over the error of misclassification expected by chance (50%). However, it does indicate that there may be a degree of overlap between the characteristics of acquired and non-acquired firms, or perhaps that Singh chose the wrong variables.

Singh's study is very comprehensive and was the first U.K. study to introduce multivariate discriminant analysis in the prediction of takeover events. His application of discriminant analysis resulted in an accuracy rate of 65% on the original sample, i.e. predicting takeover targets. This result is an over-estimation of the accuracy rate because the discriminant function was applied to the very data from which it was computed. Singh took cognizance of the methodological pitfall in his study when he stated:

> "although this figure represents definite improvement over the error of misclassification expected on random allocation (50%), it does indicate a rather large degree of overlap between the characteristics of taken-over and non-taken-over firms.... Furthermore, it should be noted that the errors for misclassification given above are in fact an under-estimate in an important sense. This is because they are based in each case on the application of the linear discrimination function to the very set of data from which it was estimated. If these functions were used to classify other sets of data (e.g. of a different time-period), the errors of misclassification would tend to be even higher". p113.

Later studies, where improvement has been made to the methodology have shown the sample-specific nature of such previous studies.[1]

1. Further consideration of this topic is given in chapter 6 on Methodology. For a fuller discussion, See Frank, et al "Bias in Multiple Discriminant Analysis," Journal of Marketing Research, August (1965)

If Singh's model is slightly less accurate than he claimed, then there may be a reason to believe that acquired companies cannot be differentiated from non-acquired companies based on their financial characteristics.

Singh's sample companies were drawn from the period 1955- 1960. It is however, to be expected that the general economic situation has altered. The economic indicators affect, to some extent, the financial variables used in deriving the model. Similarly, the financial accounting reporting framework has changed with the introduction of the Statements of Standard Accounting Practice (SSAPS) in the early 1970s.

Tzannos and Samuels (1972) carried out an investigation into 36 randomly selected mergers that took place from the beginning of July 1967 to the end of March 1968. A control group consisting of 32 companies was constructed on a random basis. As with Singh's study, the authors used a discriminant analysis approach.

The variables used consisted of the following:

(1) trend in capital gearing
(2) volatility in capital gearing,
(3) level of capital gearing;
(4) trend in ratio of profit to capital employed
(5) volatility of profit to capital employed
(6) liquidity percentage
(7) acid test ratio
(8) price earnings ratio
(9) price cash flow ratio
(10) trend in dividends per share and volatility of dividends per share.

The authors concluded that the characteristics possessed by the acquired firms which differentiated them from the non-acquired were as follows: a higher absolute level of capital gearing, a higher rate of increase in capital gearing, a slower increase in profits, a lower price earnings ratio, a slower rate of increase in dividends and a greater variation over time in the rate of dividends. Tzannos and Samuels also found that the characteristics of the companies that were active in taking over other companies were an above average downward trend in capital gearing, a lower absolute level of capital gearing, a higher than average increase in profits to capital employed and a higher than average increase in the trend of dividends.

The study by Tzoannos and Samuels tends to confirm some of the findings of other studies which sought to discriminate between acquired and non-acquired companies using financial ratios as variables.

Unlike Singh's study, which covered a period of well over five years, Tzoannos and Samuel's study covered only a nine-month period. As a result, not very much could be read into the conclusions of the study. It could be that the characteristics of the companies involved in the merger process during that 'single-period' were atypical of other periods. Like Singh, the discriminant function

of Tzoannos and Samuels study was applied to the very sample on which the model was developed. This tends to bias the results upwards as admitted by the authors (p.12).

A summary of other U.K. studies which have sought to differentiate the financial characteristics of companies involved in merger activities has been made by Levine and Aaronovitch (1981). The summary is reproduced as Appendix A at the end of this chapter.

2.9. Studies Outside the United Kingdom:

Similar studies to those in Appendix A have been conducted outside the United Kingdom, especially in the United States. However, before describing some of these studies, it is worth pointing out that the business conditions, corporate financial characteristics and the institutional framework differ somewhat between the U.K. and the U.S.A. Despite these differences, the results of some of these studies can be of significant value.

Taussig and Hayes (1968) investigated cash takeovers in the U.S. with the objective of identifying any common financial characteristics. Their sample consisted of a random selection of fifty cash takeovers between January 1956 and December 1966, from several sources including the

'Standard and Poor's Called Bond Record', 'The Wall Street Journal' and "records of various investment banking houses". The financial characteristics of this sample were then compared against a randomly chosen control group consisting of fifty non-acquired firms, paired with each subject company by three-digit standard industrial classification (SIC) number and gross sales. The authors concluded that acquired firms had high liquidity, poor earnings and a declining dividend record.

The conclusions of the authors may not be applicable to other forms of takeover because many takeovers are not for cash. Cash takeovers represent only a tiny form of financing acquisition and may be very susceptible to the economic climate. In a rising stock market, for example, acquirers may prefer to finance their acquisitions through share exchanges. If this condition prevails, the number of cash takeovers within that period will be considerably reduced. Further, in a cash-squeezed economy with rising interest rates, financing acquisitions by cash may not be an ideal method for management.

However, notwithstanding the limitations of the study, the conclusions of the study cannot be dismissed. The conclusions seem to confirm similar studies involving all forms of takeovers that acquired firms possess declining rate of profits and declining dividend records.

In a more comprehensive study, Stevens (1973) used discriminant analysis and factor analysis in an attempt to discriminate between acquired and non-acquired companies. His sample consisted of 80 firms with 40 firms in each group, chosen from the 1966 Moody's List of Companies. Financial ratios were calculated for each of the firms and the ratios as a group measured financial qualities such as profitability, liquidity, activity and leverage. Multiple discriminant analysis (MDA) was employed using the ratio data to develop a linear model that best discriminated the acquired group from the non-acquired group.

The MDA model was employed to classify each firm in the original sample, the results of the classification are reproduced in Table 2.4 and the discriminant function in Table 2.5.

Table 2. 4

RESULTS OF STEVEN'S STUDY
CLASSIFICATION OF ACQUIRED AND NON-ACQUIRED FIRMS USING MDA MODEL

Actual Group	Predicted Group Acquired	Non-acquired
Acquired	34	6
Non-Acquired	18	22

Source: D. L. Stevens "Financial Characteristics of Merged Firms: A Multivariate Analysis" Journal of Financial and Quantitative Analysis: March, 1973 p.156.

Table 2.5

STEVEN'S DISCRIMINANT FUNCTION:

Variable	Ratio	Discriminant Coefficient	Scaled Vector	Rank
X1	EBIT/Sales	0.108	8.085	2
X2	NWC/Total Assets[1]	-0.033	-4.800	4
X3	Sales/Total Assets	0.987	5.196	3
X4	LT liabilities/TA	0.111	12.953	1

1. Net Working Capital/Total Assets

Source: D.L. Stevens (1973) "Financial Characteristics of Merged Firms" p154.

Each firm was classified based upon the probability of group membership, given its discriminant score. When the discriminant model was applied to the model-derivation sample, the total classification accuracy was 70% (58/80) which was statistically significant at the 0.001 level, compared with a chance classification of (40/80) correct.

Stevens reported that the classification accuracy was not similar between the groups since acquired firms were classified with 85% accuracy (34/40 correct) and the non-acquired sample was more evenly split (22/40 correct). Thus, 18 of the non-acquired firms had financial profiles more similar to those of the acquired firms. He asserted that the result was not surprising when one considers the nature of the non-acquired sample in which a non-acquired firm may still be attractive for acquisition.

In an improvement to earlier studies using discriminant analysis, notably Singh (1971) and Tzoannos and Samuels (1972), Stevens made attempts to validate his model by classifying firms not used in deriving the model. A split sample validation technique was employed with half of the original sample used to develop a model and the remaining firms used for classification. This resulted in minimal shrinkage, as overall classification accuracy was 67.5%, perhaps lending support to the stability of the original model.

A second attempt at validation was made by determining if the variables in the discriminant model and their coefficients remained stable over other time periods. To carry out this validation, the same ratios were calculated for two new samples, with 20 acquired firms in each, taken from the acquisition years 1967 and 1968. The result obtained from the validation sample led Stevens to assert that the 1966 model had enough stability over the three-year period to classify accurately these new samples. He then concluded that his findings implied that financial characteristics alone provide a means by which acquired firms can be separated from others.

Stevens made a robust attempt to discriminate between acquired and non-acquired companies. He applied the factor analysis technique in an attempt to reduce the financial data that entered the discriminant function. His model was successful in classifying acquired companies but less successful in classifying non-acquired companies. The latter outcome is to be expected, since there are many non-acquired companies possessing financial characteristics similar to acquired companies, but which for one reason or the other have not seen predators.

Stevens, by validating his model using the split-sample technique has avoided the methodological pitfalls of earlier studies. Because his 'test' sample

companies were drawn from a single period (one year), there is the need to pool companies over a number of years to determine if the outcome will be different from that of Steven's study. The test companies in the present study were pooled over a period of five years.

In a recent study, Palepu (1986) argued that it is difficult to predict takeover targets using accounting information. He cited earlier studies[1] which indicate that accounting based models have impressive ability to predict acquisition targets six to twelve months before the announcement of takeovers.

Palepu's criticisms of earlier studies are based on three methodological problems. First, the use of non-random, equal-share samples in the model estimation, without modification to the estimators, leads to inconsistent and biased estimates of the model

1. These studies include Simkowitz and Monroe (1971), Castagna and Matolcsy (1976), Belkaoui (1978) and Dietrich and Sorensen (1984). The studies report prediction accuracies ranging from 70% to 90%.

parameters. This results in overstating the model's ability to predict targets. Second, the use of equal-share samples in prediction tests leads to error rate estimates that fail to represent the model's predictive ability in the population. Third, the use of arbitrary cutoff probabilities in prediction tests without specifying a decision context, the relevant state-payoff matrix, and the relevant state-payout matrix, and the prior state probabilities makes the reported prediction accuracies difficult to interpret. Palepu pointed out that the appropriate cutoff probability to be employed in the prediction tests, should be determined by the decision context in which the model's predictions are to be used.

Palepu's study was an attempt to rectify the methodological pitfalls of earlier takeover prediction studies. His 'improved' model was more successful in classifying acquired companies than non-acquired ones. The outcome of his study is similar to that of Stevens (referred to earlier) which was not very successful in classifying non-acquired companies. However, the contribution of Palepu's study, especially in pointing out the methodological flaws of previous studies, should be recognized. The study by Palepu has opened a new line of argument as to whether or not accounting based models are capable of predicting takeover targets.

In an attempt to shed more light on the controversy, Castagna and Matolcsy (1986), derived accounting based models from Australian Companies, involved in takeover activities. The study was based on a sample of 82 'industrial' listed firms which were acquired in the period of 1970 to 1980, and for which financial data were available for at least five years prior to acquisition. A discriminant model using financial ratios as variables was derived. The predictive performance of the model is reproduced in Tables 2.6 and 2.7. Generally, the results indicate a high misclassification rate for acquired firms relative to that of surviving (non-acquired) firms. For example, the results in Table 2.8 indicate that the model (using a ten variable set with equal prior-probabilities) classified 75.76% of the surviving firms correctly, but only 42.42% of the acquired firms were correctly classified one year prior to acquisition. Similarly, the results in Table 2.7 (using a five variable set) classified 78.80% of the surviving firms correctly, but only 42.4% of the acquired firms. Based on the results of their study,

Castagna and Matolcsy concluded:

> "..the results of this study question the usefulness of published accounting numbers for identifying takeover targets and suggest that the claims to the contrary made by some investment service firms and sections of the professional finance community cannot by supported"..p.13

Table 2.6..

CASTAGNA AND MATOLCSY'S STUDY
CLASSIFICATION ACCURACY OF DISCRIMINANT MODEL
(using ten variable set with equal priors)
ACQUIRED AND NONACQUIRED COMPANIES

Actual Group Membership	Percentage Total	Predicted Group Membership				
		Ist	2nd	3rd	4th	5th
		(Years Prior to Acquisition)				
Acquired	100%	42.42	45.45	54.55	48.48	39.39
Surviving	100%	75.76	72.73	72.73	66.67	66.67
Average Correct Classification %		59.09	59.09	53.03	57.58	46.97

Table 2.7..

CASTAGNA AND MATOLCSY'S STUDY
CLASSIFICATION ACCURACY OF DISCRIMINANT MODEL
(using five variable set with equal priors)
ACQUIRED AND NONACQUIRED COMPANIES

Actual Group Membership	Percentage Total	Predicted Group Membership				
		Ist	2nd	3rd	4th	5th
		(Years Prior to Acquisition)				
Acquired	100%	42.42	45.45	48.48	48.48	39.39
Surviving	100%	78.79	69.70	69.70	63.64	66. 7
Average Correct Classification %		60.61	57.58	59.09	56.06	53.03

Castagna and Matolcsy further remarked that given the robustness of the statistical analysis employed in their study, it was unlikely that alternative forms of analysis and/or extensions to the data set would significantly improve the results. However, they suggested that a fruitful line of enquiry would be to analyze the characteristics of targets with a view to testing hypotheses on the factors that make firms attractive as acquisition targets.

2.10. Summary

The review of empirical studies on firms associated with mergers presents mixed results. The earlier studies indicated the possibility of predicting acquisition targets using accounting based models. However, subsequent studies with 'refined' methodology appear to produce a somewhat negative result. Both the earlier and the later studies have successfully 'classified' acquired and non-acquired companies. But disagreement comes in 'predicting' acquisitions. Although some of the earlier accounting based models claimed to have succeeded in predicting takeover, what they have actually done is classifying acquired and non-acquired companies.

There is strong reason to uphold the above line of argument given that the stock market does not seem to

predict acquisition targets with a high degree of accuracy even three months prior to the announcement of takeover bids, (Dodd and Ruback (1977), Asquith (1983)). Based on the evidence of the market-based studies, Jensen and Ruback (1983 p.29) argued that "it is difficult, if not impossible, for the market to predict future targets". Furthermore, they argued that the takeover announcements convey a substantial amount of new information as evidenced by the dramatic increase in the target firm's share prices. If takeovers can be anticipated from publicly available accounting data, such price reaction is unlikely to occur at the announcement time. Accordingly, it seems unlikely that any takeover prediction model based on publicly available accounting information will be able to predict takeover targets with a high degree of accuracy as has been reported by earlier accounting based studies.

Moreover, it has been recognized that there is a weakness in the methodology adopted by some researchers arising from non-randomness of the sample and the use of arbitrary cutoff probabilities. These methodological loopholes may have the effect of understating the error rate in predicting takeover targets and overstating the error rate in predicting non-targets.

However, in spite of the disagreement over 'prediction' that has surrounded these studies, the

studies have tended to produce a uniform picture of merger targets. The studies indicate that merger targets were relatively unprofitable, sluggish, over-liquid firms, often with a history of static or declining earnings and dividends. These were the findings of the studies outside the United Kingdom (Taussig and Hayes (1965)). Similarly, research based on accounting data in the U.K. has shown that in general acquired firms have lower profitability, growth and stock market ratings, compared with a control group prior to takeover (Singh, (1971), Tzoannos and Samuels (1972), Kuehn (1975), Firth (1976) and Cosh et al 1980)).

The above findings lend some support to the hypothesis that some targets may be regarded as potentially failing firms and that mergers may be an alternative to bankruptcy. This is one of the arguments which the present study seeks to address. It would also appear that attempts to discover the characteristics of target firms may be a more fruitful line of enquiry than attempts to directly predict takeover targets. This line of enquiry is pursued in the chapter four. In the next chapter the theoretical and empirical motives for merger are reviewed.

APPENDIX A.

SUMMARY OF THE SOME U.K. EMPIRICAL RESEARCH ON FINANCIAL CHARACTERISTICS OF COMPANIES INVOLVED IN MERGER ACTIVITIES:

Author	Period	Sample	Main Variables	Nature of Study	Statistical Procedure	Main Results
Rose and Newbould (1967)	1967	46 mergers in all indus.	CE: RR: LR2	AG VS AD	Univariate Pairwise comparison	CE: AG > AD; RR: AG < AD LR2: AG < AD
Newbould	1967-68	between 74 and 237 mergers in all indus.	RR: LR2: PER: VR: DY:	AG VS AD AD VS AVE.	Univariate group comparison and MDA	RR: little difference LR2: AG < AD PER: AG > AD VR: AG > AD DY: AG < AD
Buckley (1972)	1968-71 Bids in 1971	65 non-financial mergers	GE: LR1: CGR: PER: VR:	AD VS NON-AD AD VS AVE.	Univariate Group comparison	GE: AD negative and < NON-AD LR1: AD approx. AVE. CGR: AD approx. AVE. PER: AD < AVE. VR: AD LOW (< 1.25) AND < NON-AD.
Singh (1975)	1967-70	112 mergers (manufac-	CE: RR: ES: LR2: CGR: GCE: RET: VR: GRR:	AD VS. NON-AD	Univariate and MDA	Univariate: CE: AG > AD: RR: AD < NON-AD GRR: AD < NON-AD; AG > AD MDA: AD VS NON-AD: little improvement in discrimination best discriminators: RR: GRR: GCE: and RET: AG VS AD: big improvement in discrimination: best - LNCE: GRR: RR:

APPENDIX A.(Contd)

Kuehn	1957-69	1554 in manfg. and distr. companies: 117 AG firms making more than 3 'raids'	CE: RR: LR2: GCE: RET: VR:	AD VS NON-AD	univariate and mult. regression analysis	Univariate: CE: AD approx. non-AD RR: AD < NON-AD; LR2: AD approx. NON-AD GCE: AD < NON-AD; AG > AVE. RET: AD approx. NON-AD: VR: AD < NON-AD MDA: PROB. (AD) proportional to - VR with CE insignificant. PROB. (AD) proportional t RR - GCE
Levine and (other) (1981)	1966-72	69 mergers in manfg. & distr. companies	CE: RR: ES: GRR: GES: LR1: LR2: CGR: GCE: PER: VR:	AG VS AVE. AD VS AVE. AG VS. AD	univariate group pairwise comparisons, regression analysis	Univariate: CE: AG > AD; AG > AVE. AD > AVE LR2: AG < AVE; VR: AG > AD PER: AG > AD > AVE; AD < AVE. MDA: Size discriminates almost as well as LNCE, GCE, CGR, RR AND GRR.

abbrevations used:

CE	Capital Employed
LNCE	$\log_{10}$ CE
GCE	growth of capital employed
LR1	liquidity ratio 1 = current assets/current liabilities
LR2	liquidity ratio 2 = net current assets/capital employed
CGR	capital gearing ratio = debentures/capital employed
RR	rate of return
GRR	growth of rate of return
ES	earnings per share
GES	growth in earings per share
VR	valuation ratio
PER	price-earnings ratio
AG	acquiring firms
AD	acquired firms
AVE	average.

Source: Levine P. and S. Aaronovitch (1981)
"The Financial Characteristics of Firms and Theories of Merger Activity": The Journal of Industrial Economics (Dec) pp 149- 171.

CHAPTER 3

ACQUISITION MOTIVES: THEORETICAL AND EMPIRICAL FRAMEWORK

3.1 Introduction:

In recent years, many theories for explaining mergers have been discussed and tested in the literature of finance, law and economics. Hypotheses about the motives of merger have been broadly defined as 'neoclassical' or 'managerial'. The purpose of this chapter is to review the theoretical framework of these motives and examine the empirical findings of some of the studies in an attempt to discover whether any of these motives leads to shareholder wealth creation. The focus of shareholder wealth creation is an enhancement of post-acquisition profitability.

3.2 Neoclassical Motives:

The 'neoclassical' set of theories suggests that firms will engage in takeovers if this leads to an increase in wealth for the shareholders of the acquiring company. The increase in wealth may arise from the

following areas: operational or managerial scale economies, (Bain (1959), Jacoby (1969)); pure financial rationale (Lintner (1971), Lewellen (1971)) and differential efficiency, (Copeland and Weston (1983)). Perhaps a discussion of the reasons behind these economies is necessary in order to determine whether they are likely to be realized in practice.

3.2.1 Economies of Scale:

Merger brings together two or more firms into one. Consequently, the merged entity increases its size, and as such the realisation of economies of scale is envisaged. However, even if merging does cause economies of scale, the two or three merging firms may still be more profitable apart than together. This is because it may be cheaper to achieve those economies through internal expansion rather than merger. This raises two additional issues: whether the envisaged economies are achieved in practice and whether merging is the best way to achieve them.

Scherer (1970) identified two main types of economy of scale. These are "plant level" and "firm level" economies of scale. The former results from increases in the size of individual plants, and the latter results from

increases in the overall size of the firm. The plant level economies of scale may be ignored because merging is unlikely to increase the size of a firm's individual plants. It will however, increase the number of plants it owns. Moreover, even it it did increase plant size (for example by transferring one firm's business to the other firm's plant), perhaps internal expansion could cause the same effects at a lower cost. Internal expansion would avoid the costs of negotiating the merger (and its attendant re-organisation) and of disposing of one of the firms' plants. Consequently, merging is unlikely to improve profitability by causing economies of scale at the plant level.

However, merging does undoubtedly increase a firm's size and hence firm level economies of scale may be achieved. Consequently attempts should be made to discover if the various economies of size can actually occur in practice. Scherer et al (1975) pointed out several areas of a firm's business where economies of scale may arise. These areas include finance, selling and marketing, purchasing and research and development. A review of these and other areas is necessary to determine if these economies can be achieved in real life.

3.2.2. Finance:

Sawyer (1981) argued that merging can reduce the proportionate cost of obtaining finance in two main ways. Firstly, it is argued that lower interest rates are charged because larger firms are usually perceived as being less risky than smaller firms. Secondly, it is argued that the transaction costs involved in raising finance become proportionately lower as the amount of finance required increases. Therefore, because larger firms, typically raise finance in larger blocks, their financing costs will be lower.

It appears that financing economies differ from all the other forms of economies because they seem to have occurred in practice. Kitching (1967) found that managers of merging firms generally found financial synergy to be the easiest form of synergy to achieve. It was also said to have the highest "pay-off". Similarly, Scherer et al (1975) arrived at the same conclusion. In his study, firms in all of the fourteen industries examined generally achieved financial economies from being of multi-plant size.

3.2.3. Selling and Marketing:

There are three areas of economies of scale commonly said to arise from this part of a firm's business. Firstly, it is often argued that due to the inherently uncertain nature of advertising, higher levels of promotional expenditure will bring proportionally higher returns than smaller levels (Townsend (1968)). Therefore, as merging increases firm size, thereby enabling advertising expenditure to be increased, it may result in advertising economies being achieved. There is however, no empirical study to show whether or not this is the case in practice. However, it may be the case in the few industries where advertising forms a high proportion of the firm's sales (Bain, (1959)).

The second likely economy is that the merged firm will be able to buy larger advertisements which frequently cost proportionally less than smaller ones (Prais (1976)). For example, Scherer et al stated that full-page newspaper advertisements cost less per square inch than quarter-page or smaller ones. In contrast, Prais noted that in the early 1970s, television commercials cost more per viewer at peak hours than at off-peak hours. In addition, it is not known if larger advertisements are

cost-effective (even if they do cost proportionally less), that is, if the cost of larger advertisements is sufficiently compensated by greater increases in returns. For example, Scherer et al stated that larger advertisements have relatively more 'attention getting power', whereas Prais held the opposite view. Consequently it is difficult to conclude on the relative merits of large and small scale advertisement, and hence, on whether or not mergers will cause advertising economies.

The third economy in this area is said to arise from spreading the costs of certain fixed selling and marketing resources over two firms' products instead of one, thereby decreasing their average costs. Kitching (1967) in his study of 22 merger-intensive companies, stated that these were frequently observed and were often substantial. However, Newbould (1970) found that only five mergers out of 38 studied achieved sales force and distribution economies. Kitching used U.S.A. data where the sales and distribution function may be much more important than in the U.K. Hence, Newbould's results are probably more relevant for the purpose of the present study. Thus, it is likely that merging will only cause these economies in a few cases.

3.2.4. Administration and Staffing:

Scherer et al (1975) pointed out two main reasons why economies of size may arise in a firm's administrative and staffing functions. The first is that increased specialization becomes possible. Penrose (1959) summed up this view when she stated:

> "when the scale of production is sufficient to justify a specialized production manager, a sales manager, a financial expert, or a specialist in raw materials buying, for example, each function is performed more efficiently than it could be if all of them were performed by one person". p.92

Although it has been shown that larger firms do generally employ more specialists than smaller ones (Scherer et al (1975)), there is no evidence on whether or not they benefit from this. It can probably be said that specialisation will improve efficiency, however, these gains may be offset by higher salaries. In addition, the efficiency gains may be quite small. For example, it has been noted that managers of small firms can perform a number of different tasks reasonably efficiently, and that they can obtain specialist help from outside sources. Consequently, it is hard to tell if these economies[1] will generally be achieved in practice.

1. Scherer, F.M et al (1975) The Economies of Multi-plant Operation: an International Comparisons Study, Chapter 7.

The second economy of size arises because certain administrative and staffing functions use a fixed set of resources. Hence, their average cost will reduce as size increases. If these economies are to be realised, total administrative and managerial staff will have to be significantly reduced after a merger takes place. However, in Newbould's (1970) study of 38 merging companies, he found that executive redundancies were either zero or negligible in 23 cases. The corresponding figures for non-executive redundancies was 27 out of 38, (although there are no recent studies to confirm or refute the findings). Consequently, the evidence suggests the realisation of economies might be scant. It also questions the notion that acquisition is a vehicle for eliminating 'bad management'.

3.2.5. Research and Development:

Low (1970) argued that merging is supposed to cause R & D economies as increased size enables increased specialisation, and/or increased spreading of fixed R & D resource costs to be achieved. In addition, it can also be hypothesized that larger firms tend to have a wider range of products. As a result, they are more likely to make fruitful use of any discoveries made in the R & D department. All three R & D prospective economies have

one thing in common, namely they are impossible to measure. This is because it is practically impossible to identify and quantify the results accruing to a firm from the R & D department. For example, the first and third economies should increase the benefits from R & D, while holding costs constant. In contrast, the second economy reduces the costs of R & D while holding the benefits achieved constant. Consequently, if the benefits arising from R & D are difficult to measure, it is also difficult to determine if these benefits actually exist. However, Scherer's interview results indicate that in general, single plant firms are not seriously disadvantaged in comparison with multi-plant firms in this context. Similarly, Kitching concluded from his study that mergers generally receive little synergy from R & D economies. Nevertheless, both studies found significant R & D economies in a few cases. If a meaningful interpretation is to be accorded to these studies, it appears that R & D economies can only be obtained in a few cases.

3.2.6. Complementary Resources:

An occasion where merging may improve profitability is where the merging firms hold complementary resources, (Brealey and Myers (1981)). This is likely to occur if one of the merging firms has resources that the other

needs and when they are combined their overall efficiency improves. This economy relies on one critical assumption, namely, that it will be beneficial for the firms to obtain the required resources by merging, rather than buying or building them up by themselves. For instance, Brealey and Myers gave an example, in which a small firm has a unique product but does not have the production and sales facilities necessary to develop it properly. If it merges with a firm with these facilities, then overall profitability may be higher than if each firm tried to obtain these resources independently. However, such occasions are likely to be few and far between. This is because merging is often an expensive process. It may be possible for firms to get the resources they require at less cost through other means.

In addition to the foregoing alleged to be generated as a result of scale-economies, other 'newer' forms of neoclassical merger motives[1] have been put forward (Lintner (1971)). Some of these motives are discussed below:

1. Other merger motives include Price Earnings 'Magic' (Lintner (1971), Mead (1969)) and redeployment of corporate capital (Sherman (1972), Weston (1970) and Williamson (1970, 1975)).

3.2.7. Taxes:

Lintner (1971) argued that tax exemption of corporate re-organizations, and the use of one company's tax loss carry-overs by its partner provides a possible incentive for mergers. Sometimes a firm may have potential tax shields but not have the profits to take advantage of them.

However, mergers undertaken just to use tax loss carry-forwards may be challenged by the Inland Revenue[1] and the use of the tax-carry-overs may be denied, or the conditions to be satisfied render the merger unattractive.

3.2.8. Leverage/Debt Capacity:

Lewellen (1971) and Lintner (1971) made a case for a financial leverage-related acquisition motive in the form of taking advantage of latent debt capacity. They identified two sources of gain. The first arises from the fact that borrowing costs decline with the size of firm

1. The main provisions which deal with this form are found in the T.A. 1970, Sections 258-264, F.A. 1973 Section 28, and Sch.9 F.A. 1985.

(all things being equal), because of size-scale economies in credit investigation and security issue costs as well as "marketability". Lintner asserted that

> "large firms can thus refinance debt of small independent firms at lower economic cost resulting in a genuine capital gain through merger" p.107.

The second source of gain arising from lower debt costs has been referred to by some (Levy and Sarnat (1970)) as diversification. They argued that the combined debt capacity of the two companies as separate entities was less than the debt capacity of the firm resulting from their merger. As Lewellen explained:

> "..if we assume that in any given year (or run of years) there exists for each individual firm some positive probability of suffering losses large enough to induce financial failure, the joint probability of such an event is reduced by... the combination of other than perfectly correlated income streams in a merger.. The diversification can be expected to create a true economic gain to the shareholders owing to the fact that the combination of the financial resources of the two firms making up the merger reduces lenders' risk while combining each of the individual shares of the two companies in investors' portfolio does not" p.801

However, Higgins (1971) argued that Lewellen's analysis was incomplete because it examined explicitly the impact of merger on the firms' creditors. He asserted:

> " .. if it can be demonstrated that a merger benefits the firm's creditors, however one chooses to measure this benefit, without simultaneously hurting the firm's shareholders, then it seems unnecessary to refer to the much debated capital structure proposition to demonstrate that the value of the firm will increase with the merger" p.543

In a similar disagreement with Lewellen's 'debt-capacity' motive for merger, Levy and Sarnat (1970) demonstrated that in perfect capital markets the value of the merged firm will be the same as the combined market values of the separate firms - because portfolio diversification by investors will have already exhausted the diversification benefits available through the merger. Similarly, others (Alberts (1966), Adler and Dumas (1975)), have argued persuasively that investors can obtain the same diversification themselves by purchasing appropriate amounts of the unmerged companies. Therefore, merger may not alter the total value of the combining firms[1], and may only achieve that in a perfect market[2].

> 1. Myers (1968) argued that conglomerate mergers will not alter total values if the capital market is perfect and complete. In an incomplete market, such a merger can harm stockholders by forcing them to hold two otherwise separate companies in fixed proportions. Although Myers observation refers to conglomerate mergers, such implications may be valid to other forms of mergers.
>
> 2. see Beaver (1981) for the effects of information assymetry in an imperfect market setting.

Higgins and Schall (1975) have also questioned Lewellen's conclusion and they demonstrated empirically that, in the absence of transaction costs of bankruptcy, shareholders of merging firms bear the "cost of the co-insurance"[1] of debt which arises from the merger. They argued that for shareholders to benefit from the merger, the value of the incremental 'benefits' must exceed the cost of co-insurance.

The foregoing arguments suggest that the benefit arising from debt capacity and diversification may be questionable and it requires an empirical approach to determine whether these benefits are realized in practice.

3.2.9. Replacement of Incompetent Managers:

Some of the neo-classical economists (Dewey (1961), Manne (1965)) have seen merger as a method for replacing inefficient managements. This merger motive argues that the management of acquiring companies search for 'poorly' managed companies which can be bought at nominal prices.

1. Rubinstein (1973) regards the cost as a loss of some of the limited liability advantages of holding shares in separate companies as opposed to the combined company.

However, the justification of this merger motive becomes debatable in view of recent findings. For example, Mueller (1969) stated inter alia

> "... as frequently happens, the acquired firm is left to operate as an autonomous division of the larger unit, operated by the same management team that controlled it before the merger"..p.643.

One can therefore argue that if replacement of 'inefficient management' was a motive, it is implausible that the same set of management has to remain after the merger. However, a more recent evidence has indicated that 52% of a target firm's executives no longer will be with the acquiring firm three years after a merger or acquisition (Duns Business Month (1981, pp 86-88)). But the evidence does not indicate whether the managers left as a result of personal goals being at odds with the objectives of the parent companies or removal as a result of alleged inefficiencies.

3.3 Summary:

In summary, it appears that the neoclassical hypothesis that merger improves the wealth of the acquiring firm tends to be unrealistic. Firstly, the economies are only likely to occur very rarely in practice. Secondly, in some of these cases, internal expansion may have the same effect at a lower cost. Thirdly, in some of the remaining cases, it is likely that the efficiency gains may be offset by associated

diseconomies. In conclusion, it seems doubtful whether the detailed prediction from the neoclassical theories of merger would lead to improvements in merger profitability. Given this conclusion, it is perhaps necessary to review the other alternative hypothesis of merger motive - the 'managerial'.

3.4 Managerial Motives:

The 'managerial' school of merger motives upholds the view that management will seek to maximize its own utility whether or not this is consistent with the maximization of shareholder wealth. There are three possible outcomes which result from managerial theories in relation to merger profitability. The first suggests that mergers will generally reduce profitability, the second that in the majority of cases, mergers will have no effect on profitability at all, and the third that merging will generally not improve profitability.

The first of these theories is that of Baumol (1959). He argued that firms will maximize sales not profits. He also contended that, in the majority of cases, sales and profitability will be negatively correlated. Hence, merging (because it increases sales) is likely to reduce profitability.

The second is Marris's (1964) theory that firms maximize a sustainable growth level, at which profitability is constant. Thus, merging to sustain growth is likely to have no effect on profitability. However, when a firm is increasing its growth rate in an attempt to reach this maximum sustainable level, Marris's model implies that growth and profitability are likely to conflict. Therefore, merging in these circumstances is likely to reduce profitability.

The third theory is Williamson's (1963) theory which states that, in conditions of imperfect competition, improvements in efficiency are likely to be offset by increases in costs due to management slack. Hence, mergers will probably not improve profitability, even if efficiency gains are expected to occur. However, this theory does recognize that in conditions of perfect competition mergers will only occur if they are expected to increase profitability. Thus, if this state of perfect competition continues to exist such that managerial slack will not arise, in these restricted circumstances merging may actually improve profitability. A further discussion of the basis and rationality of the managerial motives for merger follows.

3.5. The Basis of the Managerial Theories of Merger Profitability:

The managerial theories of the firm emanate from Berle and Means (1932) propositions (more recently restated by Jensen and Meckling (1976) as agency theory). They noticed that it was increasingly common, in large corporations, for control to be divorced from ownership. Consequently, they suggested that managers (who run the firm) could act in such a way as to further their own goals, with little interference from the shareholders (who own the firm). Hence the managerial theorists realised that there was little reason to believe that firms will follow profit maximisation policies. Therefore, by reference to managers own self-interests, they attempted to establish the corporate policies that managers would actually adopt. A discussion of Baumol's sales maximisation theory follows.

3.5.1. Baumol's Sales Maximixation Theory:

Baumol contended that managers' self-interest will motivate them to maximise sales subject to some minimum profit constraint (see below for his reasoning). Therefore it is likely that mergers will be seen by

managers as a quick and easy way to satisfy their own self-interests by increasing sales. Therefore, there is little reason to hold the view that merging will improve profitability.

In fact, Baumol contended that although initial sales increases may increase profitability, in the majority of cases, the increase in sales will cause a decrease in profitability. Consequently, it is reasonable to assume from this that the vast majority of mergers will probably reduce profitability. Furthermore, it is likely that the initial sales increases, which increase profitability, will be achieved internally, while the later sales increases, which reduce profitability, will be achieved by acquisition. This is because initial sales increases may be comparatively easily achieved by increasing expenditure on advertising and R & D, or through internal expansion, for example. However, as the firm grows, it may find it increasingly difficult to increase sales still further. Hence, they may turn to acquisition as a quicker and easier way to increase sales. Consequently, not only is acquisition likely to reduce a firm's profitability, it will probably also be less profitable than internal expansion.

The rationality of Baumol's theory is questionable on two grounds. Firstly, do managers actually maximize sales

as opposed to profits, and secondly, does this imply that acquisition will probably reduce profitability? The first question is important because if firms actually maximise profits, then acquisitions will only occur if they do not adversely affect profitability. Consequently, in this situation, mergers should not reduce profitability. However, if managers are more interested in sales, mergers are more likely to reduce profitability than to improve it (Baumol).

Baumol argued that the main reason why managers are motivated to maximize sales is because their salaries are more closely related to a firm's sales level than to its profitability. A number of studies have been carried out in this direction and they indicate that there is a strong positive relationship between sales and executive remuneration[1]. For example, in his study, Cosh (1975) used a regression analysis technique to determine the relative importance of the effects of sales and profitability upon executive remuneration for over 1,000 U.K. companies between 1969 and 1971. Cosh found that, for larger quoted companies, size[2] alone explained 44% of the variance in executive

1. See Sawyer, M.C. (1981) for a detailed review of these studies:"The Economics of Industries and Firms: Theories, Evidence and Policy, London, Croom Helm.

2. Sales as a proxy for size.

remuneration, while size and profitability together explained only 48%. For the group of smaller quoted companies, the corresponding figures were 19% and 34% respectively. He suggested that this difference may be explained by the probability that smaller firms are more likely to be owner-controlled. Therefore, in general, Cosh's study suggests that firm's size has a more significant effect upon executive remuneration than its profitability. Consequently, it is likely that a good proportion of managers will follow sales maximization policies and hence, there is some support to Baumol's theory in this respect.

In general, the studies looking at firm's size and profitability have shown that there is no systematic relationship between firm size and profitability. For example, Eatwell (1971), carried out a review of the empirical evidence available in 1971 and concluded that there was no consistent relationship between the mean rat of profitability by size classes when individual firms are considered.

However, he asserted that if the sample consisted solely of (positive) income corporations, there was a weak but significant negative relationship between profitability and size.

It appears that Eatwell's conclusion is supported by a more recent study by Whittington (1980). He examined the relationship between sales and profitability for over 1,000 U.K. companies for the period 1960 to 1974 and concluded that the average profitability was largely independent of firm size, but such relationship as there was tended to be negative.

Consequently, the empirical evidence tends to show that size does not have a major effect on profitability. Nevertheless, it is possible that it may have a small adverse effect on profitability in some cases. This later evidence does not support the assertion that sales and profitability are negatively correlated but there is strong theoretical evidence for this from both micro-economic theory and product life cycle theory.

3.5.2. Marris's Growth Theory:

Marris (1964) put forward a theory that managers are motivated to maximize a sustainable growth level. This theory is closely related to Baumol's, although the latter

is essentially a one period model where managers maximize the sales level in each period. However, Marris's theory is a dynamic model where managers' long term goal is to maximize the steady growth rate in sales achieved every period.

Marris contends that a manager's objective is to reach a maximum sustainable level of growth. By this it implies a growth level that can be sustained each year without adversely affecting either the firm's future growth potential or its profitability. Marris suggested that when a firm's growth rate is at the maximum sustainable level, merging to sustain this growth level should not affect profitability. However, he argued that in the few cases where growth is being increased mergers will probably reduce profitability.

The rationality of Marris's theory is questionable on two grounds. Firstly, whether managers do actually maximise growth. Marris gave various reasons why they should, ranging from psychological, sociological to purely economic ones. However, the main reason given is that executive remuneration is more closely related to sales than to profitability (Cosh (1975)). Secondly, if managers do maximize growth, what is the likely effect of such a strategy on profitability? Marris contended that firms maintain a constant growth rate and at this rate

profitability is also constant. However, it does seem plausible that, as the growth rate increases, the costs of reorganizing and adjusting the firm's business will increase, hence reducing profitability.

3.5.3. Williamson General Preference Function Theory:

Williamson (1963) put forward another variation of managerial theory. Like all managerial theories, it assumes that managers are primarily concerned with their own best interests and that they manage the firm accordingly. However, because, Williamson's theory takes competitive structure into account, it realises that in conditions of perfect competition, it will be in managers' best interests to maximise profits. Hence, mergers occurring in situations of perfect competition may be expected to increase profitability.

In the contrasting situation of imperfect competition, Williamson recognized that managers will be free to follow their other goals apart from profits. In this situation, he contended that managers will maximise a utility function whose prime components are management slack variables[1]. Basically, management slack constitutes the costs to the company incurred by managers to further

1. for a fuller description of management slack, see Cyert, R.M. and March, J.C. (1963). Chap. 3.

their own objectives at the expense of profit maximisation. In fact, if one is to uphold the propositions of Baumol and Marris, it is highly likely that mergers are often a form of management slack. Consequently, if this is the case, there is no reason to believe that acquisition improves profitability.

In summary, Williamson's model implies that in the majority of cases, mergers will not improve profitability. This is either because acquisition is a form of management slack, or because any expected efficiency gains from acquisition will be offset by increases in management slack. The only situation where mergers may be expected to increase profitability is when they are expected to improve efficiency (for example, where conditions of perfect competition exist) and where this condition does not cause a reduction in competition (management slack may not occur).

3.6. Conclusion of Managerial Theories:

From the review of managerial theory of the firm, i seems quite likely that managers will maximise their own self-interests. This could take the form of maximising sales, growth or a utility function. The three theories described above suggest that merging may either reduce

profitability, have no effect upon it, or, in exceptional circumstances, improve it. In the next section, a brief review of the empirical studies may indicate the 'achievement' of mergers, in other words, which of the merger hypothesis comes closest to reality. It will also provide expectations of the outcome of the present study.

3.7. Empirical Evidence:

Researchers in accounting and finance have had a long-standing interest in examining and explaining mergers and acquisitions. This is reflected in the large volume of academic and professional literature on the subject, where two dominant methodologies have emerged - 'market-based' and 'accounting-based' studies. The analysis of mergers and acquisitions within a market context generally involves an examination of market returns of the acquiring firms. For example, the studies conducted by Mandelker (1974), Langetieg (1978), Firth (1979) and Dodd (1980), amongst others, provide evidence on the profitability (increase in share prices) of takeovers and on the timeliness of a market's response to public announcements of takeover offers.

The accounting-based studies of mergers examine the usefulness of published accounting information in determining the impact of merger on the acquiring firm. For example Singh (1971) and Meeks (1977), provide evidence on the profitability of takeovers. The review of the empirical studies is grouped according to which merger motive the study tends to support, i.e. whether mergers increase or decrease profitability.

3.7.1. Studies which conclude that Mergers Improve Profitability:

Lev and Mandelker (1972)(a U.S. study) studied 69 firms making a single large acquisition during the period 1952-63. Profitability and share prices were computed for the five years prior to the merger and for the five years subsequent to the merger. They found that shareholders in the companies earned higher average returns on their stocks over the five years following the merger than before, as compared with a sample of companies matched by size and industry. They also found that the growth of acquiring firms over the eleven-year period was larger than that of the control firms. Growth in assets, sales and operating income were 205, 199 and 186%, respectively, while the corresponding growth rates for the control firms

were 130, 100 and 57% respectively. They argued that these differences could be attributed to the higher growth rate of acquiring firms in the pre-merger period and to the substantial change in the merger year.

Mandelker (1974) examined 252 mergers in the United States. His objective was to determine whether mergers provide abnormal positive or negative returns to the shareholders of the target and bidding firms. He also sought to test whether news of mergers is reflected in the share prices. His studies showed that for the acquired firms, the shareholders can earn abnormal gains before the acquisition takes place. This was evidenced in the findings that the cumulative average residuals (CAR) showed a positive return seven months before the merger, in contrast with the earlier months before the seventh month, where the CAR's were mostly negative. For the acquiring firms, the study did not detect any abnormal movements in returns, suggesting that the shareholders were earning normal returns. From this result, Mandelker concluded that any gains that were made from the merger went to the shareholders of the target firms and that the situation suggests that the target firms may have 'unique resources' and that the management of the target firms

were inefficient in detecting these resources. Mandelker went further to assert that the normal returns achieved by the acquiring firms suggest that their shareholders did not lose from mergers and that these normal returns show that the rate of return "is equal to other investments - production activities of similar risk". p 329.

In the United Kingdom, Franks, Broyles and Hecht (1977) used a similar method to Mandelker's. They estimated the gains to shareholders arising from 71 mergers in the breweries and distillers industry during the period 1955-72. Again, substantial net gains from merging were found for a majority of companies. The acquired obtained gains averaging 26% over a period of 3 months prior to the announcement of the merger, and acquirers about 2.5% on their own market values.

There are differences between the U.K. and the U.S results although both applied the same methodology. In the U.K. study, Franks et al found that most mergers were not anticipated until less than three months prior to the announcement date. This is compared with the seven months obtained in the U.S study. Franks, Broyles and Carleton (1985) attribute this difference to the use of different sources and different definitions of critical dates, about the bid. The U.K. target firms had abnormal losses prior to the announcement of the acquisition, perhaps indicating that weaker companies were being acquired.

The studies reviewed conclude that their findings are inconsistent with the hypothesis that mergers are not undertaken to improve the welfare of the acquiring firm's shareholders, or perhaps lead to real gains in economic efficiency. However, these studies also point out that mergers do appear to have generated 'higher' gains to the shareholders of the acquired firms than to the shareholders of the acquiring firms, and in some cases experienced no gain at all. Consequently, at a minimum, the mergers appear to have generated enough efficiency gains to have benefitted the shareholders of the acquired firms. But this conclusion raises some important questions about the motives behind the mergers from the point of view of the acquiring firms. Perhaps, the empirical studies reviewed in the next section might partly answer the question.

3.7.2. Studies Supporting Managerial Hypothesis:

Singh (1971) investigated the profitability of 77 horizontal mergers which occurred during the period 1954-60. He split the 77 firms into five industry groups and then measured the average profitability (accounting ratio) for each individual industry and for all industries. For each merger, he compared the amalgamated profitability in the year of the merger and in the following two years with the weighted average profitability of the individual firms before the merger.

Singh's results are summarized in Table 3.1. According to Singh, the results achieved indicate that

> ".. both for the individual industries and for all industries together, there was in a majority of cases, a decline in the relative profitability of the acquiring firms, whether one considers profitability in the year of takeover or one or two years after takeover". p.162

One of the limitations of Singh's study is that he did not test his results for statistical significance. There is therefore a possibility that the results achieved are due purely to chance.

Table 3.1

SINGH'S RELATIVE POST-ACQUISITION TO PRE-ACQUISITION PROFITABILITY

Industry	% of amalgamations with worse profitability[1]		
	Year of Take-over	Year After Take-over	2nd Year After Take-over
Non-electrical Engineering	56.2	71.4	54.5
Electrical Engineering	75.0	100.0	100.0
Food	75.0	60.0	40.0
Drink	62.8	50.0	53.3
Clothing and Footwear	100.0	100.0	100.0
TOTAL	66.2	66.0	57.1

1. These are the firms whose relative profitability declined compared with the combined relative profitability of the amalgamating firms before take-over.

Source: Singh, A. (1971) Table 7.3 p. 163.

Utton (1974) adopted a different approach from Singh. He compared the profitability of a group of 39 "merger-intensive" firms with that of a group of 39 firms who grew mainly through internal expansion. This was done both for the period 1961-65, when the merging firms wer active acquirers, and in the period 1966-70, when the merging firms undertook few mergers. The measure of profitability used was rate of return on net assets. The results obtained are reproduced in Table 3.2. They show that in both periods the control group had significantly higher profitability than the merger intensive group.

TABLE 3.2.

UTTON'S RELATIVE PROFITABILITY OF MERGER-INTENSIVE AND INTERNAL GROWTH FIRMS

	Mean Profitability (%)	
	1961-65	1966-70
Merger-Intensive Group	13.6	11.5
Internal-growth group	15.4	14.1
Diffence	-1.8**	-2.6*

* statistically different from 0 at the 1% level
** statistically different from 0 at the 5% level.

Source: Utton, M. A. (1974) Table. IV.

Meeks (1977) examined the "normalised"[1] profitability of 213 mergers occurring between 1964 and 1972. Unlike Singh, Meeks used a much longer time period, comparing profitability in the year of the merger and the following seven years, with the weighted-average profitability of the firms in the three years prior to the merger.

1. A full discussion of the normalised profitability index is made in Chapter 6, Appendix C.

The results (reproduced in Table 3.3) show that in six of the seven post-merger years profitability was lower than the average pre-merger level, although the reduction was typically quite small. In addition, the decline was statistically significant in three of those years. However, there was a significant increase in profitability in the year of the merger, but Meeks dismisses this as being due to distortions in measurement which frequently occur in the year of the merger. There is also an increase in profitability in the seventh post-merger year but this is not significant. Meeks therefore concluded that ".. a mild decline in profitability did typify those mergers".

Table 3.3.

CHANGES IN MEEKS NORMALISED PROFITABILITY MEASUREMENT

Year	Change in Profitability after the merger[1]	% of Firms with reduced profitability after the merger
Y	0.200*	0.284
y + 1	-0.009	0.500
y + 2	-0.005	0.524
y + 3	-0.069*	0.594
y + 4	-0.044	0.646
y + 5	-0.122**	0.594
y + 6	-0.157**	0.545
y + 7	0.021	0.500

Notes: * significantly different from 0 at the 1% level
** significantly different from 0 at the 5% level

1. "normalised" profitability of the amalgamation less the 3-year average pre-merger "normalised" profitability of the amalgamation.

Source: Meeks, G. (1977) Table 3H p.39.

Firth (1979) used the 'market-based' approach. He examined 224 successful merger bids during the period 1972 to 1974 and determined the abnormal returns accruing to the shareholders of both the acquired and the acquiring firms as a result of the merger. He then computed the overall gain or loss achieved by the shareholders during the period when the information that the firms were to merge was being fully impounded into the share prices.

The results show that the shareholders of the acquired firm benefitted from the merger while the acquiring firms shareholders suffered. However, when the average gain of the acquired firms shareholders was added to the average losses of the shareholders in the acquiring firms, they practically cancelled each other. Nevertheless, on average there still appeared to be a small loss overall (see Table 3.4)

Table 3.4

Firth's Results:

Gain/Loss from Merger (£m)

	Total	Acquired Firms	Acquiring Firms
Mean	-9.1	655.6	-664.70
No. of Losses	119	2	179
No. of observations	224	224	224

Source: Firth, M. (1979) Table 4. p.324.

Asquith (1983) analyzed the returns obtained for 587 successful and unsuccessful mergers[1] in the U.S. during the period 1962-1976. The results of the study are summarized in Table 3.5. Asquith divided his sample of companies into four groups. The first two groups are the target firms, and the second two, the bidding firms. Target firms and bidding firms were divided further into mergers or bids on the basis of success and failure. The Table shows abnormal returns for each group for five periods around the date of mergers, calculated in the same way as Mandelker's results.

The first is the pre-press period, which begins 480 days before the announcement of a merger bid and ends 21 days before. The Table shows that in the pre-press period the abnormal returns were significantly negative for the two groups of target firms (suggesting a weak profile) and were significantly positive for the group of successful bidding firms. This evidence lends credence to the view that it is the strong firms that take over the weak.

1. 'successful' means that the merger was consumated, while 'unsuccessful' implies the opposite.

On the press date, the day that news of the merger bid first appeared in the Wall Street Journal, all four groups showed positive abnormal returns, but only the two groups of target firms showed significantly positive abnormal returns, approximately 6 to 7% more than could be attributable to general movements in the market.

The next period, the interim period, begins one day after the press day and finishes two days before the "outcome date" when the outcome of the merger is reported in the Wall Street Journal. In the interim period, the abnormal returns continue to be significantly positive only for the group of successful target firms, while they are significantly negative for the two groups of firms involved in unsuccessful mergers.

Table 3.5

ASQUITH'S ABNORMAL RETURNS FOR FIRMS ENGAGED IN MERGER BIDS (%)

No of Firms	Pre-Press period(a)	Press Date(b)	Interim Period(c)	Outcome Date(d)	Post-outcome period (e)
211 Successful Target firms	-14.1*	+6.2*	+8.0*	+1.13*	n.a.
91 Unsuccessful Target firms	-10.5*	+7.0*	-8.1*	-6.4*	-8.7*
196 Successful bidding firms	+14.4*	+0.2	-0.5	+0.2	-7.2*
89 Unsuccessful bidding firms	+2.2	+0.5	-6.2*	-0.2	-9.6*

(a) The pre-press period is the period from 480 days before the announcement of a merger bid until 21 days before. The abnormal returns given are for the entire period.

(b) Press date is the day that news of the merger bid first appears in the Wall Street Journal

(c) Interim period is the period from 1 day after the press day until 2 days before the outcome date. The abnormal returns given are for the entire period.

(d) Outcome day is the day that the outcome of a merger bid is reported in the Wall Street Journal.

(e) The post-outcome period is the period from 1 day after the outcome date until 240 days after the outcome date. The abnormal returns given are for the entire period.

* The abnormal return is significantly different from 0 at th 1 level.

On the outcome date, large significant negative abnormal returns continued for the group of unsuccessful target firms. Finally, in the post-outcome period, beginning one day after the outcome date until 240 days after the outcome date, all remaining groups (except for the successful target firms) showed significantly negative abnormal returns.

The groups that are of particular interest to the present study are the successful target firms and the successful bidding firms. The outcome of Asquith's study and of two further studies whose results are presented in Table 3.6 seem to present consistent evidence that the shareholders of successful bidding firms (acquirers) do not benefit from mergers.

Table 3.6

POST-OUTCOME ABNORMAL RETURNS ACQUIRING COMPANIES:

Study by	Period	Event Period	Sample Size	% Abnormal Returns
Langetieg (1978)(U.S.)	1929-1969	Month after through 12 months after the effective date.	149	-6.59
Malatesta (1983) (U.S.)	1969-1974	Month after through 12 months after approval for entire sample	121	-2.90
		month after through 12 months after approval for mergers occuring after 1970	75	-13.70
		month after through 12 months after approval for firms with equity value under 300m.	59	-7.70

Similarly, several studies have been carried out on the pre-outcome abnormal returns for companies involved in merger activity (see summary of some of the studies in Table 3.7). The evidence from these studies suggests that on average both the bidding[1] and target companies experience increases in their share prices during the bid period. However, the increase experienced by the target companies is substantially higher than the bidding companies, suggesting in part that shareholders of the target companies gain more than those of the bidding companies.

1. Recent events suggest that the increase in the share prices of the bidding companies may have been induced by the action of 'friends' of the bidding companies. One of the latest controversies in the Guinness saga surrounds the undeclared use of Indemnities to encourage institutions to ramp the Guinness share price during a takeover period. The use of indemnities first came to light in October, 1985 when the Takeover Panel reprimanded Hill Samuel for not declaring the indemnities given to acquirers of the shares of Associated Engineers plc.

The argument against the use of indemnities to acquire shares is because of the impossibility of assessing its impact on share prices. In other words, it is difficult to know what proportion of the increase in share prices arose from the action of 'friendly' parties.

Table 3.7

PRE-OUTCOME RETURNS FOR COMPANIES ENGAGED IN MERGER ACTIVITIES[1]

Study by	Period	Event Period	Bidding Firms		Target Firms	
			Successful %	Unsuc. %	Successful %	Unsuc. %
Dodd (1980) U.S.	1970-77	20 days pre-public announcement	+0.80 (60)	+3.13 (66)	+21.78 (71)	+22.45 (80)
Eckbo (1983) U.S.	1963-78	20 days pre- and 10 days post the public announcement	+1.58 (102)	+4.85 (57)	+14.08 (57)	+25.03 (29)
Asquith et al (1983) U.S.	1963-79	20 days pre- and through the announcement day	+3.48 (170)	+0.70 (41)	+20.5 (35)	+10.0 (19)
Malatesta (1983) U.S.	1969-74	public announcement month	+0.90 (256)	n.a.	+16.8 (83)	n.a.

Notes: Sample sizes are given in parentheses

1. A comprehensive U.K. study is in course of completion by Professors J. R. Franks and R. Harris. (1986)

In a similar study to those in Table 3.7, but using U.K. companies, Taffler and Gomar (1985) reported that shareholders of target companies in abandoned bids make substantial positive abnormal gains due to the bid of the order of 33% in the bid month alone. They further stated that

> "..these (abnormal gains) do not decay when the bid is abandoned"..p32

However, the evidence from their study appears to be inconsistent with those of Asquith's study reported in Table 3.5. Taffler and Gomar pointed out that it appears that the market in the U.K. revalues unsuccessful targets more substantially than the U.S. market. They further argued that, though their result appears to be inconsistent with the neoclassical theory, "as no transfer of control has taken place, it is nevertheless consistent with the view that an information efficiency gain was generated in the market by the merger bid". The new information about the target firms presumably leads to upward revision in their valuations.

The foregoing studies (see also Appendix B at the end of the Chapter for summary of other post-merger performance studies) reinforce the argument that shareholders of the acquired companies benefit from mergers and conversely, that the shareholders of the acquiring companies do not benefit from mergers. Thus, if

a company is potentially in danger of bankruptcy it would appear to be in the interest of its shareholders to attempt to find a company willing to acquire the business rather than terminate trading. (This does assume however, that the positive abnormal returns would still accrue in such a situation). It also raises an additional issue of why the management of acquiring companies should embark on acquisition if it does not lead to any significant improvement in the wealth of their own shareholders.

3.8 Summary of the Chapter:

In this chapter, the neoclassical and managerial motives of mergers were reviewed. An attempt to reconcile the empirical findings in order to determine which of the merger motives was predominant did not lead to a coherent view of merger activities. However, the bulk of empirical evidence of post-acquisition performance of the acquiring companies (using either accounting-based or market based models) seems to suggest that the shareholders of the acquiring companies do not benefit significantly from merger. This outcome in part supports the managerial motives of mergers.

Conversely, evidence from the studies reviewed also indicates that shareholders of the acquired companies benefit from merger despite the 'weak' financial

characteristics often observed for acquired companies, (see Chapter 2). The motive of acquiring 'weak' companies which generates huge benefit to the acquired and leads to little, if any, gain to the acquirer becomes questionable. In addition to the managerial motive, another suggestion that have been put forward is that acquisition is a way to avoid bankruptcy (the failing company hypothesis). This issue is considered in the next chapter.

APPENDIX B.

SUMMARY OF OTHER POST-MERGER PERFORMANCE OF ACQUIRING COMPANIES:

Study by	Period	Sample	Main Variables	Nature of Study	Conclusion[1]
Singh (1971)	1954-60 (U.K.)	77	return on assets	comparison of pre-merger and post	U
Utton (1974)	1961-70	39	rates of return on Net Assets	comparison pre-and-post merger	U
Hogarty (1970)	1953-64 (U.S.)	43	Dividend plus share price increase	comparison pre- and post merger	U
Lorie and Halpern (1970)	1955-67 (U.S.)	115	share prices	Acquired company Capital appreciation	F
Reid (1968)	1951-61 (U.S.)	478	share prices; earnings; assets and sales	tested for changes pre-and post-merger	U
Meeks (1977)	1964-71 (U.K.)	233	rate of return on assets	pre- and post-merger changes	U
Cosh, Hughes and Singh (1980	1967-69 (U.K.)	233	rate of return on assets	pre-and post-merger changes	F
Kumar (1983)	1960-76 (U.K.)	354	rate of return on assets	pre-and post-merger changes	U

Notes: 1. U. indicates an observed post-merger decline
F. indicates an observed post-merger increase.

CHAPTER 4

ACQUISITION AS AN ALTERNATIVE TO BANKRUPTCY

4.1 Introduction:

In Chapter 2, it was shown that acquired companies are likely to be relatively unprofitable, sluggish, often with a history of declining profitability. These findings suggest that acquisition targets may possibly be regarded as potentially failing firms. In chapter 3, it was suggested that acquiring companies may have embarked on acquisition in order to avoid bankruptcy. In this chapter, the theoretical and empirical framework of merger as an alternative to bankruptcy (the so-called 'failing-company' doctrine) is developed. However, the economic justification for such behaviour merits investigation. In particular what factors or costs might precipitate such action? As a digression from the main theme of this chapter, bankruptcy costs are discussed in the following section.

4.2 Bankruptcy Costs:

The size, and significance, of the costs associated with corporate bankruptcy has remained one of the major unresolved issues in financial theory. This debate stems from the work of Modigliani and Miller (1958, 1963) who, in the development of their capital structure irrelevancy propositions, excluded the possibility of bankruptcy[1]. If, as has been subsequently argued, bankruptcy costs are significant, then the use of debt may be limited to a level where the present value of the expected costs of bankruptcy is equal to the present value of the tax subsidy gained by the use of additional debt.[2]

An alternative view suggests that bankruptcy costs are relatively trivial and cannot influence capital structure decisions. Haugen and Senbet (1978) have argued that the costs commonly attributed to bankruptcy are actually costs of liquidation, which is a capital budgeting problem, and

1. M & M (1958, p.274 fn.18) did however, recognize the possibility of temporary insolvency which could involve costly reorganisation.

2. Some studies have modelled bankruptcy costs. These studies include Robichek and Myers (1966), Baxter (1967), Kraus and Litzenberger (1973), Kim (1978), Bulow and Shoven (1978), Turnbull (1979) and White (1980).

therefore independent of the act of transferrring control to creditors. The true costs of bankruptcy are those associated with this transfer and must be small relative to the subsidy on debt. However, Hangen and Senbet's implied model of bankruptcy cost appears to have ignored the indirect cost of bankruptcy, which are likely to have an adverse effect on society at large.

Gordon and Malkiel (1980) stated that an additional cost to bondholders results from their inability to enforce their prior claims in bankruptcy proceedings. A court bias may exist in favour of equityholders. Moreover, while bankruptcy proceedings are in progress interest is rarely paid on outstanding debt. These considerations tend to precipitate early settlement of claims with the result that subordinate debtholders and even equity holders receive some recovery, though senior debtholders are not paid in full. This departure from "me-first" rules may however be less serious than claimed, as bond and shareholders could often constitute the same group. Certainly, the growth of institutional participation in listed securities in the United Kingdom implies a less serious consequence to bondholders from the abrogation of "me-first" rules. This however is only true, to the extent that the same institution holds equity and debt in the same bankrupt firm.

Whether bankruptcy costs are of sufficient magnitude to be of economic significance is an empirical question. Attempts to provide empirical evidence have been made by Baxter (1967), Stanley and Girth (1971), Van Horne (1976), White (1981) and Ang et al (1982). However, because of problems in data definition, measurement errors and small sample sizes, the results of these studies are sparodic and somewhat inconclusive.

In the United Kingdom, no empirical study of which this author is aware has been carried out. However, previous empirical studies (for example, Warner, (1977), Kim, (1978) and Haugen and Senbet (1978)), have identified elements of direct and indirect cost as having potential relevance for the determination of bankruptcy costs.

The direct or measurable costs of bankruptcy include costs such as legal, accounting and selling expenses, as well as costs paid to agents who administer the bankruptcy process. The direct cost may also include shortfall costs, which arise if assets are sold in the process of liquidation for less than their economic value to the firm. These costs are primarily due to imperfections in secondary markets for physical assets, with the results that a forced sale may not realise the normal market prices of the assets of liquidating firms.

The indirect costs are the additional costs imposed upon a firm because of its bankruptcy potential. These costs may include profits on lost sales, costs of unfavourable credit terms, higher interest charges on late borrowings, and costs associated with the attendant enforcement of repayment priorities. The indirect cost may include the loss of tax credits which the company would have received if it had not gone bankrupt, and also the 'social cost' of employees made redundant.

In summary, the precise direct costs of bankruptcy may be difficult to determine because of methodological problems. Similarly, the indirect costs, although not readily quantifiable in monetary terms can have a greater impact in the society than the direct costs. A combination of both the direct and indirect costs may be of such magnitude that avoiding these costs may be an appropriate approach for management to adopt. It is therefore not surprising that merger is an alternative that has been proposed and for which some empirical evidence exists. In the following sections, merger as an alternative to bankruptcy is discussed.

4.3 The Failing Company Hypothesis for Merger Activity:

There are two identifiable versions of the failing firm hypothesis. The first version is that a profitable firm may wish to acquire a failing firm or a firm in a less profitable industry. The second version of the hypothesis is that acquiring firms near bankruptcy or in a declining industry may wish to use merger as the vehicle for entering more profitable or growth-oriented industries. A discussion of the failing firm hypothesis for the acquired firm follows.

4.3.1 Failing Company Hypothesis: The Acquired Company

In a 1961 paper, (more recently restated by Scott (1977)), Dawey claimed that most mergers in the USA,

> "... have virtually nothing to do with either the creation of market power or the realisation of scale economies. They are merely a civilized alternative to bankruptcy or the voluntary liquidation that transfers assets from failing to rising firms" p.257.

Marris (1964) explained the merger rationale in terms of inefficiency in resource usage. His 'formal' theory of takeovers is expanded within the context of the growth and investment opportunities of the 'managerial firm'. He argued that shareholders accept a lower dividend payment

as long as there are investment opportunities with 'abnormal' profits available to the firm. However, when management continues the high growth/low dividend payment policy where these investment opportunities no longer exist, shareholders revise the market valuation of the firm and may reduce it to such an extent that the firm itself becomes an 'attractive' takeover target.

A few years later Manne (1965) generalized the argument in constructing a theory of "the market for corporate control". In this market, firms compete for control of inefficiently managed companies through the takeover route. Manne argued that a poorly managed firm would have its share price decrease in the market relative to other companies in the same industries. Furthermore, Manne argued that the power of the 'market' will facilitate the effort to takeover management positions by compensation. Also by acquiring the inefficient firm, the acquiring firm could increase the efficiency of the inefficient firm thereby producing "private as well as social gains".

Meade (1968) summed up the inefficiency argument for the acquired firms as follows:

> "a company which sacrifices profit either to an easy life or to unprofitable growth makes itself liable to a takeover bid" p.387.

This view is supported by Samuelson (1970), when he stated:

> "takeovers, like bankruptcy, represent one of nature's methods of eliminating deadwood in the struggle for survival. A more open and more efficiently responsive corporate society can result" p. 505.

Thus, in these early studies, mergers were seen as an economical way of eliminating bad management, reorganizing corporate structures and improving allocation in the market.

4.3.2. The Empirical Evidence:

The foregoing discussions provide compelling reasons to hypothesize that, many perhaps most, merger targets were 'potentially' failing firms. Boyle (1970) sought to test the failing company hypothesis for the acquired firm. He gathered profit rates[1] and changes in profit rates of 698 (55%) of the 1,276 acquired firms in large acquisitions over the period 1948-68 in the U.S.A. Acquired firms were classified as either a horizontal, vertical or conglomerate category. In the year prior to acquisition, the median profit rate of acquired firms was 8.8%, 9.2% and 10.2% for horizontal, vertical and

1. Profit rate was defined as profit after taxes as a percentage of stockholder equity.

conglomerate categories respectively. Boyle showed that few acquired firms were suffering losses. He also went further in his analysis by looking at the trend of growth in assets and profits. He found that acquired firms in conglomerate mergers had a higher median rate of increase in both profit and assets for the five years preceeding merger than the firms in the non-conglomerate category.

Boyle's study appears to have effectively rejected the hypothesis of merger as a response to impending bankruptcy, assuming that failing firms cannot be profitable. However, most of Boyle's comparisons were only among the classes of mergers, i.e. vertical versus horizontal versus conglomerate instead of between acquired and non-acquired firms. It would have been useful to compare the performance of the acquired firms with that of non-acquired firms to ascertain whether they had performed less well (even though profitably). Furthermore, Boyle reported no test of statistical significance, hence he had no assurance that his observations were not the result of chance. Despite the study's limitations, Boyle's efforts are commendable for being the first to test empirically the 'failing-firm' hypothesis.

Blum (1974) developed a failing-company model (FCM) to aid the Antitrust Division of the U.S. Justice Department in assessing the probability of business failure. Blum's purpose was to quantify this probability by analyzing the financial data of failed firms.

In the USA, the FCM is an acceptable defence against the antitrust restrictions on corporate mergers. In International Show v FTC., (1970), the Supreme Court recognized that when a failing-company is forced into liquidation, the potential harm to communities, employees, creditors and owners associated with the business may outweigh the potential harm to competition caused by allowing the failing firm, while still intact, to merge with a competitor. According to Sinkey (Jr), (1981), one of the difficulties in applying the FCM is the determination of the point at which a company is considered 'failing'. This is because the legal jargon loosely defines failing as a "grave probability of failure".

Blum used multivariate discriminant analysis (MDA) of financial ratios as a means for determining the imminence of corporate failure. He defined failure as "entrance into a bankruptcy proceeding or an explicit agreement with creditors which reduces the debts of the company". Blum's

sample consisted of 115 industrial firms owing liabilities of more than one million dollars at the time of failure during the years 1954-1968 plus 115 non-failed firms. Blum developed a discriminant function consisting of financial variables.

In a test of the function using measurements taken no more than one year prior to failure, the model's overall predictive accuracy rate was approximately 94%. The accuracy rate declined to 80% for predictions two years in advance of failure and 70% for predictions three years prior to failure.

Clearly, the type of information proceeding from Blum's study is useful, not just for pleading or deciding antitrust cases, but also to creditors, investors and others who may be affected by the impending failure of a business enterprise[1].

A companion argument could be made, although Blum did not discuss it, that while the combination of two competitors may tend to reduce competition below present, previous, or "ideal" levels, the imminent failure of one

1. Similar arguments may be advanced in support of the 'public interest' logic by the Monopolies and Mergers Commission in the United Kingdom.

(or both) of the separate companies may threaten an even greater reduction in competition for the industry as a whole. It is conceivable, moreover, that a merger of two firms in an industry could strengthen overall competition within an industry if neither of the merging firms is an industry leader, and particularly if one of the merging firms would otherwise fail.

Conn (1976) later sought to test the failing company doctrine. He drew his sample from the major mergers in manufacturing and mining during 1960-1969 as reported by the U.S. Federal Trade Commission (FTC). Most of his empirical work was centered on the "pure conglomerate" category of mergers. Conn advanced reasons for this choice of merger category.

> "First, these mergers represent a significant and increasing portion of all mergers. For the 1948-69 period, pure conglomerate mergers represented over 17% of all mergers and nearly 25% of all conglomerate acquisitions...Second, these mergers are between firms selling widely different products in separate geographic markets. Thus, neither substantial cost savings nor market power gains seem likely to result from consolidation.". p.184

Finally, Conn's third reason was that as a separate group, the pure conglomerates had not been previously tested for pre-merger profitability.

Conn collected financial information on 56 mergers for the five-year pre-merger period. As a profitability measure, he used net income after taxes/total assets. He performed a paired-difference test to compare the significance of the difference between profit rates for each merger group. He argued that since the paired-difference test suppresses the effects of common events on each observation, it is the appropriate test to measure firm or industry events affecting profitability

Conn found that acquiring and acquired firms had similar levels of profitability for each of the pre-merger years examined. The results are summarized in Tables 4.1 and 4.2.

Table 4.1

CONN'S MEAN PRE-MERGER PROFIT RATES FOR ACQUIRING AND ACQUIRED FIRMS FOR A SAMPLE OF 56 PURE CONGLOMERATE MERGERS (1960-1969)

Firm Profit		One Year Prior to Merger (t)(%)	Five Years prior to Merger (t-5)(%)
Acquiring Firms	(n_a)	0.06612	0.08314
Acquired Firms	(n_b)	0.06782	0.08917

n = Mean of Net Income after Taxes/Total Assets

Source: Conn, R.L., "The Failing Firm/Industry Doctrines in Conglomerate Mergers:" The Journal of Industrial Economics, March, 1976 p.185.

Table 4.2.

CONN'S PRE-MERGER MEANS OF PAIRED DIFFERENCES BETWEEN PROFIT RATES OF ACQUIRING AND ACQUIRED FIRMS FOR 56 PURE CONGLOMERATE MERGERS (1960-69)

Acquiring Versus Acquired Firms

$n_{at} - n_{bt}$	-0.00178	t = (0.228)
$n_{at-5} - n_{bt-5}$	-0.00633	(0.205)
$n_{at} - n_{at-5}$	-0.01692	(1.305)
$n_{bt} - n_{bt-5}$	-0.01701	(1.313)

n = net income after taxes/total assets. Subscripts a and b refer to acquiring and acquired firms respectively; t and t-5 refer to the years for which calculations are based - one and five years prior to merger.

Source: Conn, R. L. "The Failing Firm....".

Rows one and two of Table 4.1 give the mean profit for acquiring (n_a) and acquired firms (n_b). Table 4.2 contains the means of the paired differences between each acquiring and acquired firm for both pre-merger years and t-statistics. The subscripts a and b refer to the acquiring and acquired firms

Based on his analysis, Conn observed no significant difference between the premerger profitability of acquiring and acquired firms in period t or t-5 (t values were 0.228 and 0.205 respectively). He also found no significant change in either the acquiring or the acquired firms' profitability in the five years preceding merger. Conn pointed out that while the mean profit rates for each set of the firms declined during the pre-merger period, the change was not statistically significant. For the acquiring firms t = 1.305, and for the acquired firms t = 1.313. He stated that the general inference, that could be drawn from the data, was that firms were acquiring others of similar profitability, and neither buyers nor sellers seem to be significantly declining enterprises. Conn concluded that "the acquired firms are not 'faltering' and that the financial vitality of acquirers, and acquirees casts considerable doubt on the failing firm/industry defences for conglomerate mergers" (p.187).

Conn made a serious attempt in testing the failing-firm hypothesis. Unlike, the Boyle study, he carried out statistical test of significance. However, his study is not without loopholes. His study sample comprised of 'pure conglomerate mergers' during the period 1960-69. Therefore his conclusions, may not be applicable to other forms of mergers. Indeed, Conn pointed out that his sample represented only 17% of all mergers, therefore any conclusion as to the performance of the remaining 83% during the period under review is lacking.

Although Conn sought to test the two versions of failing company doctrine, he omitted an important element in his comparison. By failing to test the profit-rate of other companies not involved in any form of merger during the period, he might have inadvertently reached his conclusions. The omission of the 'fate' of other companies (a control group) is of vital importance. It could be that during the period of his study, firms generally were enjoying rapid growth in profitability rate. Alternatively, the comparison directly between acquiring and acquired companies may be masking the two observations of the failing company doctrine, i.e., for both acquiring and acquired companies. Comparison with a 'non-acquiring and non-acquired' control group would reduce this likelihood.

Conn's use of a single-factor[1] (profit-rate) as a surrogate for success is also of doubtful validity. If the surrogacy is to be accepted, it implies that a firm failing to earn profit is liable to failure. Although this may be true to some extent, if lack of profit continues in the long-term, it is equally true that companies have gone out of business with positive profit records.

1. The use of multiple discriminant analysis (MDA) involving the use of several ratios indicates that there are 'several factors' involved in the prediction of business failure. This is one of the advantages of MDA over univariate statistics. A full discussion is made in Chapter Six on Methodology.

4.3.3 Failing Company Hypothesis: The Acquiring Company:

Weston and Mansinghka (1971) sought to test this hypothesis, suggesting that conglomerate mergers occur for 'defensive' reasons. That is, that acquiring firms frequently have below average industry profitability and merger occurs "to avoid adverse effects on profitability from developments taking place in the firms traditional market product areas". p.928

They compared the profitability of a sample of 63 conglomerates with two control groups randomly selected from among the 'Fortune 500' industrials. Their data cover the periods 1958-68 and 1960-68. They found that in 1958, the conglomerates, (the 63 firms) had profit rates significantly below the randomly selected sample of industrials. After 1968, the peak year of merger activity, the conglomerates had profit rates roughly equal to those of the industrials[1]. Their findings are summarized in Table 4.3.

1. Holzmann, Copeland and Hayya (1975) also found that a sample of 21 conglomerates had lower average profitability than a size matched sample of non-conglomerates for both the 1951-60 and 1961-70 periods.

Table 4.3

Results from the Weston and Mansinghka Study:

	1958			1968		
	Sample Means(%)		F Statistics	Sample Means(%)		F-Statistics
	Test Group	Control Group		Test Group	Control Group	
EBIAT/TA	5.8	9.2	9.83*	10.4	8.5	0.44
EBIT/TA	8.7	16.7	17.13*	15.1	15.6	0.02
NET INCOME/ NET WORTH	7.6	12.6	10.52*	13.3	12.4	0.81
DEBT/NET WORTH	95	56	8.19*	169	87	10.25*

Notes: *difference between test group and control group is different from 0 at the 1% significance level.

EBIAT/TA is Earnings before interests and preferred dividends but after Taxes/Total Assets. EBIT/TA is Earnings before interest, preferred dividends and Taxes.

The third line of the table shows that the profitability of the conglomerates grew significantly faster than the control group during the period of heavy merger activity. However, the fourth line indicates how the conglomerates financed their growth. In 1958, their leverage ratio was higher than the control group but that ratio almost doubled by 1968, showing perhaps that the conglomerates financed their growth by an increase in their leverage ratios.

The foregoing results led Weston and Mansinghka to state:

> "... analysis of the backgrounds and acquisition histories of the conglomerate firms suggests that they were diversifying defensively to avoid (1) sales and profit instability (2) adverse growth developments (3) adverse competitive shifts (4) technological obsolescence and (5) increased uncertainties associated with their industries"...p 928.

They summarized their findings thus:

> "... hence the foregoing data are consistent with the proposition that the conglomerate firms perform the economic function of preserving the values of ongoing organisations as well as restoring the earning power of the entities. In addition the conglomerate firms avoid the costs of bankruptcy".

The failing-company hypothesis for the acquiring company received further support by Melicher and Rush (1974)[1]. They compared the profitability of 61 conglomerate firms they acquired. They found that the conglomerates acquired firms significantly more profitable than themselves. They also found that the conglomerates acquired firms with significantly lower leverage ratios than themselves, suggesting "a latent debt or leverage capacity motive" p.145.

1. This conclusion supports generally the conglomerate-firms-as-a-bundle-of-managerial-effi ciencies proposed by Jacoby (1969). Lynch (1971) also concluded on the basis of case study of 28 conglomerates that they followed a strategy of acquiring 'successful, profitable companies' with capable management that can be retained (pp. 83-85).

However, in an earlier critique of the Weston and Mansinghka study, Conn (1973) disagreed with their conclusion and in his later analysis concluded that "the general inference drawn from these data is that firms are acquiring others of similar profitability, and neither buyers nor sellers seem to be significantly declining enterprises" p.186

Weston and Mansinghka's results are inconsistent with those of Conn. Given the contradictory nature of the results, the time-period covered, and lack of attention that has been given to the failing firm doctrine for the acquiring firm, further examination of the issue is in order. This line of enquiry forms one of the objectives of the present study.

Shrieves and Stevens (1979) commenting on Conn's study asserted: "thus Conn's conclusions like Boyle's, can support only the contention that bankruptcy avoidance is not the exclusive rationale for mergers". Such assertion implies that Shrieves and Stevens accept both Boyle's and Conn's 'single-factor' measurement as adequate in testing the failing company doctrine. Unfortunately, the measurements used by both studies (Boyle (1970) and Conn (1976)) are inadequate and their conclusions are not final.

The foregoing discussions suggest that any empirical analysis of the failing company doctrine should employ a robust model or technique which will focus on the extent to which acquired firms were in danger of failure prior to merger. An important consideration (which has been stressed by Shrieves and Stevens) is that upon consummation of the merger, the failure which may have befallen the merged firm cannot be observed, unless a subsequent failure of the merged firm can be attributed to the acquisition. Thus, while it may be possible to observe firms experiencing financial problems, and in some cases their subsequent liquidation, for acquired firms the process of failure may be terminated by acquisition.

Shrieves and Stevens (1979) took the issue further by examining the extent to which acquired firms were in danger of failure prior to acquisition by seeking to measure the ex ante likelihood of bankruptcy. They used the Altman (1968) bankruptcy prediction model[1]. Their sample comprised of 224 firms with 112 firms in each group, acquired and non-acquired respectively. The acquired group was selected randomly from the FTC's Larger Mergers in Manufacturing and Mining during the period 1948-1971. They applied the model to samples of acquired and non-acquired firms to assess the incidence of predicted financial

1. The Altman's Model is reviewed in Chapter 5.

distress in the two groups. Their results were utilized in testing the null hypothesis that "the relative frequency of firms deemed likely to experience bankruptcy within one year is the same or lower among acquired firms as among firms not subsequently acquired". Rejection of the hypothesis was interpreted as supporting the bankruptcy cost avoidance merger rationale.

They found that 17 (15.2%) of the firms in the acquired firm sample were near bankruptcy at the time of the acquisition. This result was compared with 5 firms (4.5%) found to be near bankruptcy in the sample of non-acquired firms, and the difference was significant at the 1% level. They concluded that their results were consistent with the bankruptcy avoidance motive and went further to argue that severe financial crises among large firms are often resolved through the merger process.

Shrieves and Stevens' study is worthy of commendation because they applied a robust model in an attempt to test the failing company doctrine. However, it is ironic that the weakness of the study arises out of the model. They relied on the Altman (1968) model for their study. Altman in turn derived the model from a choice of financial ratios over a twenty-year period. The time-span in the derivation of the model may have assumed that average ratios do not shift over time. Although the issue of

ratio stability over time is yet to be fully resolved, it seems unreasonable to assume the stationarity of ratios over long time-periods given the influence of financial and economic circumstances.

Taffler and Soper (1983) expressed caution on the outcome of Shrieves and Steven's study. They stated "it should also be noted that the surprisingly low percentage of the non-acquired set with "bankrupt" Z-scores is out of line with other studies using the same model which must suggest some methodological problems" (p.6 footnote 5).

The arbitrary use of cut-off probabilities without specifying a decision context is a weakness inherent in the Altman model. Prior probabilities are probabilities of group membership in the population. In the Altman's study, they may be denoted as b_1 for the probability of bankrupts and $b_2 = (1-b_1)$ for non-bankrupts. Altman's inference on the development of the model was based on the premise that sample group frequencies were equal to the prior probabilities, that is, $b_1 = n1/n$ and $b_2 = n_2/n$. However, when these conditions do not hold, the statistical inference made may be seriously misleading if the prior probabilities are not accounted for in the analysis (Joy and Tollefson (1975), Eisenbeis (1977) and Palepu (1986)).

The appropriate cut-off probability to be employed in the prediction tests is determined by the decision context in which the model's predictions are to be used. To derive the 'optimal cutoff probability', it is necessary to specify the decision context of interest and the prior state probabilities. The first condition is not a weakness to Shrieves and Stevens' study. However, the second condition poses a serious threat to the conclusions of their study. This is because neither Altman (bankruptcy) nor Shrieves and Stevens themselves (acquisition) incorporated the prior state probabilities. The failure to incorporate the prior state probabilities underestimates the error rate of the model.

In a study similar to that of Shrieves and Stevens but using U.K. data, Taffler and Soper (1983) applied the Taffler (1983)[1] model to a group of acquired and nonacquired companies. The main data sample used in their analysis consisted of 172 industrial (manufacturing and construction) companies quoted on the London Stock Exchange that were identified as acquired between the beginning of January 1979 and mid-July 1983. These companies had their accounting data held on the EXSTAT computer tape of company financial information.

Taffler and Soper compiled their sampled companies from three sources. The acquisitions between 1977 and 1980 were taken from the lists compiled by the Department of Trade and Industry for Business Monitor No.7. "Acquisitions and Mergers

1. The Taffler's model is reviewed in Chapter 6.

of Industrial and Commercial Companies" and those for 1981 from the list of U.K. mergers published in the 'Investors Chronicle'. The 1982 and 1983 acquisitions were taken from the 'Financial Times' "Bids and Deals" section published each Saturday.

Tables 4.4 and 4.5 describe the characteristics of their main data set.

TABLE 4.4

ACQUISITIONS IN THE DATA SET BY YEAR

	1977	1978	1979	1980	1981	1982	1983
No of Acquisitions[1]	32	31	23	15	30	23	33[2]
Size of EXSTAT Population	803	773	733	698	672	736	704[3]
% Acquired	4.0	4.0	3.1	2.2	4.5	3.1	4.7[2]

Average % Acquired 3.7

notes:

1. These are the numbers of quoted industrial companies on the EXSTAT tapes used with financial year ends between 1:5:76 and 30:4:77 and so on which approximate to the number of live companies in the respective calender year. Because of this treatment (the only practical one given the way the tape is arranged) and the number of company failures, the decline in the size of the population total does not reconcile with the number of acquisitions.

2. Annualized basis. There were 18 acquisitions to mid-July 1983

3. Estimated.

Table 4.5.
CLASSIFICATION OF ACQUISITIONS

Type/Year	1977	1978	1979	1980	1981	1982	1983	% of Total
Horizontal[1]	11	14	9	6	16	10	9	75
Vertical	7	6	6	3	2	5	4	31
Conglomerate	7	6	5	3	6	4	3	34
Foreign Owned Co.[2]	7	7	3	3	6	6	2	32
Total	32	31	23	15	30	23	18	172

notes: 1. 6 companies in 1981 and 1 each in 1982 and 1983 were acquired by their directors or special companies set up for this specific purpose and these are treated as horizontal mergers

2. most of the acquisitions by foreign owned companies were horizontal and many were by U.K. trading subsidiaries of the overseas parent.

Source: Taffler and Soper (1983) "Acquisitions...."

The Taffler (1983) model was used to analyze the U.K. data in a similar way to that of Shrieves and Stevens. Table 4.6 shows the results of applying the model together with the percentage of "at risk" Z-score quoted industrial companies on the EXSTAT tape, excluding the acquired companies for comparison purposes.

The results led Taffler and Soper to conclude

> "The U.K. evidence then provides evidence consistent with Shrieves and Stevens overall in that there does appear to be a significant difference in the acquisition patterns of at risk companies for the total pooled sample of 172 acquired companies for the six and half year period" p.16.

Table 4.6

A COMPARATIVE PERCENTAGE OF "AT RISK" COMPANIES:
ACQUIRED vs NONACQUIRED

	1977	1978	1979	1980	1981	1982	1983	Total
No of Acquisitions with "At Risk" Z-scores	6	4	4	1	9	9	13[3]	24.6[1,5]
% of Total	18.8	12.9	17.4	6.7	30.0	39.1[4]	38.9[4]	46.0
% of "At Risk" Z-scores in the non-Acquired population	13.7	10.9	11.8	16.2	20.6	22.5	21.1	16.5

Notes:
1. Including 1983 on an annualized basis
2. Derived by weighting the respective percentages by the number of non-acquired companies in the population
3. Annualized basis, there were 7 "at risk" acquisitions in the 18 acquired cases to mid-July 1983.
4. This is significantly different to the population percentage at better than = 1
5. This is significantly different to the population % at better than = 1%.

They further split the period of the study into pre-recession and recession years. They observed that when the economic climate was reasonably sound, there was no evidence that the percentage of acquired quoted industrial companies possessing bankruptcy characteristics differed to that of the population percentage. However, they point out that this does not apply during the recession period (in other words there was evidence that the percentage of acquired companies possessing bankruptcy characteristics differed from the population percentage) where the null hypothesis was rejected at 0.1% level. Apparently, this 'strong rejection' may have eclipsed the 'no-difference' result in the pre-recession period and therefore have biased the non-split-period conclusion.

Taffler and Soper tested companies "quoted on the London Stock Exchange that could be identified as being acquired". One can argue that their conclusions relate to both small and large quoted companies during the period. The support for this argument is based on the sources of their sampled companies. The list of acquisition compiled by the Department of Trade and Industry includes "all acquisitions". This is also the case with the list of acquisitions compiled by the "Investors' Chronicle" as well as the acquisitions taken from the Financial Times "Bids and Deals" section. As such, one cannot conclude

from the findings of their study that severe financial crises among 'large' quoted firms are resolved through the merger process. This gap in knowledge of large firms is important and an examination of the issue is in order. This is because it is the large firms that are likely to solicit for mergers as they seldom go bankrupt, (Singh (1971)). This line of enquiry is of particular interest to the present study.

One of the criticisms of the earlier bankruptcy models similar to those of Altman and Taffler is the stability of financial ratios over time. Mensah (1984) argued that because of changes in economic environment over time, financial ratios should not be assumed to be stable over time. Although the issue of ratio stability is yet to be resolved, it is expected that the average ratio changes over time. In order to avoid the problem of ratio stability, the model for the present study was derived specifically over the same time period as the companies used in the analysis. In other words, the companies used for the derivation of the model and the acquired companies were drawn from the same time period.

In addition to the shortcomings of the previous studies, none of the studies has compared the post-combination performance of the acquiring companies according to the financial characteristics of the acquired companies.

4.4. Summary:

The failing company hypothesis for merger activity has been discussed. There appears to be empirical support of the hypothesis for the acquired firms. The evidence for the acquiring firms appears subtle. In the next chapter, a review of financial ratios as a tool for analysis is made.

CHAPTER 5

BANKRUPTCY PREDICTION MODEL
A REVIEW AND EVALUATION OF RATIO ANALYSIS

5.1. Introduction:

This chapter reviews the history of financial ratio analysis and evaluates many of the contributions to its development. The review and evaluation seeks to convey an understanding of the process of development, the state of the art, and the difficulties encountered by researchers in the field of financial ratio analysis and business failure prediction.

5.2. Derivation of Financial Ratios:

Financial ratios are derived from the financial information provided by companies. The term 'financial information' is used broadly in business practice and

literature but for the purpose of this study, the term is specifically defined to mean the information which is a product of the accounting system, i.e. contained in the published financial statements. The financial statements include the balance sheet, the income (profit and loss) statements and derivatives thereof.

Financial statements may be historic or forecast and audited or unaudited. Financial information for this study was that information contained in the historical, audited financial statements (balance sheet and income statements) - the type of statements a prospective investor, analyst or a lending institution would require of a company.

One may wonder, however, whether in practice this financial analysis, in its current form, plays any role or has any importance in the decision making of intended users - particularly in this case of predicting business failure and takeover.

Some studies such as Roper (1948), Lee and Tweedie (1975) have indicated that individual investors pay little attention to financial reports. At the same time, there have been studies that have indicated that considerable reliance is placed on reports by financial analysts.

Horngren (1957) suggested that "...although the annual report is not always the most important source of information (to security analysts), in terms of usage, it belongs in the first place among sources", p.599. Then Dyckman (1969) reinforced the belief that financial statements are of significant importance to such analysts.

Even in the case of the current 'efficient' capital markets debate, the apparent and implied uselessness of published financial statements in the context of efficient markets (see Gonedes (1972)) seems to be exaggerated. In fact, there seems to have been considerable evidence to confirm that investors, even in that context, use financial statement information and still consider it useful in their investment decisions, (Ball and Brown (1968), Beaver (1968) Brown (1970), May (1971), Kiger (1972) and Niedhoffer and Regan (1972)). Such studies, apart from establishing the significant importance of financial information in market economies have helped in attempts to serve better the needs and preferences of users of information.

5.3. Ratio Analysis: Early Development:

According to Horrigan (1968), the usage of ratios in financial statement analysis can be said to have begun with the advent of the current ratio, which was first used during the 1890's. Subsequently, financial analysts began to investigate numerous ratios as a basis for credit decisons. Horrigan discovered that, as early as 1905, Cannon, the pioneer in financial analysis, used ten different ratios in a study of business borrowers. Nevertheless, it appears that most analysts in the early days emphasized the comparison of the value of a single ratio to a preconceived criterion value for that ratio. The most prominent "absolute criterion" was a 2 to 1 value for the current ratio.

In a classic study of financial ratios, Wall (1919) classified 981 firms by nine industry groupings and nine geographic regions. For each firm, he computed the values of seven ratios and concluded that the values of these ratios were significantly influenced by geographic location and type of business.

By today's standards, Wall's methodology would appear to lack rigour. His conclusions were drawn without adequate objective analysis. However, his work is

significant on many counts. First and foremost, the study adopted an empirical approach. Secondly, it investigated a large sample. Thirdly, it promoted the idea that a large number of ratios are useful in evaluating a firm's financial condition. Fourthly, it challenged the notion that a single criterion value is a suitable standard for ratio comparisons. Finally, it explicitly recognized the problem of heterogeneity inherent in samples of firms from different industries and regions.

In a later study, Wall (1928) laid additional groundwork for studies of the present kind. With Dunning, he published an index of ratios for use in financial statement analysis. Each ratio is assigned a weight indicating its relative importance in the index. One could argue that the assignment of an index to financial ratios without a theoretical background represents a crude, somewhat subjectively derived methodology.

Despite the shortcomings of the early studies, ratio analysis has flourished as a vital analytical tool to evaluate the financial condition and performance of a firm. The analysis involves two types of comparison. First, the analyst can compare a present ratio with past and expected future ratios for the same company. For example, a profitability ratio (earnings/total assets) for

the present year-end could be compared with the profitability ratio for the preceding year-end. When financial ratios are arrayed on a spread-sheet over a period of years, the analyst can study the composition of change and determine whether there has been an improvement or a deterioration in the financial condition and performance of the firm over time.

The second method of comparison involves comparing the ratios of one firm with those of similar firms or with industry averages at the same point in time. Such a comparison gives insight into the relative financial condition and performance of the firm.

Although ratios are useful analytical tools, there are some limitations on their usage. Ratios are derived from accounting data, and accounting data are subject to different interpretations and perhaps manipulations. For example, measurement of profitability is ambiguous, because there is more than a single meaning of profit.

There are economic definitions of profit but the accountants have usually found the pure economic concepts of profit (income) not susceptible to pragmatic use. Neither Fisher's definition (1966)[1] nor Hick's (1946 p.172)[2] provides enough guidance for measurement purposes of the accountants.

In accounting, the amount of profit resulting from the measurement process depends on the valuation concepts used. Thus, one may end up with a different profit figure depending on whether one used market values (liquidation or opportunity cost value), or historical cost values or general purchasing power adjusted value or capitalized (discounted) values. For example, when the historical values are used, the income reported includes only that amount which accountants refer to as "realized income".

1. According to Fisher, income is held to be the flow of wealth of services in excess of that necessary to maintain a constant capital.

2. According to Hicks, income is the amount an individual can consume during a time period, and be as well off at the end of that period as he was at the beginning. The immediate problem, however, is that no precise meaning of what constitutes "being-well-off" was given.

Where current costs are used to evaluate assets and liabilities the resultant income figure excludes monetary gains and losses obtained from the mere holding of the monetary assets during the period whether realized or not (Edward and Bell (1962)).

With the use of general purchasing power units of monetary measurement, the income is recast in terms of measuring units, which attempt to take into account explicitly the changing purchasing power of money due to the rise or fall in the general price-level.

Indeed, one can go on enumerating more bases of valuation and in each case the result is a different income figure. Such a multiplicity of bases of valuation with concomittant numerous income figures leaves the analyst in an ambiguous position to choose the appropriate income figure to use in his analysis.

The limitations of ratio analysis are not confined to measurement problems. Interpretation of the ratios themselves may be ambiguous. For example, a high stock turnover ratio could indicate efficient stock control, but it could also indicate a serious shortage of stocks and suggest the likelihood of stock-outs.

The limitations of accounting data and financial ratios have been recognized. However, in spite of their defects, they represent in most cases the best available indication to investors and shareholders on the stock market of the current and past record of a firm. These are the data used and discussed in the financial press and in the financial community generally, to indicate company performance. In the next section, a discussion of the empirical studies of financial ratios is made.

5.4 Empirical Studies:

Major empirical studies into ratio analysis have taken different patterns and spanned many years. Most of the studies have taken one of two forms: univariate analysis and multivariate discriminant analysis. A discussion of each is made in turn.

5.4.1 Univariate statistical method:

A univariate approach involves the analysis of ratios to determine their predictive ability on a one-by-one basis. This methodology has been applied in the determination of successful and unsuccessful companies.

Relevant Studies:

During the same time period in which pragmatical empiricism flourished, a quite different movement began[1]. Several reseachers undertook a more 'scientific' approach to the analysis of ratios. Smith and Winakor (1930) collected and analyzed data on samples of troubled firms. Their first study involved 29 firms and a later study included 183 companies that failed during the period 1923-1931. Smith and Winakor, in both studies computed means of 21 ratios for the sampled firms and found that patterns of decline in the values of certain variables appeared to portend failure. The ratio of working capital to total assets showed an almost perfectly regular pattern of significant deterioration beginning in the 10th year before failure. Cash to total assets began a regular and steep descent in the sixth year preceding failure. The current ratio showed a reverse trend in the sixth and fourth years prior to failure, but thereafter declined steeply.

1. In the 1930s, Foulke (1937) of Dun and Bradstreet is reported to have promoted the adoption of his own chosen handful of ratios for use in financial statement analysis. He based his claim to authority on his extensive personal experience in analyzing financial statements. Foulke provided neither *a priori* constructions nor quantitative empirical analyses as bases for his ratio selections.

A major weakness of the Smith and Winakor studies is that they did not compare the ratio trends of unsuccessful firms to trends for control groups of successful firms and demonstrate a significant contrast. The studies cover the decade preceding the Great Depression, a period during which the means of successful firms' ratios might also have followed a similar pattern to the unsuccessful ones.

In an analysis similar to Smith and Winakor's but based on a very small sample of 20 unsuccessful firms, Fitzpatrick (1931) studied trends of 13 ratios. In a follow-up study, Fitzpatrick observed trends of the same ratios as in his original study. He concluded that the ratios of net profit to net worth, net worth to debt, and net worth to fixed assets were the best indicators of success or failure.

The Smith and Winakor and Fitzpatrick studies all had their shortcomings. However, the studies are extremely significant. They represent pioneer efforts in the use of empirical analysis to identify relationships between financial ratios and subsequent business success or failure.

5.4.2. Recent Studies:

In a more recent study which may now be regarded as a landmark in financial ratio research, Beaver (1966) applied a univariate statistical technique to predict business failure. He carried out the research by examining the failure prediction ability of 14 financial ratios. The study involved 79 pairs of failed and nonfailed firms matched by industry and asset size. The failed firms in the sample were those firms which during 1954-1964 had been removed from Moody's Industrial Manual due to bankruptcy, bond default, overdrawn bank account or nonpayment of a preferred stock dividend.

Beaver computed 30 financial ratios for each year up to 5 years prior to failure for each of the failed firms. For each ratio, he grouped values according to the number of years before failure and computed the arithmetic mean for each group. He then compared these means, arranged by numbers of years preceding failure, to corresponding values of the means of non-failed firms. Then for each year, he selected that value (in between means of failed and nonfailed firms) of each ratio which separated the ratio scores of failing and nonfailing firms with minimal error.

Beaver found that five of the variables used as predictors of failure showed significantly low rates of predictive error for each of the five years preceding failure. These variables are summarised in Table 5.1. and the misclassification rates in Table 5.2.

Table 5.1

BEAVER (1966) SUMMARISED RATIOS
SUMMARY OF RATIOS FOUND TO BE SIGNIFICANT PREDICTORS:

1. Cash flow to total debt
2. Net income to total assets
3. Working Capital to Total Assets
4. Current Ratio
5. No-credit Interval[1]

Source: Beaver (1966)

1. The no-credit interval is a relatively new ratio in the finance literature. It is computed by dividing the "net defensive assets fund" (quick assets - current liabilities) by the operating expenditures. For a thorough discussion of the no-credit interval and other interval measures, see George H. Sorter and George Benston, "Appraising the Defensive Position of the Firm" The Accounting Review. October, 1960, pp 633-650.

Table 5.2

BEAVER'S CLASSIFICATION RESULTS

Years prior to failure	Misclassification Overall	Type I	Type II
1	(13%)		
	10%	22%	5%
2	(21%)		
	18%	34%	8%
3	(23%)		
	21%	36%	8%
4	(24%)		
	24%	47%	3%
5	(22%)		
	22%	42%	4%

(a) Figures in parentheses represent test against holdout sample. Figures not in parentheses are test against same sample from which dichotomous classification test was estimated.

(b) Type I Error is misclassifying a failed firm: Type II Error is misclassifying a non-failed firm.

In Table 5.2, misclassication rates on all the variables were lowest during the first year. Misclassification rates were, in some cases, slightly higher in intermediate years than in the 5th year, but in general they increased as the time interval to failure increased.

Beaver's study is an application of univariate statistical analysis to business failure prediction. In the study, numerous variables were examined; however, each variable was analyzed apart from all others to determine its usefulness for the purpose in question. The setback to such an approach is that it provides no means for determining the compound descriptive or indicative or predictive significance of more than one variable. Another possible problem with the method is that a sample drawn from a population may not typify that population with respect to a particular variable, even though the sample may be typical in many other respects.

Another potential weakness is the sensitivity of a single ratio (and some groups of ratios) to manipulation by management. Some traditionally prominent ratios are quite susceptible to such manipulation, often referred to as 'window dressing', or what Argenti (1976) described as 'creative accounting'. The current ratio provides an example. In order to improve or 'dress' the current

ratio, management may reduce the current liabilities prior to publishing the financial statements. Management may also build up cash for this purpose, by reducing stocks or offering substantial discounts to customers for early payment of their accounts. If the initial value of the current ratio is greater than unity and if discounts given in liquidating current assets are not excessive, the 'reduced' current liabilities results in an increase in the ratio.

Increasing the number of ratios considered in ratio analysis tends to defeat window dressing efforts. However, there are exceptions to this generalization. For example, suppose an analyst computes stock and debtors turnover ratios using closing stock and debtors balances respectively as denominators. Then management may liquidate stocks, offer discounts to debtors to speed collection, and use the proceeds to pay off current debt, thereby increasing the stock turnover and debtors turnover ratios while also increasing the current ratio. Thus, in a series of actions that are not necessarily beneficial, and may well be detrimental, to the real financial and operating position of his company, a 'skilful window dresser' may make supposedly representative items displayed in his 'shop window' appear deceptively attractive.

Neter (1966) in a discussion of Beaver's study, noted an interest in the possible effectiveness of multivariate analysis of evaluating financial ratios as predictions of business events. This is because the univariate analysis treats each ratio as though it were independent of every other ratio analyzed. And unless multicollinearity is taken into account, it may be difficult to draw accurate conclusions about the relative predictive abilities of various ratios. Multiple discriminant analysis (MDA) provides a method of evaluating the usefulness of several ratios taken as a group for correctly classifying observations into a priori classes. The procedure takes multicollinearity into account in computing weights (coefficients) of variables.

5.5. Multiple Discriminant Analysis (MDA):

The late 1960s witnessed a new interest in financial ratio analysis. Researchers in business, finance, accounting and banking started investigating the usefulness of multivariate analysis as a method for improving the effectiveness of financial analysis. MDA, as has been pointed out, is a statistical method used to classify subjects into one of two or more a priori classes, based on an analysis of selected characteristics believed to be related to class membership. From a decision making perspective, MDA is a method for choosing one of a finite number of alternative courses of action.

From a forecasting perspective, MDA is a method of predicting whether one or another of a finite number of mutually exclusive events will occur. In any case, it is usually convenient to discuss discriminant processes in terms of "classification", or membership in a class defined by known or knowable values of a classification variable.

Following Beaver's (1966) paired sample design, Altman (1968) selected 33 non-failed firms matched to the failed firms according to industry classification and asset size (value of total assets). He then tested a number of combinations of variables and found a linear combination of five variables. The following discriminant function was derived:

$$Z = .012x_1 + .014x_2 + .033x_3 + .006x_4 + .999x_5$$

where x_1 = Working capital to Total Assets
x_2 = Retained Earnings to Total Assets
x_3 = Earnings before interest and taxes to Total Assets
x_4 = Market value of Equity to Par value of Debt
x_5 = Sales to Total Assets.

Altman most successfully classified firms by categorizing those observed to have a 'Z-score' greater than 2.675 as nonbankrupts and those with lower scores as bankrupts. In other words, the Z-value 2.675 is the 'critical score' in the discriminant model.

In a 'series of tests' on validation samples, Altman's model correctly classified more than 90% of firms one year before failure. Using financial data taken two years before date of failure, the model correctly classified nearly 80% of the firms in the sample. Success in classification deteriorated and grew erratic when the model was tested on data taken more than two years prior to failure. However, the results were better than results Beaver (1966) obtained with his best single ratio.

Joy and Tollefson (1975) criticized Altman's conclusion. They claimed that Altman's classifications were not predictions of corporate bankruptcy but merely ex post discriminations. They also contended that Altman's 'holdout'[1] sample should have been drawn from a future period completely distinct from the original (or analysis) sample period in order to illustrate the predictive ability of the model.

1. This is a method of testing that the discriminant model is not sample-specific. For fuller explanation, see Chapter 6.

They further claimed that evidence of ex ante predictive power requires intertemporal validation and not merely cross validation. (By cross validation, they mean verification using a time-coincident holdout sample). Joy and Tollefson did admit, however, that under the assumption of stationarity (of the parameters and variables of the discriminant function) ex post discrimination (or validation) is tantamount to prediction, provided the researcher proves that stationarity indeed exists. Otherwise, according to them, ex post discriminations (or cross validations) merely are useful for making inferences about the importance of individual variables.

Eisenbeis (1977) contended that Joy and Tollefson incorrectly viewed the process of prediction as only making inferences into the future. As a result, they excluded instances when one is interested only in predicting whether or not an event will occur without reference to a particular time period and when one is willing to assume stationarity. In such cases, Eisenbeis claimed that cross validation is not inappropriate or meaningless. According to Eisenbeis, divergency in ex ante and ex post classifications constitutes a crude test of the stationarity hypothesis.

Despite the shortcomings of Altman's study, it was important for introducing multiple discriminant analysis to failure prediction and reconfirmed the usefulness of ratio analysis. To date, it is the most widely referenced failure-prediction model.

Deakin (1972) combined the approaches of Beaver (1966) and Altman (1968). He used Beaver's 14 financial ratios as independent variables in a multiple discriminant analysis. An attempt was made by Deakin to eliminate some ratios from the discriminant function, but this resulted in substantially increased misclassication rates, hence the 14 ratios were retained.

Deakin performed his discriminant analysis on 32 pairs of failed and non-failed firms which were matched according to industry classification and asset size. A separate analysis was performed for each of the five years preceding failure. The results indicated that misclassification errors averaged 3%, 4.5%, and 4% for the first, second and third years respectively. The error rates increased markedly in the fourth and fifth years rising to 21% and 17% respectively.

Deakin's model was tested on an independent sample consisting of 11 failed and 23 non-failed firms selected at random from the 1964 and 1963 Moody's Industrial Manual. Error rates of 22%, 6%, 12%, 23% and 15% were observed for each of the five years prior to failure. The

deterioration in the classification accuracy of the model is expected when applying a statistical test to sample populations other than the population from which the model was drawn. However, the deterioration of the first year appears rather severe and Deakin was unable to explain the result.

Deakin's study emphasized the failure prediction ability of MDA models, using financial ratios as the input, for three years preceding failure - a result Altman was unable to obtain. Compared with the classification results obtained by previous studies, Deakin's model appears to give consistently better results than either the best prediction variable (Beaver (1966)), in the dichotomous test or of the single-year discriminant analysis (Altman (1968)), see Table 5.3

Table 5.3

CLASSIFICATION ERROR RATES FOR PREDICTING FUTURE BANKRUPTICES[1]

Year before failure	Beaver's Cash flow/total debt	Altman's discriminant function	Deakin's Discriminant function
1	13	5	3.0
2	21	28	4.5
3	23	52	4.0
4	24	71	21.0
5	22	64	17.0

Sources: Beaver (1966), Altman (1968) Deakin (1972)

1. Based on original samples.

Most of the bankruptcy prediction models have concentrated on medium to large-sized companies. Edmister (1972) attempted to apply a technique similar to Altman's to small business. He pointed out that when many closely correlated variables are included, the resulting function is likely to be biased toward the sample from which it was developed. Thus, its reliability would be limited to samples similar to the sample that determined the function. The sample firms employed by Edmister were borrowers and guarantee recipients from the U.S. Small Business Administrations (SBA), for the period 1954 to 1969. Loss borrowers were designated as failures and non-loss borrowers were considered to be non-failures. Under the stipulation that three consecutive annual financial statements be available from the period prior to the date when the loan was granted, his sample of loss borrowers consisted of 42 firms.

Edmister analyzed 19 financial ratios, including most of those found to be important in previous failure prediction studies such as Beaver (1966) and Altman (1968). In order to mitigate the problem of multicollinearity, he used a stepwise inclusion of discriminating variables. A variable was excluded if its correlation with another variable was greater than 0.31. This approach led to the reduction of the 19 ratios to seven.

Edmister claimed that the seven-variable function correctly discriminated in 39 out of 42 cases (93%) when the decision rule was to predict failure if Z < .520 and non-failure if Z > .520.

Edmister's study does not stand clear from criticism for the following reasons. First, his sample frame was drawn from the population of SBA loan applicants. Although aversion to the risk of either Type I or Type II error[1] may vary among lenders, the U.S. SBA seems disposed to accept greater Type I risk than is acceptable to some conventional private lenders. Such a disposition is suggested by the following statement:

> "By law, the Agency may not make a loan if a business can obtain funds from a bank or other private source. One, therefore, must first seek private financing before applying to SBA".[2]

1. Type I Error is lending to borrowers who will default and Type II refusing to lend to borrowers who would repay.

2. U.S. Small Business Administration, SBA Business Loans (Washington, D.C.) Office of Public Information, Oct. 1969, p.1.

The SBA may lend only to applicants who are presumably judged by other lenders to be too risky. The 'last resort' lending activities of the SBA could imply that the financial statements of these applicants may have already indicated "financial distress". In other words, Edmister's model derivation and its subsequent validation was developed from an already 'biased' population.

A second, perhaps more fundamental, weakness of the study is what Joy and Tollefson (1975) referred to as inconsistency of the purpose of the study and characteristics of the analysis. Joy and Tollefson maintain that for the 'rule of multiple discriminant analysis to hold, the sampling frame should be conceptually identical to the populations toward which the research question is directed'. If, for example, the intended use of the MDA model is to discriminate between good and bad loan applicants (as in the case of Edmister), the samples should be drawn from a sample of loan applicants. It is perhaps erroneous to draw the test sample from a population of good and bad loan acceptances where applicants that were denied loans have been excluded. The Edminster study illustrates an inconsistency between purpose and analysis. His intent was to assess the usefulness of financial ratio analysis in predicting failure of small business. However, his

data, collected from SBA loan records, were from only those that were granted loans. His sample design might lead one to conclude that his conclusions related to firms that were granted loans.

Finally, Edmister concluded that the 3-year average of a ratio is a predictor of small business failure. He argued inter alia, "averaging is expected to smooth the ratios and to result in a more representative figure than that calculated from only the most recent statement"...p 1481. It is quite understandable to argue that a year's financial statement may not be sufficient for a "trend" to emerge, but it can also be argued that averaging may obscure the benefits of trend. If, for example, a company has the following ratios (Net Profit/Sales) in the years prior to failure 3.0%, 4.5%, 6.0%, for year one, two and three respectively. It is easy to see that the ratios are falling. However, if the average of the 3-years is taken (as Edmister did), the "representative figure" will be 4.5%. The representative figure improves the ratios and hides to some extent the nature of the trend to the analyst.

Despite the shortcomings of Edmister's study, his work is significant in that he related ratio analysis to the prediction of small business failure, an area previous researchers had avoided.

The development of bankruptcy prediction models is not confined to the United States of America. Taffler (1982) developed such a model, using United Kingdom data This model has received the most exposure and testing to date in the U.K. He selected a sample of failed firms consisting of 46 manufacturing firms quoted on the London Stock Exchange failing in the 8-year period to the end of 1976 which met 'certain criteria to ensure reliable source data'. Bankruptcy was defined as one of the following (a) appointment of a receiver; (b) entry into creditor's voluntary liquidation; (c) winding up by Order of the Court or (d) clear action on the part of the government. Taffler used principal component analysis (PCA) to help avoid multicollinearity problems and a stepwise linear discriminant analysis produced a model consisting of the following four variables:

$$Z = X_1 + X_2 + X_3 + X_4$$

where X_1 = profit before taxes/current liabilities (53%)
X_2 = current assets/total liabilities (13%)
X_3 = current liabilities/total assets (18%)
X_4 = no-credit interval (16%).

(The percentage figures are the relative contribution of individual variables to the discriminant function).

Taffler reported that out of the 92 companies from which the Z-function was derived, only two firms were apparently misclassified by the cut-off of -1.95. One of the misclassified firms was Rolls Royce, which Taffler argued convincingly was not a true misclassification. He stated "in the case of Rolls Royce, it is doubtful whether it was actually insolvent at the date of appointment of the receiver,.. since all creditors and debenture holders were subsequently repaid in full and the distribution to ordinary shareholders amounted to three and a half times the share price when finally suspended" (p.299).

Taffler's study appears to follow the 'usual' bankruptcy prediction models frequently produced in the U.S.A. However, it differs in many respects. The most important difference relates to the matching procedures. Most U.S.A. studies have taken a random sample of nonfailed companies to match with the failed companies according to accounting year end. Taffler recognized explicitly that a company still in business is not necessarily financially sound and that many companies presently in existence resemble previous failed companies in terms of their financial profile. Consequently, selection on a matched stratified random basis reduces the discriminatory power of the computed models and increases particularly their Type II errors (misclassification of a non-bankrupt as a bankrupt). Taffler concludes "the group

of continuing exterprises should consist of financially sound,.. and consequently distinct companies for correct application of the methods"..p343.

Taffler also pointed out that matching according to industries is incorrect, "particularly as some industries are more failure-prone than others". On the matching according to financial year, Taffler argued that the data for the non-failed firms should be drawn from their most recent financial statements as the derived function is to be applied prospectively.

A spin-off from Taffler's model is the construction of Performance Analysis Score (PAS). Taffler pointed out that the "Z-score" of a firm lies above or below a cut-off point and thus identifies a firm as resembling more closely previous failures or non-failed companies. In this regard, the Z-score has no range limits, so no ratio scale applies, "thus, a Z-score of 2.0 can only be viewed as better than a value of 1.0, not that it is twice as good". To provide an avenue of measuring the relative strength or weakness of a firm, Taffler developed the PAS. A company's PAS in a particular year is arrived at by ranking the Z-scores of all companies for that year in ascending order and observing the percentile in which the Z-score of the company lies. Taffler invoked Shashua and

Goldschmidt (1974)[1] to illustrate that the PAS-score explicitly meets all the criteria necessary to constitute an efficient and operational measure of relative economic performance. (The PAS-score is used in the present study to analyse the performance of acquiring companies - see Chapter 9).

Taffler's studies highlight some salient issues in the development of bankruptcy models which apparently have gone unnoticed over the years and make a useful contribution in the development of the performance analysis score.

1. Shashua and Goldschmidt (1974) specify the following criteria for an efficient performance index:

(a) it can be readily interpreted;
(b) each of its constituent elements is consistent;
(c) each is independent and non-tautological;
(d) each is monotonic and has the same partial correlation with the performance index;
(d) the index has fixed scale limits, and
(f) it has a linear relationship with company utility.

5.6. Summary of the Section:

The foregoing studies illustrate efforts made to develop a predictive model based on financial ratios. The next stage in the information process is the ability of information processors to use the model. Or to put it in another way, whether information processors thought the empirical studies were in the right direction. This aspect of information processing is discussed in the next section.

5.7. Predictive Ability as a Criterion of Usefulness:

Predictive ability as a criterion of usefulness is based on a simple assumption that in order to make a decision, one has to at least implicitly make a prediction. It has been contended that a more comprehensive test of the usefulness of financial or accounting information would be the prediction achievement criterion (Libby (1974),(1975)) rather than mere prediction ability as established by the studies reviewed. However, according to the prediction achievement criterion, the usefulness of accounting information, or any format thereof (e.g. ratios), is a function of not only the predictive ability of the information per se (i.e. the ability of the information to

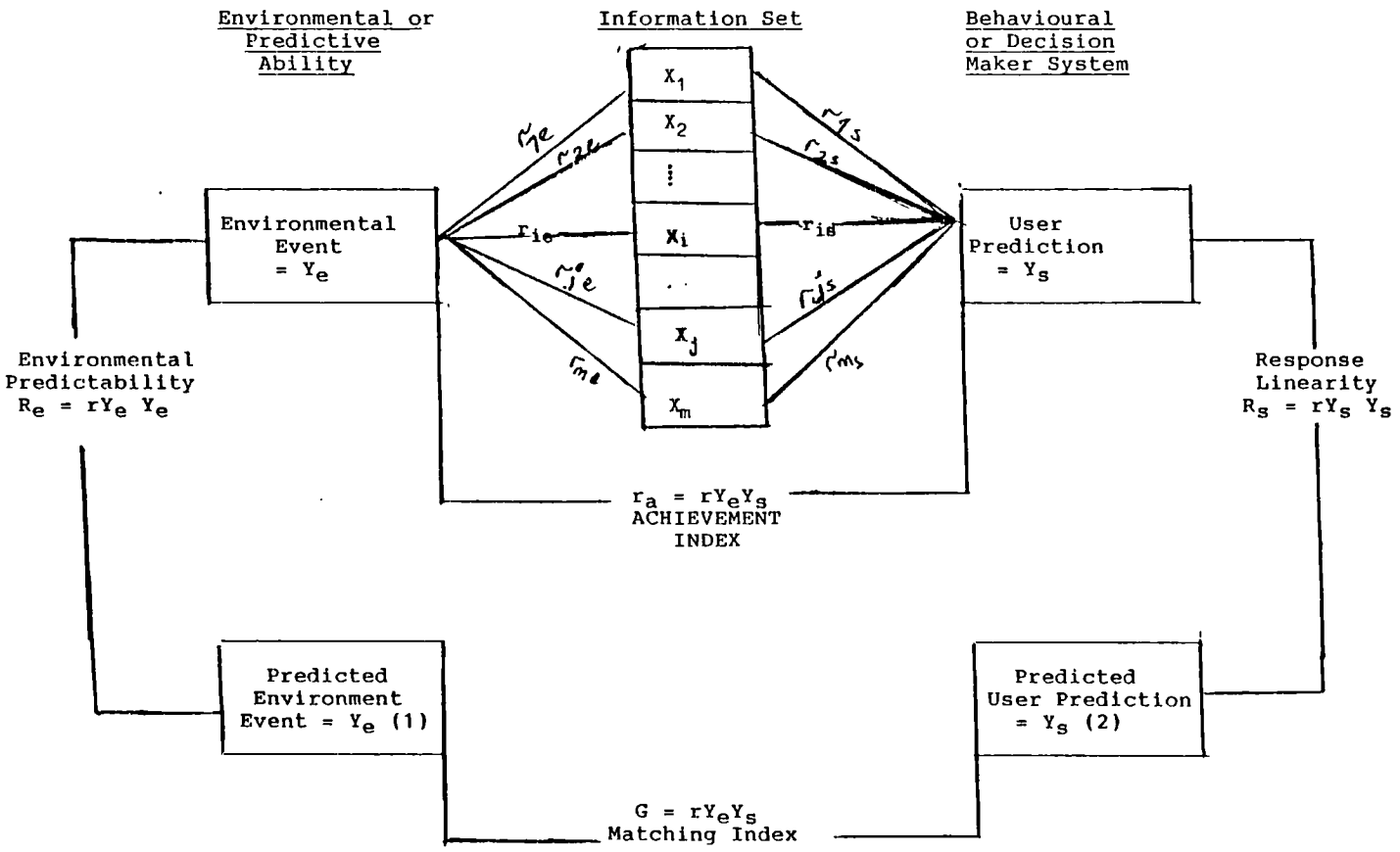
predict the relevant event, given its correct usage), but also of the ability of the users to interpret and correctly use the data. The criterion is based on the Brunswick Lens Model (Brunswick (1952)). The lens framework is a general descriptive information processing model which attempts to model the examination of judgmental situations where men make decisions or predictions based on a set of explicit cues or pieces of information from the environment which are probabilistically related to a relevant environmental event (see Figure 5.1).

Figure 5.1 depicts a version of the Lens model as per Dudyacha and Naylor (1956) and correlation statistics are used to outline the elements of the model (although any other appropriately similar measure may suffice).

The predictive ability system describes the relationship between the information set ($\underline{X}$) (e.g. ratios), and a relevant environmental event (Y_e) (e.g. failure or non-failure). The correlation coefficient r_{ie} called the ecological validity of the cue, indicates the relationship between each individual piece of information or cue (X_i) and the environmental event to be predicted. The multivariate linear relationship between that environmental event and

FIG. 5.1

REGRESSION FORMULATION OF THE LENS MODEL



(1) $Y_e = b_{1e}X_1 + b_{2e}X_2 + \ldots\ldots b_{ie}X_i + \ldots . b_{ke}X_k$

(2) $Y_s = b_{1s}X_1 + b_{2s}X_2 + \ldots\ldots b_{is}X_i + \ldots . b_{ks}X_k$

the whole set of information is what is labelled environmental predictability (R_e). On the other side of the model, the correlation coefficient (r_{is}) known as the utilization coefficient defines the relationship between an information cue (X_i) and the decision maker's prediction (Y_s); and the multivariate equivalent relating all cues to the decision maker's prediction is called the response linearity (R_s). The prediction achievement index ($r_a=rY_eY_s$) measures the prediction accuracy by the decision maker himself; and this is what is deemed to be the relevant index of the usefulness of information.

The Brunswick Lens Model highlights the relationship between predictive ability of the information and the information utilization because high prediction achievement demands both high predictive ability and the correct utilization of the information.

Altman and McGough (1974) compared the predictions of auditors in the form of going-concern qualifications to the predictions of a multiple discriminant model. They found that the model predicted almost twice as many failures as the auditors. The interpretation of the results is debatable. For the auditor to make a going-concern qualification, he must have predicted failure. However, an auditor might have believed that a firm was going to fail and yet not disclosed this through

a disclaimer or qualified opinion. The disclosure is a function of both the prediction of failure and the utility function of the auditor regarding the disclosure of the results of that prediction. The auditor might have believed that the firm had some chance of recovery and that a going-concern qualification would have induced the demise of the firm. The auditor might have felt that to avoid this was preferable to making full disclosure of his belief regarding the firm's future. This might explain why the auditors in Altman and McGough's study failed to do as well as the model. The study was important, despite this problem, for showing that according to the prediction model, more bankruptcies should have been disclosed by auditors through a going-concern qualification. It also suggests the potential usefulness of the models for auditors in deciding whether or not to issue a going-concern qualification.

In a recent study using U.K. companies, Taffler and Tseung (1984) studied the extent of the going-concern qualification among quoted companies over a seven-year period. They examined specifically the proportion of companies failing without having such qualifications in their audit reports compared to those which did have such qualifications. They found the ratio to be 3 to 1, and they asserted that in most of the latter cases, the qualification could be described as obvious. They also

found that only 43% cases of companies failing within six months of publication of their accounts were qualified and that twice as many companies at serious risk of bankruptcy, as measured by derivatives of the Z-score approach, were not qualified as were qualified.

They recommended the use of a reliable Z-score and associated statisitical techniques to aid auditors in their assessment of 'qualification' risks. They also argued that such techniques could provide the auditor with an unbiased measurement tool to help alert management to problems in its business and also "strengthen the auditor's hand when discussing a possible qualification or related audit matters with client management" (p.269).

As with the Altman and McGough study, it is debatable whether these results indicate auditors' inability to use the Z-score model or merely an unwillingness, though the latter seems the more likely.

Libby (1975) adopted the lens model paradigm to determine whether accounting ratios provide useful information to loan officers in the prediction of business failure. In particular, he examined the accuracy, consistency (over time), and consensus of loan officers' predictions of business failure made on the basis of accounting ratios and the ability of a linear model to predict these judgments.

In the study "43 experienced loan officers" made business failure predictions for 70 real firms, on the basis of five-ratio financial profiles. Half of these firms had prevously failed within 3 years of the financial statement date. The lens model statistics were measured by the percentage of correct predictions. Libby found that the bankers' predictions were quite accurate. Their achievement (r_a) ranged from 45% to 83% correct and averaged 74% correct. Environmental predictability (R_e) which sets an upper limit for achievement, was 85% as determined by a linear discriminant analysis model. Based on this result, Libby concluded that "traditional confidence in ratio analysis for credit rating seems justified" (1975 p.156).

Casey (1980) in a replication of Libby's study asked 48 loan officers to evaluate financial ratio profiles representing 30 firms, half of which had failed within three to five years of the financial statement date. The cases were represented only by six accounting ratios. The environmental predictability of the cue set (based on the original sample) was 80%, 83.3% and 73.3% for the third to fifth year before failure respectively. The individual's accuracy averaged 56.7% which was not very high compared with chance.

In a similar study, Zimmer (1980) asked Australian bankers to predict failure for Australian firms. The major difference between Zimmer's study and Casey's was that the former told his subjects in advance that half of the firms had failed. Forty loan officers evaluated 42 firms, one-half of which had failed within three years of the financial statement date. The individual's accuracy averaged 72%. Table 5.4 summaries the findings of the three studies.

Table 5.4.

MAN VERSUS MODEL
RESULTS OF BANKRUPTCY PREDICTION

Attributes	Study by		
	Libby[1]	Casey[2]	Zimmer[3]
Individual's Accuracy	% 74	% 56.7	% 77
Consensus	80	80.0	72
Discriminant Model	88	(not reported)	90

Notes: 1. Libby, Robert, (1975) (pp 150-61)
2. Casey C.J., (Jr.) (1980) (pp 603-613)
3. Zimmer, I. (1980) pp. 629-36

The major limitation of these studies relates to the generalizability of the results with respect to (a) subjects (b) the real world situation. Participants in the studies were not randomly selected and the lending policy of a particular bank might affect the individual loan officer's perception of financial information. In the actual lending decision, loan officers have an abundance of multi-period quantitative and qualitative information available to them.

Notwithstanding the limitations of these studies, the attempt to test the usefulness of only a small segment of the available quantitative information in single-period form is a step in the right direction. The information set used in the studies was chosen because of the apparent theoretical and empirical support concerning the relationship between single period financial ratios and business failures. The accuracy of the individuals prediction also illustrates that the usefulness of accounting information is a function of the predictive ability of the information and the ability of users to interpret the data.

In the previous two sections, the bankruptcy prediction model and predictive ability as a criterion of usefulness have been discussed. In the next section, a discussion of circumstances under which a firm would be forced into bankruptcy is made.

5.8 Bankruptcy Condition:

Bulow and Shoven (1978) developed a model to investigate the circumstances under which a firm would be forced into bankruptcy. Their model focussed on the conflicts of interest among the various claimants to the assets and income of the firm. They derived conditions under which the necessary funds for continuation would not be forthcoming and illustrated the importance of liquidity and debt maturity structure in warding off bankruptcy. They found the conditions for bankrutpcy more complex than previously believed.

Their model included three separate groups of claimants on the assets and income of the firm: bondholders, bank lenders and equity holders. They assumed that bondholders have a fixed time pattern of claims on the firms should it remain in business and cannot negotiate to alter the terms of their loan if bankruptcy should become probable. Bank lenders, on the other hand, were assumed to have the ability to negotiate with equity holders to alter the terms of their loans. Bulow and Shoven assumed that as residual claimants, the equity holders would always try to avoid bankruptcy. Equity holders were assumed to be willing to give up part, or all, of their claim to convince bank lenders to keep the firm in business. This would make continuance more valuable than bankruptcy for the banklender.

The following algebric expression represents Bulow and Shoven's condition for bankruptcy:

$$E_c < B_b - B_c$$

where E_c = present value of the equity holders' claim with continuance:

B_b = value of the (large loan) bank's claim under immediate bankruptcy; and

B_c = present expected value of the claim of the (large loan) bank if the firm is allowed to continue one more period with the additional loans granted at the same interest rate.

Thus, a firm will go bankrupt if the banks' bankruptcy claim is greater than or equal to its continuation claim, even after the equity holders have forfeited their entire claim to the bank.

In order to further explore the conditions of bankruptcy, Bulow and Shoven replaced Equation (1) with a more specific two-period framework. Their expanded model

can be expressed as follows:

NEGATIVE NET WORTH CONDITION

$$C + P < (1 + r_B)B + r_1 + D_1 + \frac{D_2(1 + r_D)}{1 + i} \quad ...(2)$$

$$C + L < (1 + r_B)B_1 + r_1 + D_1 + D_2 \quad (3)$$

ILLIQUIDITY CONDITION

$$C < (1 + r_B)B_1 + r_1 + D_1 \quad .....(4)$$

where: C = cash or liquid assets of the firm;
P = present expected value of future earnings of the plant;

L = liquidation value of the plant;

r_B = the bank's first period interest rate of loans to the firm;

B_1 = the principal outstanding to the bank at the beginning of period one:

r_1 = the bond interest due in period one;

D_1 = the bond principal due in period one
D_2 = the bond principal due in period two
r_D = the interest rate paid on the bonds maturing in period two; and

i = the bank's discount rate.

Bulow and Shoven used the extended model to illustrate the following results:

1. A firm may stay in business with a negative net worth and a cash shortage.

2. A firm may be liquidated even if the going concern value (C+P) exceeds the liquidation value (C+L).

3. A firm may be allowed to continue, even if its liquidation value exceeds its going concern value.

4. Given two firms with identical bankruptcy costs, identical variance in their returns from staying in business, identical liabilities, and assets of equal value, it is possible that the one with the most cash will be allowed to remain in business while the other will be forced into bankruptcy.

By expanding their model to include taxes and mergers, Bulow and Shoven illustrate the following:

1. A tax which treats gains and losses differently increase the attractiveness of merger or bankruptcy. This is only true for firms which might experience losses sufficiently large that their taxes would be negative with a symmetric tax system.

2. Even a symmetric tax system can make bankruptcy more attractive by reducing the variance in the income of the firm.

Bulow and Shoven concluded that bankruptcy depends on several variables in addition to the firm's net worth and the cost of bankruptcy. The maturity structure, priority

structure, and the ownership of the firm's debt must also be considered. The decision is also affected by the composition of the firm's asset portfolio and the variability of potential returns to that portfolio. Generally, a longer-term debt structure, a more liquid asset portfolio, and a more variable return decreased the probability of a firm being forced into bankruptcy.

Bulow and Shoven's findings confirmed and explained many of the empirical results, (Beaver (1966), Altman (1968), Taffler (1982) and others). By showing that a combination of factors must be present for bankruptcy to occur, they explained why the multivariate models out-performed the univariate models. The findings also explained why a company can maintain a "failing" Z-score over many years without being declared bankrupt and conversely why a company with a "high" Z-score may be declared bankrupt. Since the bankruptcy process, as analyzed by Bulow and Shoven, was so complex, this helps to explain the large error rates which were found by others in the prediction studies. Their results also show that the empiricists were looking at the right factors in designing their experiments: debt structure, liquidity and cash flows. The possibility that further knowledge of the bankruptcy process may be gained by additional work on Bulow and Shoven's model must be recognized.

5.9 Summary:

The present chapter has described and evaluated only a few of the many ratio analysis studies that have been conducted. Some of the studies were chosen for discussion because they made a significant contribution to the development of ratio analysis. Others were chosen because they presented opportunities to observe and discuss some of the many difficulties encountered by researchers in the field of ratio analysis. Still others were selected because they illustrated the general trend of progress in the field.

In the studies reviewed, the dominant statistical method for analysis has been the multivariate discriminant analysis (MDA). The growing interest in MDA and the proliferation of MDA studies appear to have won recognition in many financial analysis textbooks (Lev (1974), Foster (1978), Van Horne (1980) for the significance of the method of analyzing financial information. The recognition of MDA of financial ratios by textbook authors and researchers all over the free-economy world, is evidence of a growing awareness of the need for more effective tools for evaluating a company's financial condition in a complex and rapidly changing business, financial and economic environment.

The following chapters discuss multivariate discriminant analysis and its use in analyzing financial ratios of a sample of failed and non-failed companies, and the susbsequent application of the derived model to a group of acquired and non-acquired companies to determine their financial profile prior to acquisition.

CHAPTER 6

METHODOLOGY AND HYPOTHESIS

6.1. Introduction:

In the previous chapter, a review of the literature on the development and use of financial ratios as variables for model building was made. The main objectives of the study set out in Chapter One were to:

(1) determine whether acquired firms were in danger of failing prior to acquisition:

(2) determine whether acquiring firms were in danger of failing prior to acquisition:

(3) determine the impact of acquisition on acquiring companies; and particularly to consider whether their performance differs according to whether or not the companies they acquired appeared to be in danger of failing.

This chapter expands on this broad outline by explaining in detail for each of these main objectives; the research hypotheses within the objective, the strategies to be used for testing the hypotheses and the detailed methodology for each strategy.

6.2 DERIVING A RATIO MODEL TO IDENTIFY FAILING COMPANIES: THE FAILING COMPANY HYPOTHESIS:

6.2.1. Acquired and Non-Acquired Companies:

The bankruptcy prediction model provides a benchmark to measure whether or not a company possessed financial characteristics similar to previous failed companies. The model is useful in testing the proportion of firms possessing failing characteristics in two groups of unclassified companies. This is the approach formulated to test the following null hypothesis:

H_o: There is no significant difference between the proportion of firms possessing failing characteristics in the sets of acquired and non-acquired firms:

The alternative hypothesis is:

H_1: There is a larger proportion of firms possessing failing characteristics in the set of acquired firms.

Rejection of the null hypothesis will be interpreted as supporting the hypothesis that more acquired firms were on their way to failure, in other words, supporting bankruptcy cost avoidance as one of the more important rationales for merger activities.

6.2.2. Acquiring and Non-acquiring Companies:

It has been evidenced (Weston and Mansinghka,(1971)) that some companies acquire 'defensively' to avoid impending bankruptcy. To seek support for the evidence, a similar approach adopted in testing the failing company hypothesis for the acquired companies was adopted for the acquiring companies. This led to the formulation of the following null hypothesis:

H_o: There is no significant difference between the proportion of firms possessing failing characteristics in the sets of acquiring and non-acquiring firms:

The alternative hypothesis is:

H_1: There is a larger proportion of firms possessing failing characteristics in the set of acquiring firms.

It is important to note that the test of the bankruptcy cost avoidance merger motive depends not on the absolute magnitude of the frequency at which acquired or acquiring firms might have failed, but upon whether this frequency is larger or smaller than that observed in non-acquired or non-acquiring firms (Stevens and Shrieves, (1979)).

6.2.3 RESEARCH STRATEGY:

The following steps are required to test the failing company hypothesis:

(1) To select or formulate financial ratios which may be related to the ability of firms to survive and to derive the values of these ratios from the financial statements of a sample of companies drawn from a population of failed and non-failed companies.

(2) To choose 'appropriate' ratios and develop a mathematical model that classifies companies in the sample so that disagreement of the results, when compared to the known outcomes, is minimized and

(3) To validate the model by

   (a) classification of an independent holdout sample of both failed and non-failed companies, and

   (b) using the Lachenbruch (1967) jackknife technique.

(4) To apply the model developed in (2) above to a sample of companies involved in merger activity in testing the failing company hypothesis for both acquired and acquiring companies.

6.3 BANKRUPTCY PREDICTION MODEL - METHODOLOGY AND DISCUSSION:

6.3.1 Choice of Financial Variables:

Several studies have employed financial ratios as variables in their analyses. The authors of these studies have argued that their chosen ratios were useful. However, because ratio analysis lacks a precise theory, the recurring question has been the determination of an appropriate set of ratios to be analyzed to obtain the required information. Hundreds of ratios can be computed from a given set of financial statements and many have been reported in the literature as being useful. Naturally, different researchers have included different ratios and discrimination is therefore needed to identify a limited set of financial ratios.

Given such a heterogeneous set of useful financial ratios, the decision maker might encounter some problems in selecting ratios for the task in hand. It is not conceivable that all ratios are significant and equally important in a multi-ratio model. Ideally, the financial ratios to be computed should be selected on some theoretical basis, coupled with demonstrated empirical evidence of their usefulness. However, an acceptable theoretical foundation for the selection of ratios for

decision-making is yet to be found. Similarly, the scattered empirical evidence in published studies does not identify a complete set of useful ratios. Despite the problems of selecting useful ratios, one may argue that certain ratios are capable of measuring certain dimensions of a company's financial structure.

6.3.2. Sample of Financial Ratios:

Twenty-two financial ratios were selected for the group of failed and non-failed companies in order to provide appropriate ratios for selection in the derivation of the model (see Table 6.1). The selection of these ratios was based on their apparent usefulness in previous studies.

Previous research studies have shown that multicollinearity between ratios can lead to sample specific results and steps had to be taken to reduce this problem. A brief discussion of the relevant research and the resulting techniques is presented in the following section.

Table 6.1

FINANCIAL RATIOS USED FOR ANALYSES AND IN PREVIOUS STUDIES

Ratio Term	STUDY BY: 1966 Tamari	1966 Beaver	1968 Altman	1972 Deakin	1972 Edmister	1974 Blum	1975 Libby	1975 Elam	1977 Altman et al	1977 Moyer	1979 Norton & Smith	1980 Ohlson	1982 Taffler	1983 Mensah	1984 Lincoln	TOTAL	Meaning
1. EBIT/TA			X						X	X						3	earnings before interest and taxes/total assets
2. CA/TA				X		X	X				X				X	5	current assets/total assets
3. TL/TA		X		X	X		X	X			X	X		X	X	8	total liabilities/total assets
4. CA/CL	X	X				X	X	X	X					X		7	current assets/current liabilities
5. Cash/Sales				X		X					X			X		3	cash/sales
6. CA/Sales						X	X									2	current assets/sales
7. EBIT/CL													X			1	earnings before interests and taxes/current liabilities
8. QA/TA				X					X		X					2	Quick Assets/Total Assets
9. RE/TA			X							X					X	4	Retained Earnings/Total Assets
10 QA/CL				X	X			X								3	Quick Assets/Current Liabilities
11 Cash/TA				X												1	Cash/Total Assets
12 Stock/Sales	X			X	X									X		4	Stock/Sales
13 EBIT/Sales								X	X							1	Earnings before interests and Taxes/Sales
14 WC/TA		X	X											X		3	Working Capital/Total Assets
15 LTD/CA								X	X							1	Long term debt/current assets
16 Cash/CL				X			X		X							3	Cash/Current liabilities
17 NCI		X									X		X			3	No Credit interval
18 QA/S				X		X								X		3	Quick Assets/Sales
19. Sales/TA			X					X	X		X			X		4	Sales/Total Assets
20 CL/Total Assets								X	X				X	X		3	Current Liabilities/total assets
21 WC/Sales	X			X	X									X		4	working capital/sales
22 CA/TL													X			1	Current Assets/total liabilities

6.3.4. Multicollinearity:

Horrigan (1968) noted that collinearity is a problem with the use of financial ratios. Stevens (1973) also noted that multicollinearity is a problem coincident with the use of multiple discriminant analysis (MDA) with ratios and with most empirical studies in finance. The phenomenon occurs because several financial ratios might be measuring the same dimension of a company's performance as a result of sharing common factors. An assumption of most statistical techniques derived from the general linear model is that the independent variables are mutually uncorrelated.

Morrison (1969) pointed out that moderate departures from the assumption that the independent variables are uncorrelated do not significantly impair the results. However, he conceded that when the variables are highly collinear, the weights in the resulting model are highly unstable, and the model tends to be highly sample sensitive, and interpretation becomes very difficult. The multicollinearity problem was evident in the bankruptcy study by Altman (1968). He noted the high multicollinearity in the ratio set from which he derived a discriminant model. He emphasized the need to choose the variables for the model carefully, and his selection was achieved through a large number of trial computer runs.

The current study used MDA, and at the same time employed a fair number of ratio data. It was expected that multicollinearity could be a problem. In order to reduce the problem, the technique of factor analysis was adopted. This approach has been adopted by previous researchers (Piches and Mingo (1973); Stevens (1973), Libby (1975) and Taffler (1982)).

6.3.5 Factor Analysis:

Factor analysis is based on the proposition that there is a systematic interdependence among a set of observed variables which must be due to something more fundamental (latent) which creates this commonality. The variables are therefore considered as simply indicators of this fundamental factor. The questions likely to be asked are: what is this factor?, can it be extracted from the observed data and their relationship established? and how can it be extracted?. Is the factor unidimensional or multidimensional? For example, can a company's liquidity, profitability and level of activity be considered as indicators of financial viability. Conversely, factor analysis may also be used as a data-reduction technique which summarizes the commonality of all the manifest variables into a few factors. Factor analysis can therefore be used as a descriptive and/or data reduction technique.

One of the goals of factor analysis is to construct a small number of variables (called Factors) that can convey the information present in a large number of variables. For example, a 22-ratio set might be designed to secure information on a company's liquidity, profitability and activity in general. Factor analysis assumes that the variables are correlated with each other. If the correlations between variables are small, it is unlikely that they share common factors. The null hypothesis that the correlation matrix is an identity can be tested. (This test is done in Chapter 7, Section 7.2).

In the example involving a 22-ratio set, each of the 22-ratio set would define a separate variable. Each company in the sample would have 22-ratios, and each of these ratios would vary across the sample of companies. A factor analysis of the financial dimension of the sampled companies would begin by calculating the correlation coefficient between every pair of ratios. Two variables have a correlation of zero if scores on one have no relationship to scores on the other. If two ratios on the company scale had a correlation of zero, it would mean that companies' financial dimension to one of the ratios would not be linearly related to the other.

Conversely, a pair of ratios on the scale might have had a correlation of 1.0. The new pair of ratios would

apparently be measuring the same kind of dimension, since higher scale to one of the ratios would always correspond to higher scale to the other ratio. A single variable would convey as much information about the companies' financial dimension as the two original variables. That single variable is called a 'factor'. Its meaning would be determined by the content of the pair of ratios it represented.

6.3.6. Derivation of Factors:

Principal component analysis (PCA) is a procedure for deriving factors from sets of variables. Its basic objective is to determine factors that can convey the essential information in a larger set of variables. PCA assumes that each of the original variables can be divided into two parts, an error component that reflects the less-than-perfect reliability of all companies dimension, and a true-score component that is common to all of the variables being factor analyzed.

After the correlations between every pair of

variables have been computed, PCA determines a set of factors called an 'Initial Solution' or an unrotated solution. This is done be selecting a factor that has the largest EIGENVALUE[1]. In an unrotated solution, an initial factor that represents best all the variables is determined first. Then a second factor that next represents all the variables is found. The second factor is required to be uncorrelated with the first. Next, a third factor that is uncorrelated with the first two factors is found. This factor must also represent best the information in all the variables, subject to the requirement that it cannot be correlated with the first and second factors. PCA proceeds in this way, until the number of factors determined is equal to the number of variables being factor analyzed. (The analysis is made in Chapter 7, Section 7.3).

1. It indicates how much of the variation in the entire set of original variables is 'accounted for' by each factor.

6.3.7. The Rotation Phase:

The factor matrix obtained in the extraction phase indicates the relationship between the factors and the individual variables. However, it is usually difficult to identify meaningful factors based on this matrix. Often the variables and factors do not appear correlated in any interpretable pattern. Most factors are correlated with many variables. Since one of the goals of factor analysis is to identify factors that are susbstantively meaningful (in the sense that they summarise sets of closely related variables), the rotation phase of factor analysis attempts to transform the initial matrix into one that is easier to interpret. Ideally, after rotation, each group of variables will have high correlations with one of the rotated factors, and low correlations with all of the others. This is the sense in which it is claimed that a factor 'represents' a group of variables, (Rummel, (1970)).

6.3.8. Selecting a Variable to Represent a Factor:

A variable (ratio) is selected to represent a factor because each group of variables will have high correlations with one of the rotated factors, and low correlations with all of the others. By such a procedure, the number of variables selected is reduced from the original variables. The question of which variable should

represent a factor has yet to be resolved. The popular procedure has been to select a variable with a 'high' loading . Stevens (1973) and Chen and Shimerda (1981) argued that the selection of a variable with the 'highest' absolute factor loading makes the selection sensitive to the sample. They further stated that such a procedure may be satisfactory for data reduction purposes, but may not be satisfactory for model building or theory construction.

The appealing procedure is therefore to select a variable with a 'high' loading to represent a factor. However, the selection of the 'best' variable for a factor is not independent of the variables selected for other factors. This is because each variable contains common as well as unique information. The common information is shared by any other variables in the factor while the unique information is not shared by other variables. Intuitively, the selection of variables should be made in a manner which seeks to capture most of the common information contained in their factors, as a group and at the same time more of the unique information than any other set of variables. A combination of both procedures was adopted in the present study (in other words, in some cases, the variable with the 'highest' loading was selected and in others a variable with a 'high' loading).

6.3.9. Drawback of Factor Analysis:

There are several reasons for the increasing popularity of factor analysis among researchers. Factor analysis appears to be an objective way to reduce the available data to a more manageable level. It is also effective in reducing the problems of multicollinearity and redundancy often associated with the use of large numbers of financial ratios. Moreover, in the absence of a well-established theory to guide the selection of variables in the context of a specific decision or event, factor analysis can be an expedient means of choosing variables.

In spite of these advantages, several problems exist in the use of factor analysis. There is no absolute guarantee that variables so selected necessarily represent all relevant dimensions of the subject area under study. Neither will all dimensions be equally represented (Chen and Lew, (1984)). For example, when initial variables are selected by examining the literature, with additions and deletions made on the basis of the researcher's judgment, an important dimension will be included only if it is already in the literature or if the researcher is aware of it.

Factor analysis like other research tools has limitations. However, the overriding requirement in its usage is for the researcher to bear its limitations in mind when interpretating the results of its use.

In Chapter 7, an application of factor analysis to the actual research data of the present study is made. However, a description of discriminant analysis procedure follows in the next section.

6.3.10 Multiple Discriminant Analysis Phase (MDA):

In the previous section, it was stated that the purpose of factor analysis was to reduce multicollinearity. This approach leads to the reduction of the data set. The reduced data set becomes an input into the MDA phase that generates a linear function capable of separating failed and non-failed companies.

Multiple discriminant analysis is a statistical procedure that classifies subjects into one of two or more a priori classes based on an analysis of selected characteristics believed to be related to class membership.

6.3.11 Class Membership:

The first step in MDA is to define the classes into which subjects are to be classified; for the purpose of the present study, failed and non-failed companies. The classes should be mutually exclusive and collectively exhaustive. The two classes in this study are exhaustive and mutually exclusive subsets of business outcome.

6.3.12 Variable Selection:

The second step in the procedure is to identify variables which may be correlated with a particular outcome class, for example, business failure outcome. The variables identified for analysis in the present study consist of a number of financial ratios, the reduced set resulting from the factor analysis.

6.3.13 Basis for Selecting MDA as Method of Analysis:

The variables of MDA are equivalent to the 'independent' variables of regression analysis, and the outcome class variable of MDA is similar to the 'dependent' variables of regression analysis. MDA was first used by Fisher (1936) to classify plants into one or another of three groups. Fisher also showed that, when

outcome classes can be defined dichotomously, the mathematics of regression analysis and MDA is essentially the same. The choice between the two methods depends upon the objective of the analysis. If the dependent variable is to be expressed quantitatively (metric) then regression analysis is the appropriate method. Conversely, when the dependent or outcome variable is expressed qualitatively (non-metric), for example, yes or no, failed or non-failed, acquired or non-acquired, then MDA is appropriate.

The MDA sets each observation into the class the observation resembles most closely. Resemblance is measured by comparing the profile of an observation to the mean profile of known members of each of the outcome classes. The profile reflects the values of the indicator variables being used.

Table 6.2 is a reproduction of Lubin's (1950) criteria for choosing among various statistical techniques for analysis.

Table 6.2

Lubin's Methods of Solution for Various Statistical Problems

	Dependent Variate	Independent Variate	Method of Solution
1.	Quantitative	Quantitative	Multiple Regression
2.	Quantitative	Qualitative	Analysis of Variance
3.	Qualitative	Quantitative	Discriminant Function
4.	Qualitative	Qualitative	?

Source: Lubin, A.(1950) "Linear and Non-Linear Discriminating Function": British Journal of Psychology, No.3 Part II Statistical Section (June), pp 90-104.

The criteria for using MDA are met in the present study. The two possible values of the outcome variable can be described qualitatively, and the indicator variables are readily measurable in quantitative terms. In the next section, the classification procedure of discriminant analysis is outlined.

6.3.14 Linear Classification Procedure:

The objectives of a discriminant analysis have been explained, the notations and classification procedures are summarized below:

Let each individual's discriminant score Z_i be a linear function of the independent variables. That is:

$$Z_i = b_o + b_1X_{1i} + b_2X_{2i} + \ldots b_nX_{ni}$$

The classification procedure follows:

If Z_i > Z crit: classify individual i as belonging to Group 1.

If Z_i < Z crit: classify individual i as belonging to Group 2.

Where X_{ji} = the ith individual's value of the jth independent variable

b_j = the discriminant coefficient for the jth variable

Z_i = the ith individual's discriminant score

Z crit. = the critical value of the discriminant score.

The linear classification procedure allows an interpretation of the effect of each of the independent variables. Suppose the independent variable X_1 is profitability and the classification procedure is if $Z_i >$ Z crit., classify the company as not being in danger of failing, i.e., the higher the value of Z_i, the more likely the company is solvent. If the sign of b_i is positive, then higher profitability implies a better solvency, and the larger the size of b_i, the more important variable X_1 is in discriminating between Group 1 and Group 2 companies. Therefore, if $b_i = 0$, then X_1 has no effect.

The outline of discriminant analysis has been noted. In the next section, its assumptions are discussed.

6.3.15 Assumptions of Discriminant Analysis:

Linear discriminant analysis is dependent on three assumptions. Firstly, that each group is drawn from a population which has a multivariate normal distribution. Such a distribution exists when each variable has a normal distribution about fixed values on all the others (Blalock, (1979), p.452)). The normal distribution permits the precise computation of tests of significance and probabilities of group membership. When this assumption is violated, the computed probabilities may not be exact, but they may still be quite useful if interpreted with caution (Lachenbruch, 1975)(p41-46).

The second assumption is that the population covariance matrices are equal for each group. The covariance between the variables is a measure of how much they vary together. Relaxation of this assumption affects the significance tests for the differences in group means and the appropriate form of the classification rules.

The third assumption is that the groups must be mutually exclusive. This assumption has been met in this study because a failed company cannot at the same time be a non-failed company or vice versa.

The first and second assumptions have been examined by empirical methods. Kerlinger (1973) set up artificial populations, drew samples from them and performed 't' and 'F' tests. He invoked the conclusions reached by other authors, (Lindquist, (1953) and Boneau (1960)) and concluded that the importance of the normality and homogeneity of variance are overrated. Kerlinger quoting Lindquist suggested that the F. distribution is amazingly insensitive to the form of the distribution of criterion measures in the parent population.

He also argued that unless variances were so heterogeneous as to be readily apparent, that is relatively large differences exist, the effect on the F test would probably be negligible. Boneau appears to

confirm the view, when he stated that in a large number of research situations the probability statements resulting from the use of 't' and 'F' tests, even when these two assumptions are violated, will be highly accurate. Kerlinger summarized the violation of the assumptions issue by stating:

> "..unless there is good evidence to believe that populations are rather seriously non-normal and that variances are heterogeneous, it is usually unwise to use a non-parametric statistical test[1] in place of a parametric one. The reason for this is that parametric tests are almost always more powerful than non-parametric tests. (The power of a statistical test is the probability that the null hypothesis will be rejected when it is actually false)" . p.287.

Several attempts have been made to circumvent or minimize the effects of the violation of the assumptions. One such attempt is to minimize the effect of non-normality by prior transformation of the variables. Unfortunately, prior transformation of accounting ratio data to approximate normality has been found to be ineffective (Deakin (1976), Altman et al (1981)). However, other authors, notably, Gilbert (1968), Krzanowski (1975) and Lachenbruch (1975) have shown that discriminant analysis is a rather robust technique which can tolerate some deviation.

> 1. A non-parametric statistical test is a test whose model does not specify conditions about the parameters of the population from which the sample was drawn (Siegel, (1956)).

If the assumptions of group covariances are not met, a quadratic discriminant function rather than a linear one is required to minimize the probability of misclassification. However, simulation studies by Marks and Dunn (1974), Wahl and Kronmal (1977) suggest that with small sample sizes (like in the present study), the quadratic rule can perform quite poorly. Similarly, in the case of dichotomous variables, most evidence suggests that the linear discriminant function often performs reasonably well (Gilbert (1981); Moore (1973)).

The equality of group covariance can be tested for statistical significance (Box (1949)). This is based on the determinants of the group covariance matrices. The significance probability is based on an F-transformation. A small probability leads to the rejection of the null hypothesis that the covariance matrices are equal. However, Norusis (1985) noted that when sample sizes in the groups are large, the significance probability may be small even if the group covariance matrices are not too dissimilar. More importantly, the test is very sensitive to departures from multivariate normality. In other words, it tends to call matrices unequal if the normality assumption is violated, so it is unclear whether the outcome of the test is as a result of departures from multivariate normality or of unequal group covariance matrice. Because the test presents interpretational

difficulties, it is ignored in the present study. Even where the test has been adopted in previous studies, the authors caution readers on its interpretation (Singh (1971), Taffler (1982)).

There are other methods to assess the effectiveness of a discriminant model. These methods are discussed below.

6.3.16 Evaluation of Classification Error Rates:

The discriminant analysis model derived is likely to exhibit a high accuracy rate in classifying members of the study sample. Undoubtedly, the classification rate is due largely to favourable bias that results from the intensive search routine carried out in the multivariate discriminant analysis. The bias element inherent in the initial model was present in the studies of Singh (1971) and Tzoannos and Samuels (1972). The bias element has been discussed in detail by Frank et al (1965) and by Morrison (1969). The greater the number of variables analyzed, the more intensive the search.

The effect of intensive search bias does not persist beyond the study sample classification procedure. There

is no search in the same sense of the validation sample and therefore no search-related bias. It has been well documented in the economics and finance literature to some extent by studies by Frank et al (1965), that reclassification of the original sample used to estimate the sample rules as a means to estimate error rates leads to biased and overly optimistic results. A number of alternative methods have been suggested and evaluated for estimating classification errors[1].

There are two basic methods of obtaining estimates of error rates. These methods are (a) the original sample method (using Lachenbruch 'jackknife' method and (b) the hold-out sample method.

(a) Lachenbruch (1967) Method:

This method is based on the original sample used in the derivation of the model. The method holds out one observation at a time, estimates the discriminant functions based upon $N_1 + N_2 - 1$ observations (where N_1 = non-failed company and N_2 = failed company) and classifies the holdout observation. The process is

1. see Lachenbruch (1967, 1968, 1975); Lachenbruch and Mickey (1968) and Frank, Massey and Morrison (1965).

repeated until all observations are classified. The misclassified observations for each group are used as "almost unbiased" estimates of the misclassification error rates. Moreover, it may be used when sample sizes are small.

(b) Holdout Method:

The holdout sample method (Lachenbruch and Mickey (1968), Frank et al (1965)) divides the sample groups into two sub-samples. The first subsample is used to develop the classification functions, which are tested on the second subsample. The estimates are consistent and unbiased but require larger samples.

In order to mitigate any limitation arising from any of the methods, each of the two methods was subsequently adopted. The adoption of the methods is to ensure that the MDA model is robust. This is because the outcome of the present study (e.g. both the failing company hypothesis test and the consideration of performance between acquirers of failing and non-failing companies) depends on it.

A further problem in application of the MDA technique relates to the selection of appropriate a priori probabilities (e.g. of failure and non-failure) and a cut-off point. Discussion follows in the next section.

6.3.17 Adjusting for Prior Probabilities or Cost of Misclassification:

The standard discriminant analysis classification rules incorporate a priori probabilities to account for the relative occurrence of observations in different populations and misclassification costs. These probabilities could be adjusted because some classification errors may be more serious (e.g. costly) than others. Ideally, the prior probability should reflect the probability of failure for the period and sample for which predictions are to be made. However, because of the subjective nature of such a policy, it has been practice to either (i) let the prior probability of failure equal 0.5 or (ii) let it reflect the proportion of failures in the base sample. However, Altman et al (1981) argued that the latter method is appropriate, provided the pooled data represent a random sample from the combined group populations. Where the condition is not met, they further stated that the resulting classifications would only minimize the classification errors in the sample rather than provide estimates of the population error

rates. Because the condition required for the use of the method (ii) above is not met in most studies, method (i) has often been somewhat arbitrarily adopted.

Eisenbeis (1977) (and more recently Palepu (1986)) argued that the use of arbitrary cutoff probabilities is one of the serious 'pitfalls' in using discriminant analysis. The effect is that the misclassification rate of the model is underrated. In order to derive the optimal cutoff probability, it is necessary to specify the decision context of interest, an appropriate payoff function, and the prior state probabilities. The prior state probability for a bankruptcy prediction model is the likelihood that one of the firms will be bankrupt in a given year. This assessment can only be reasonably assessed by observation. Hence the criticisms of the use of arbitrary cutoff probabilities by earlier studies.

However, the task of the current study is different from previous ones in that the objective is <u>not</u> to predict bankruptcy in the future (where it would be difficult to know likelihood of failure). Rather, it is to estimate the number of acquired firms which had similar characteristics to failed companies at a particular time in the past. The emphasis is backward looking and probability of failure <u>can</u> be observed and reasonably estimated.

Similarly, the costs of misclassification in the present study are very different from 'normal'. From the research angle of this study, the cost of misclassifying a failed firm as non-failed merely understates the likely conclusion in the "bankruptcy alternative to merger" testing. The opposite misclassication is more important since this could tend to overstate the result.

Table 6.3 presents the number of companies on the Department of Trade's Register and their mortality rate for the relevant period of the present study. The average mortality rate for public companies during the period under review was 12.3%. However, this figure represents all types of liquidition (including 'members voluntary' liquidation) and also small and large companies. Since mortality rate appears to vary with the size of companies, it can be reasonably argued that the rate for 'large' companies (the subject of the present study) would be about one-quarter of the observed rate. Assuming 3% represents the mortality rate for large companies and 1% the over-estimation as a result of inclusion of members voluntary liquidation (which is outside the definition of bankruptcy for the purpose of the present study), 2% is therefore considered as a reasonable compromise for the mortality rate for large companies. The prior probabilities for the present study is therefore 0.98 : 0.02 to reflect the decision context (i.e. 2% failure likelihood).

However, a slight problem in the assessment of prior probabilities in this study is that, it is being hypothesized that some "about to be merged" companies are actually failing. Thus any assessment of likelihood of failure based on published failure numbers will actually understate reality, since some failures will never be 'published' (or even occur) as they will be acquired instead.

Table 6.3

Number of Public Companies on the Department of Trade Register

Details	1978	1979	1980	1981	1982	1983	Total
Public Companies							
On Registers at 31 December	16,954	17,154	10,325	9,206	6,511	6,508	
Of which, in Liquidation or course of Removal	1,129	1,139	1,162	1,188	1,187[1]	1,173	
Effective Number on Register at 31st December	15,825	16,015	9,163	8,018	5,324	5,335	
Mortality Rate %	6.7%	6.6%	11.3%	12.9%	18.2%	18.0%	12.3%

Notes: 1. Includes a number of old public companies which did not re-register as public limited company (PLC) as they were in the process of being removed from the Register.

Source: Department of Trade Companies (Annual Reports) (various issues).

Thus the importance of misclassification costs is revised in comparison with the normal intended use of the MDA model in predicting future bankruptcies.

In the second stage of this research, in considering the post-acquisition performance and particularly, the differential performance by those acquiring failing (as opposed to non-failing) companies, misclassification of companies in either direction will tend to reduce the observation of any differential performance. This must be remembered when interpreting these results.

Having developed an MDA model, it is important from a practical point of view to ascertain the contribution of the individual variables. This issue is discussed in the next section.

6.3.18 The Relative Significance of Individual Variables:

A number of different criteria for evaluating the contribution of individual variables have been proposed. Among these are: (a) ranking according to their standardized coefficients (b) ranking by maximizing Rao's V ratio and (c) minimizing Mahalanobis Distance (D^2).

(a) Standardized Coefficients Method:

Under this method, the discriminant coefficient is multiplied by the pooled-within groups variable standard deviations and divided by the pooled within-groups z-score standard deviations, (Weiner and Dunn (1966), Morrison (1969) and Eisenbeis et al (1973)). The standardized coefficients are represented thus:

$$c_i = u_i \frac{W_{ii}}{\sqrt{n - g}}$$

where W_{ii} = the sum of squares for variable i
n = the number of cases
g = number of groups
c_i = standardardized coefficients for variable i
u_i = unstandardized coefficients for variable i

The standard coefficients can be used to determine which variables contribute most in determining scores on the function. This is done by examining the magnitude of the standardized coefficients (ignoring the sign). The larger the magnitude, the greater is its contribution. While the standardized coefficient measures the relative importance of the variable, the unstandardized coefficient measures the absolute contribution of a variable in determining the discriminant score.

Although, the magnitude of a variable determines the absolute contribution, it is not easy for one to determine the extent of the differences between the contribution of two individual variables. For example, if variables X_1 and X_2 have weights 0.60 and 0.70 respectively, it is clear that variable X_2 contributes more than variable X_1. However, X_2 does not contribute 16.7% greater than X_1.

(b) Rao's V:

Another way to evaluate the contribution of a variable is to examine how much it increases Rao's V when it is added to the model. The larger the differences between group means, the larger Rao's V. Rao's V is defined thus:

$$V = (n - g) \sum_{i=1}^{p} \sum_{j=1}^{p} W_{ij}^{*} \sum_{k=1}^{g} n_k (X_{ik} - X_i)(X_{jk} - X_j)$$

where p = the number of variables in the model

g = the number of groups
n = is the sample size
n_k = is the sample size in the kth group
X_{ik} = the mean of the kth group
X_i = mean of the ith variable for all groups combined
W_{ij}^{*} = an element of the inverse of the within-groups covariance matrix.

The sampling distribution of V is approximately a chi-square with p(g - 1) degrees of freedom. A test of the significance of the change in Rao's V when a variable is included can also be based on the chi-square distribution. However, it has been pointed out (Klecka (1980) and Norusis (1985)) that it is possible for a variable to actually decrease Rao's V when it is added to a model. So V does not insure maximum separation between every pair of groups.

(c) Mahalanobis Distance (D^2):

This is a generalized measure of the distance between two groups. The distance between groups a and b is defined as:

$$D_{ab}^2 = (n - g)\sum_{i=1}^{p}\sum_{j=1}^{p} w_{ij}^* (X_{ia} - X_{ib})(X_{ja} - X_{jb})$$

where p = the number of variables in the model
g = number of groups

X_{ia} = the mean for the ith variable in group a

X_{ib} = the mean for the ith variable in group b

w_{ij}^* = an element from the inverse of the within-groups covariance matrix.

When Mahalanobis' distance is the criterion for variable selection, the distances between all pairs of groups are calculated first. In general, the greater D^2 for the two populations, the lower is the probability of misclassification.

A test of the null hypothesis that the two sets of population means are equal can be based on Mahalonobis distance: The F statistic is

$$F = \frac{(n-1-p)n_1, n_2}{P(n-2)(n_1 + n_2)} D^2ab$$

The F value can also be used for variable selection. At each step, the variable chosen for inclusion is the one with the largest F value.

Joy and Tollefson (1975) suggested that ranking of relative importance of variables based on standardized coefficients may be incorrect. They recommended a separation-of-means measure. The separation of means measure is given by Mosteller and Wallace (1963) and is based on the proportion of Mahalanobis distance.

The complexity of the problem of ranking the contributions of individual variables in a linear function is further explored by Scott (1978). Scott proved that when certain requisite assumptions are met, both the standardized coefficients method employed by Altman (1968) and the separation of means method (Taffler (1982)) produce accurate rankings of the individual variables. However, Scott also pointed out that the requisite condition is non-collinearity among variables, which was not met in Altman's function.

Therefore neither the standardized coefficients nor the separation of means computation will reliably rank variables according to their discriminant contributions when collinearity exists.

The implication of Scott's observation appears to be that where collinearity has been 'reduced', either of the methods could suffice. In Chapter 7, each of the above methods is adopted in assessing the relative contribution of the discriminating variables.

6.3.19 Summary:

The main hypotheses and methodology of the failing company doctrine have been stated. In the next chapter, the detailed methodology is followed in order to derive a discriminant model capable of discriminating between failed and non-failed companies. However, in the remaining part of this chapter, the other hypotheses and methodology are discussed.

6.4. EXAMINATION OF DIFFERENTIAL PERFORMANCE OF ACQUIRING COMPANIES:

6.4.1 Hypotheses:

In this Section, there are two sets of hypothesis to be tested:

1. Pre-Post-Acquisition Comparison:

The following hypotheses are to be tested:

H_0: There is no significant change in performance of the acquiring company (group) post acquisition.

The alternative is:

H_1: There is a significant change in performance of the acquiring company (group) post acquisition.

As three different measures are to be used in testing, the detailed hypotheses are different for each measurement scheme as is the interpretation of results (presented in Chapter 9).

2. Post-Acquisition Performance As A Function Of The Characteristics of the Acquired Company:

One of the major aims of the study is to consider the impact of the strength/weakness of the acquired company on post-acquisition performance.

The resulting null hypothesis is:

H_o: There is no difference in post-acquisition performance between companies who acquire firms with failing characteristics and those that acquire firms with non-failing characteristics.

The alternative is:

H_1: There is a significant difference in post-acquisition performance dependent upon the financial characteristics of the acquired firm.

Once again, the hypothesis is to be tested for each of the three measurement schemes.

6.4.2. Research Strategy:

In order to examine the post-acquisition performance of acquiring companies, three different types of performance measure were used: (detailed measurements are given in Appendix C at the end of this Chapter)

1. The absolute changes in financial ratio performance measures.

2. The 'normalised profitability measurement' suggested by Meeks (1977). This approach compares the 'new' profitability achieved by the combined group after the acquisition with the expected profitability which might have resulted had the merger not taken place. It uses weighted industry average measures as surrogates for the latter.

3. Changes in Taffler's 'performance analysis scores' (PAS-scores) following the acquisition, (Taffler and Soper (1983) and Taffler and Gomar (1985)). This technique adopts a single measure of performance based on the relative ranking of 'Z-scores' of companies.

6.5 DISCUSSION OF THE PERFORMANCE MEASURES:

6.5.1 Changes in Financial Ratios:

Changes in financial ratios have been widely used in measuring the performance of companies over a period and also for inter-firm comparison. There is growing evidence that financial analysts pay attention to changes in the financial ratios of companies. It is assumed that whatever may be the stated motives for a merger, the outcome should be reflected on the post-merger financial variables of the companies. A comparison of the post-merger changes in the financial ratios with those experienced by non-acquiring companies (control group) over the period would enable an opinion to be formed as to whether the merger led to improved performance.

Theoretically, the method seems efficient in isolating the impact of mergers. In practice, however, the 'matched-pair' technique may have a drawback since in view of the widespread nature of acquisition activity, it

is not always possible to obtain appropriate 'matched' companies[1]. Even where it may be possible to obtain 'appropriate' matching it is fair to judge the post-acquisition performance of the acquiring company in relation to the performance of the companies in the sector of the economy from which the acquisition was made. It was for this reason the alternative methodology of normalised profitability was considered appealing.

6.5.2 Normalised Profitability Measure:

This method takes into account the systematic influences on profitability other than acquisitions and allowance is made for changes in the firms' environment during the period of comparison. This is because profitability has pronounced cyclical fluctuations, and some industries have been more sensitive than others to these fluctuations. Moreover, the level of merger activity has been highly uneven between years and between industries. The effect of this is that for reasons not directly associated with mergers, years of numerous mergers may have been followed by years of above or below average profitability. The emphasis of the normalised profitability measure is on efficiency and the method has been used by Meeks (1977).

1. Despite the obvious limitations of this methodology, it has widely been used (Singh (1971), Utton (1974) and Cosh, Hughes and Singh (1980)) in measuring the post-merger performance of acquiring companies.

There may be ambiguity in interpreting the changes in the normalised profitability because of the distortions which lead to an overestimate of the post-merger profitability. Meeks and Meeks (1981) suggested that changes in the bargaining power of the participant companies lead to an overestimate of post-merger profitability. They argued like others (Hannah and Kay (1977), Meeks (1980) and Singh (1971)) that mergers on average enhance the bargaining power of the participants (combined group) and as such post-merger profitability could rise even though efficiency remained unchanged or actually fell. Meeks and Meeks explained:

> "... For with upward bias in the figures, higher profitability would yet be consistent with an efficiency loss (though consistent too with no change in efficiency or with a gain), whilst unchanged profitability would imply a definite efficiency decline. And an observed decline in profitability would imply a more serious deterioration in underlying efficiency. Thus the profitability measures in question could be used as possible indicators of efficiency decline but not of efficiency amelioration"...p 342.

Therefore, if any inferences for merger efficiency is to be drawn, the size of the improvement in profitability should be very high to offset the implied upward bias. A decline in efficiency may not adversely affect the shareholder if there has been an increase in profitability which enhanced the share price. However, in the long-run,

if inefficiency becomes apparent, the stock market may revise its assessment of the company and this could lead to a fall in the share price.

In addition to the above disadvantage, the normalised profitability measurement is deficient in that it (profitability) is taken as a single unit of 'performance'. However, there are several motivations for merger which may not be amenable to profit measurement. One motive that has received wider audience is diversification which may lead to risk reduction. In this situation, profitability, whether normalized or not, may not be an adequate measure of merger 'success'. The inadequacy of profitability as a measure of performance led to the search for an 'all-embracing' methodology.

6.5.3 Performance Analysis-Scores Paradigm (PAS-Scores):

This technique adopts a single measure of performance based on the relative ranking of Z-scores of companies. The Z-score is derived from financial ratios[1]. Each constituent ratio of the Z-score model separately measures a distinct interpretable dimension of company

1. The Z-score is derived from Taffler's model (discussed in Chapter 5). The provision of the PAS-scores for use in the present study is gratefully acknowledged.

performance. The dimensions are, profitability, working capital position, financial risk and liquidity. An appropriate transformation of the Z-score can therefore be used to provide a measure of relative company performance. A company's PAS-score in a particular year is derived by ranking all Z-scores for firms in that year in ascending order and observation of the Z-score of a particular company can indicate its relative performance. It was, however, necessary to use Taffler's PAS-scores, because they are only available with his model.

This measure of performance offers the advantage of combining both the balance sheet strength and corporate profitability (an advantage not offered by the normalised profitability measure) of a company. By this approach, a company's performance is normalised to take into consideration the environmental events (changes in the economy). Similarly, by the process the PAS-scores can be averaged and compared between different years.

There is however, a limitation in the use of the PAS-scores to compare the post-acquisition performance of acquirers of 'non-failing' and 'failing' companies. The relative low PAS-scores for the 'failing' companies may dilute the post-acquisition PAS-scores of the acquirers and any conclusion reached as to the relative post-acquisition performance of the acquiring companies may be biased.

In addition to the individual weakness of each of the methods, all the methods are likely to suffer from 'dirty pooling' (Lintner,(1971)). This is the suppression of asset costs at the time of merger to pad subsequent earnings, and other accounting devices which are likely to mislead outsiders on the actual impact of the acquisition.

Despite the weaknesses of each of the methods, the three different measures taken together should be able to provide a basis for testing the hypothesis of the present study.

6.6. Data Collection:

Financial statements were obtained for a sample of industrial and manufacturing companies quoted on the London Stock Exchange between 1978 and 1984. The sample consisted of six different groups of companies, paired into three sets and the breakdown is as follows:

1.	Non-Failed Companies	54
2.	Failed Companies	54
3.	Acquired Companies	104
4.	Non-Acquired Companies	144
5.	Acquiring Companies	76
6.	Non-Acquiring Companies	124
	Total number of companies	556

The failed and non-failed set represents companies known to have failed or survived during the period under review. The failed companies were required to have published accounts for at least three years prior to failure. The date of delisting was confirmed with the Extel Register for Negligible Securities and the Extel Dividend Year Book, (The list of the Companies is in Appendix D).

The acquired companies consisted of the largest acquisitions of quoted (industrial and manufacturing) companies between January 1979 and March 1984 (see Appendix E). The selection was made because one of the aims of the present study was to consider whether financial crises amongst large companies were resolved through the merger process. A merger was consummated when more than 50% of a company's equity had been acquired by another firm. This category of acquisitions is compiled and published by the 'Times 1000' under the heading 'Largest Acquisitions and Mergers'.

A reference was made to the List of Acquisitions and Mergers published by the Department of Trade and Industry to confirm the acquisitions. However, the following

groups of 'acquisitions' were excluded:

(i) reorganisations and reconstruction of companies which are also listed as acquisitions and mergers in both the Department of Trade's publications and the 'Times 1000'.

(ii) where the value of consideration was less than £2m. In other words, acquisitions less than this figure were not considered as 'large'. The acquisition has to be large enough for a significant impact on the performance of the acquiring company to be expected.

The non-acquired companies were also quoted on the Stock Exchange and approximated the size (assets) and industrial classification of the acquired companies. By virtue of being observed for the same year, and being similar in size to the acquired companies, one would expect the incidence of predicted bankruptcy to be similar for the two groups.

The acquiring companies consisted of those which acquired the acquired companies during the period under review. However, acquisitions made by foreign and unlisted companies were excluded. Similarly, multiple acquirers (i.e. those involved in more than one acquisition during the period) were also excluded. This was necessary to help isolate the observation of individual acquisition. The non-acquiring companies consisted of companies in the same industrial classification as those of the acquiring set matched by size and year on one by one basis.

The bankruptcy prediction model was derived from a sub-set of the failed and non-failed companies (60 in total, split 30 failed and 30 non-failed). The remaining 24 failed and 24 (Appendix F) non-failed companies were used to validate the model. The model was applied to the set of acquired companies and the acquiring companies to test the failing company hypothesis. The set of non-acquired companies acted as a 'control' group for the acquired companies, while the set of non-acquiring acted as a 'control' group for the acquiring companies.

APPENDIX C

MEASUREMENT TECHNIQUES ADOPTED

1. THE CHANGES IN FINANCIAL RATIOS:

Let $Y = P_{t+1} - P_{t-1}$

where Y = the absolute change in the variables

P = value of the particular ratio

t = the year of merger, such that

$t + 1$ = one year post-merger

$t - 1$ = one year pre-merger

$t + 2$ = two years post-merger

Y_{t+1} = over the two year period t - 1 to t + 1

Y_{t+2} = over the three year period t - 1 to t + 2

The change in the variables in t - 1 and t was not measured because the time was considered too early for the impact of the merger to be felt.

2. NORMALISED PROFITABILITY MEASURE:

The precise form of the tests which are carried out can be considered using the following symbols:

R: profitability
N: profit before tax
D: Net Assets
x: contributions (in terms of net assets) of victim to amalgamation
v: victim (acquired)
q: acquirer
y: year of merger
u: victim's industry
w: acquirer's industry
j: a post-merger year (including year of merger)
z: amalgamation, when standardized
m: amalgamation (not standardized)
k: average of two pre-merger years
E: change in standardized profitability

Profitability for any year t, is defined as profit flow during the year divided by the net assets employed during the year.

$$R_t = \frac{\text{Profit before tax}}{\text{Average Net Assets}} = \frac{N_t}{1/2(D_{t-1} + D_t)}$$

To compare the profitability of two merging companies with what one would have expected from the average industry results, a weighted average profitability of the two separate industries is obtained: thus,

Let Net Assets of the Acquirer (D_q) = £10m

Let Net Assets of the Victim (D_v) = £2m in year before merger for the two groups.

Let the standardized weights be x, 1 - x

$$\text{where } x = \frac{D_v}{D_q + D_v} = \frac{2}{10 + 2} = \frac{2}{12}$$

= proportion in Victims Industry, and

$$1 - x = 1 - \frac{2}{12} = \frac{10}{12}$$ = proportion in Acquirer's industry

So expected profitability of combined group based on average industry performance =

x X Average profitability of victim's industry + (1 - x) X Average profitability of Acquirer's industry =

$$xR_{ut} + (1 - x)R_{wt}$$

If one compares the actual performance of the amalgmated group after merger (R_{mj}) with this, one can see whether the group has performed better or worse than expected:

$$R_{zj} \text{ (for time j)} = \frac{R_{mj}}{xR_{uj} + (1 - x)R_{vj}}$$

If group profitability is as 'expected', then this ratio will be 1. (since R_{mj} will be $xR_{uj} + (1 - x)R_{wj}$). If it performs better than 'expected' the ratio will be above 1 and if worse below 1.

To see whether the merger has improved the relative performance of the two firms when combined, compared to the profitability before merger, need to calculate R_{zk} as follows:

R_{mt} = Average profitability of the two separate companies in the years immediately prior to merger =

$$\frac{N_{vt} + N_{qt}}{1/2(D_{vt-1} + D_{vt}) + 1/2(D_{qt-1} + D_{qt})} =$$

= Total profitability of two separate companies in Year t/ Average Net Assets of the two companies.

This R_{mt} must then be compared to the weighted industry-average performance $xR_{ut} + (1 - x)R_{wt}$ to get the pre-acquisition profitability index measure - R_{zt}

$$\text{i.e. } R_{zt} = \frac{R_{mt}}{xR_{ut} + (1-x)R_{wt}}$$

To avoid problems associated with unusual one-year results prior to the acquisition, the average of the two year's profitability index, R_{zt} was calculated:

$$\text{i.e. } R_{zk} = 1/2(R_{z,y-2} + R_{z,y-1})$$

The change in profitability is therefore:

$$E_{zj} = R_{zj} - R_{zk}.$$

3. PERFORMANCE ANALYSIS SCORES

Changes in performance analysis scores as for (1) above.

CHAPTER 7

BANKRUPTCY PREDICTION MODEL

7.1 Introduction:

In the previous chapter, the methodology and the hypotheses of the study were stated. The present chapter develops a bankruptcy prediction model for use in testing the failing company hypothesis of mergers.

Several bankruptcy prediction models have already been developed. It was thought necessary for the purpose of the present study to develop a new model for two reasons: (i) a model contemporary with the available data for acquired and acquiring companies, was required to avoid problems resulting from the instability of financial ratios over time and (ii) to overcome a major limitation of previous models following the use of arbitrary cutoff probabilities.

7.2 BUILDING THE MULTIVARIATE DISCRIMINANT ANALYSIS (MDA) MODEL:

7.2.1 Factor Analysis of Ratio Data:

In the previous chapter, a discussion of factor analysis as a technique to reduce collinearity in the financial ratios was made. The result of MDA for the present study is reported here. Twenty-two financial ratios were computed from financial data of sixty companies (30 failed and 30 non-failed) for the period 1978 to 1983.

The financial ratios were factor analysed in order to provide a reduced set for input to the discriminant function. The assumption of factor analysis is that variables must be related to each other for the factor model to be appropriate. In order to test the hypothesis that the variables are related to one another, the correlation matrix of the ratios is presented in Table 7.1. All variables are correlated with one another. Consider, for example, R1 (EBIT/TA), has a very strong positive correlation with R7 (EBIT/CL) and R13 (EBIT/S). These variables measure return on investment. Similarly, R4 (CA/CL) has strong correlations with variables R10 (QA/CL), R14 (WC/TA), R17 (NCI), R21 (WC/SALES) and R22 (CA/TL). These ratios tend to measure the liquidity aspect of the companies.

TABLE 7.1

CORRELATION MATRIX:

	R1	R2	R3	R4	R5	R6	R7	R8	R9
R1	1.00000								
R2	-0.25459	1.00000							
R3	-0.62952	.45736	1.00000						
R4	.36984	.19705	-0.52868	1.00000					
R5	.30856	-0.03777	-0.36031	.30307	1.00000				
R6	-0.11965	.39773	.06161	.40553	.11027	1.00000			
R7	.93026	-0.33037	-0.71124	.48101	.35746	-0.06179	1.00000		
R8	.12589	.57061	.13682	.15083	.25032	.14225	.05546	1.00000	
R9	.64111	-0.17683	-0.61307	.44285	.31926	-0.02911	.72498	.09315	1.00000
R10	.50624	.09572	-0.52468	.76335	.43599	.18296	.57798	.54422	.53194
R11	.29732	-0.15708	-0.30729	.14901	.64502	.03526	.32832	.13944	.17343
R12	-0.26638	.44156	.18095	.34665	-0.23976	.76350	-0.22888	-0.24843	-0.14339
R13	.88307	-0.29269	-0.63070	.42596	.42124	.05324	.86833	.08004	.60864
R14	.27337	.37747	-0.33482	.79884	.33221	.30247	.29028	.23916	.40855
R15	-0.20984	-0.39138	.19696	-0.11883	-0.00584	-0.15746	-0.17494	-0.27186	-0.22541
R16	.55068	-0.10637	-0.54830	.49938	.83786	.11661	.63846	.28349	.55682
R17	.46143	-0.08817	-0.55520	.60275	.71465	-0.06104	.52958	.38571	.50132
R18	.12560	.09454	-0.07651	.23280	.46288	.64443	.17674	.51293	.13532
R19	.08151	.28641	.16305	-0.21536	-0.07793	-0.56502	-0.06336	.29765	-0.05661
R20	-0.54744	.55341	.77462	-0.61857	-0.36674	.08099	-0.64890	.22505	-0.52209
R21	.26873	.19873	-0.46086	.81966	.46796	.50084	.33629	.05382	.41452
R22	.28339	.28604	-0.58410	.72390	.21079	.34737	.36081	.24036	.40908

	R10	R11	R12	R13	R14	R15	R16	R17	R18
R10	1.00000								
R11	.12737	1.00000							
R12	-0.15966	-0.23517	1.00000						
R13	.51267	.39274	-0.18743	1.00000					
R14	.60996	.15701	.30426	.29172	1.00000				
R15	-0.11112	.02072	-0.16864	-0.09971	-0.13656	1.00000			
R16	.65473	.63147	-0.24222	.60515	.44141	-0.04887	1.00000		
R17	.81237	.36058	-0.38555	.50073	.53901	.04937	.76548	1.00000	
R18	.48593	.34363	.02026	.30268	.13271	-0.03536	.48329	.36901	1.00000
R19	-0.09060	-0.06798	-0.37801	-0.13746	-0.06493	-0.25708	-0.06507	.05142	-0.45036
R20	-0.56926	-0.31195	.16987	-0.60873	-0.48441	-0.22133	-0.54441	-0.66572	-0.09786
R21	.54545	.22430	.43925	.36212	.87415	-0.08634	.51042	.54875	.24904
R22	.58559	.07293	.25751	.30088	.52323	-0.49053	.33488	.40512	.16471

	R19	R20	R21	R22
R19	1.00000			
R20	.30775	1.00000		
R21	-0.25457	-0.53715	1.00000	
R22	-0.01659	-0.27759	.60859	1.00000

KAISER-MEYER-OLKIN MEASURE OF SAMPLING ADEQUACY = .76220
BARTLETT TEST OF SPHERICITY = 1810.6448, SIGNIFICANCE = .00000
THERE ARE 0 (.0%) OFF-DIAGONAL ELEMENTS OF AIC MATRIX > 0.09

Bartlett's test of sphericity can be used to test the hypothesis that the correlation matrix is an identity matrix. That is, all diagonal terms are 1 and all off-diagonal terms are 0. From the Correlation Table, the value of the test statistic for sphericity (based on a chi-square transformation of the determinant of the correlation matrix) is large and the associated significance level is small (0.000). Therefore, the null hypothesis that the population matrix is an identity is rejected. The test confirms that the variables are related to one another.

Table 7.2 contains the initial statistics of each factor. Each factor represents a ratio and forms a linear combination of the financial ratios. The total variance, by each Factor is listed in the column labelled EIGENVALUE. The next column contains the percentage of the total variance attributable to each factor. For example, the linear combination formed by Factor 3 has a variance of 2.45, which is 11.1% of the total variance of 22 (ratios). The last column, the cumulative percentage, indicates the percentage of variance attributable to that factor and those that precede it in the Table. The factors are arranged in descending order of variance explained.

Table 7.2
Factor Analysis: Initial Statistics:

FACTOR	EIGENVALUE	PCT OF VAR	CUM PCT
1	8.41525	38.3	38.3
2	3.68060	16.7	55.0
3	2.44670	11.1	66.1
4	2.11591	9.6	75.7
5	1.46743	6.7	82.4
6	1.08571	4.9	87.3
7	.78348	3.6	90.9
8	.49188	2.2	93.1
9	.35621	1.6	94.7
10	.29545	1.3	96.1
11	.21160	1.0	97.0
12	.19323	.9	97.9
13	.12399	.6	98.5
14	.08954	.4	98.9
15	.07441	.3	99.2
16	.05270	.2	99.5
17	.03948	.2	99.7
18	.02949	.1	99.8
19	.02498	.1	99.9
20	.01110	.1	100.0
21	.00669	.0	100.0
22	.00417	.0	100.0

Principal Component Analysis extracted 6 Factors - those with Eigenvalue higher than 1.0.

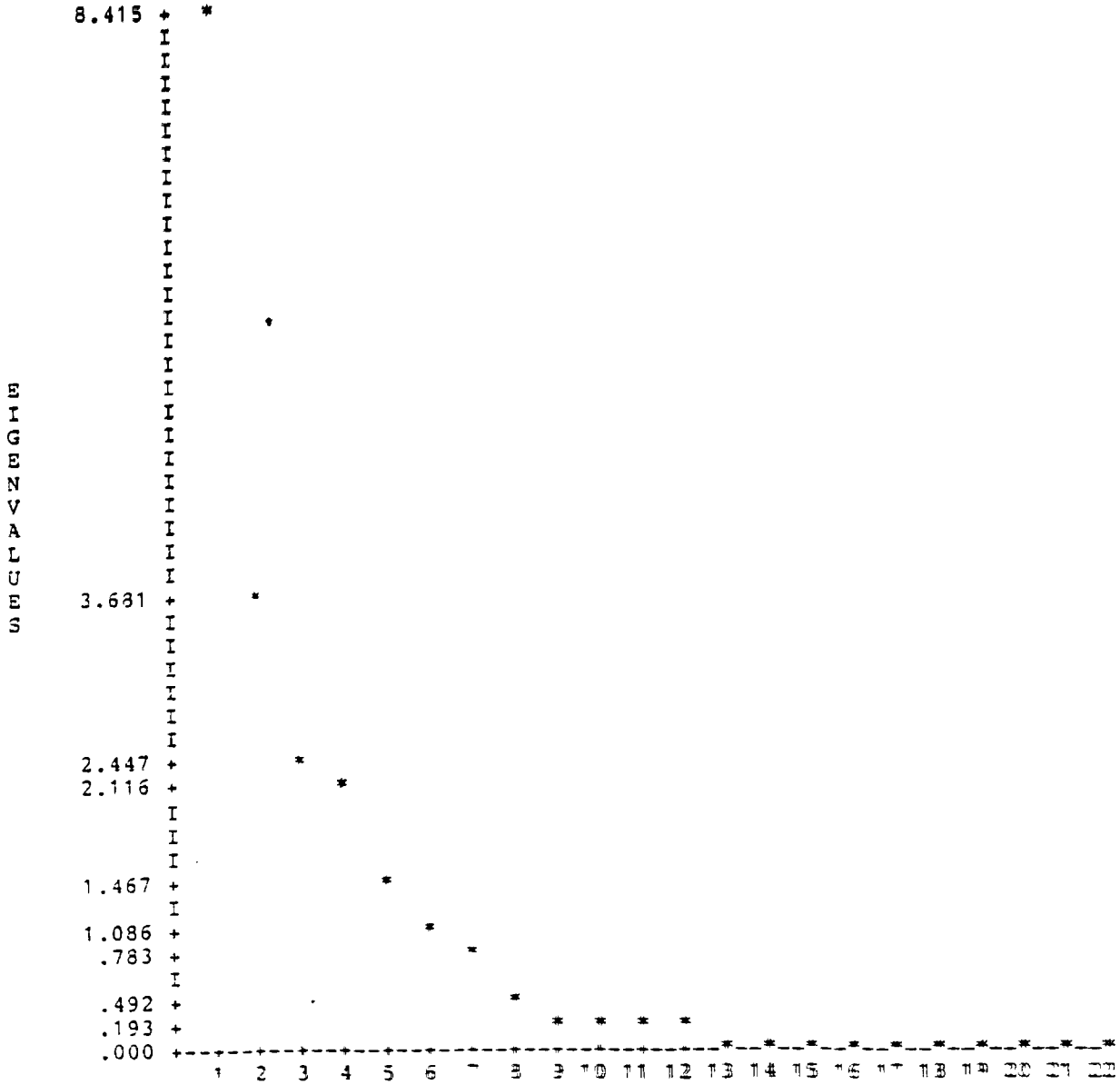
7.2.2 Number of Factors Extracted:

Table 7.2 also shows the six factors which were extracted for further analysis. The factors extracted were those with associated eigenvalue greater than a somewhat arbitrary cut-off of 1.0. In that way, only factors that convey a non-trivial proportion of the information in the original variables are retained for interpretation. Because of the ways factors are defined in a principal components analysis, the first factor has the largest eigenvalue; the second factor the next largest eigenvalue and so on. Since, the eigenvalues associated with succeeding factors will be progressively smaller, a decision to ignore some of the latter factors is often justifiable, (Rummel, (1970); Jaeger (1983)).

Figure 7.1 is a plot of the total variance associated with each factor. Typically, the plot shows a distinct break between the steep slope of the large factors and the gradual trailing off of the rest of the factors. Cattell (1966) calls the gradual trailing off a scree, because it resembles the rubble that forms at the foot of a mountain. Experimental evidence indicates that the scree begins at the kth factor, where k is the true number of factors. From the scree plot, it appears that a four- or five-factor model may be adequate for the financial profile of the sixty companies.

FIGURE 7.1

SCREE PLOT OF FACTOR ANALYSIS



PC EXTRACTED 6 FACTORS.

7.2.3 Factor Rotation:

As stated in the previous chapter, the purpose of factor rotation is to transform the initial matrix into one that is easier to intrepret. After rotation, each group of variables will have high correlations with one of the rotated factors and low correlations with all of the others. Table 7.3 shows the rotated factor matrix.

The examination of the ratios in certain factors led to the interpretation that the six factors appear to represent (a) return on investment; (b) working capital position; (c) cash position; (d) asset turnover; (e) short-term liquidity and (f) financial leverage. However, any such 'labelling' of factors must be viewed with a certain degree of scepticism (e.g. the ratio Total Liabilities/Total Assets can hardly be considered as a ratio describing 'return on investment').

Therefore, whereas the original data consisted of one set of 22 ratios with high intercorrelations, the factor analysis transformed the data into six less correlated factors.

TABLE 7.3

ROTATED FACTOR MATRIX

Ratios	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5	FACTOR 6
	RTN ON INVESTMENT					
EBIT/CL	.92482					
EBIT/TA	.88893					
EBIT/S	.84598					
TL/TA	-0.78514					
RE/TA	.73368					
CL/TA	-0.63704					
		WORKING CAPITAL POSITION:				
WC/TA		.89452				
WC/SALES		.86840				
CA/CL		.86136				
CA/TL		.64578				
			CASH POSITION			
CASH/TA			.88509			
CASH/SALES			.84576			
CASH/CL			.69425			
				ASSET TURNOVER		
CA/SALES				.88416		
SALES/TA				-0.82953		
QA/SALES				0.64950	.61717	
STOCK/SALES				0.62346		
					SHORT-TERM LIQUIDITY	
QA/TA					.89757	
QA/CL					.62349	
						FINANCIAL LEVERAGE
LTD/CA						-0.85496
CA/TA						0.63632

Notes: Ratios with loading less than .60 were excluded from the Table. The numbers are called factor loadings - they are regarded as correlations between the variables and the factors. A variable with a high loading may be chosen to represent the factor.

The result of the factor analysis confirms the existence of common ratio classifications and offers an empirical basis for grouping financial ratios. This is in line with the evidence presented by Chen and Shimerda (1981). They reconciled financial ratios used in previous bankruptcy prediction studies and concluded that the ratios can be represented by seven factors. These factors were:

1. Return on Investment
2. Financial Leverage
3. Capital Turnover
4. Short-term liquidity
5. Cash position
6. Inventory turnover and
7. Receivables turnover.

The current analysis produces a similar set with the exception that the asset turnover factors are combined in one (Factor 4) and the extra dimension of working capital is implied.

7.2.4 Comparison With Previous Factor Analysis Studies:

As mentioned in Chapter 6, some studies have employed the technique of factor analysis in an effort to eliminate redundant information. In the interest of obtaining some measure of comparability between these studies and the present one, the results are summarised in Table 7.4. For example, in the Pinches and Mingo studies, they reduced their data set for bond ratings from 35 to 7 ratios (an 80% reduction) and still accounted for 63% of the variance in the original data matrix.

Table 7.4

DATA REDUCTION IN FACTOR-ANALYZED FINANCIAL RATIO STUDIES

Study by	No. of. Original Ratios	No. of Ratios Extracted	% Reduction in Ratios	% of Variance Accounted
Pinches and Mingo (1973)	35	7	80	83
Stevens (1973)	20	6	85	82
Libby (1975)	14	5	64	not reported
Present Study	22	6	73	87

7.2.5 Multivariate Discriminant Analysis (MDA) Phase:

Twenty-two financial ratios were factor analysed and a reduced number of six factors was obtained. A ratio with a 'high loading' was selected to represent each factor. The MDA model was derived with five of the six ratios selected by the factor analysis. The sixth factor measuring cash position, did not enter the equation because its presence did not improve the discriminating ability of the model. This may be for two reasons. Firstly, the other selected factors (Working Capital/Sales; Quick Assets/Total Assets and Current Assets/Total Assets) have a 'cash' element in their composition. Secondly, the absence of 'cash' may not be an important factor in discriminating between a failed and non-failed company.

The reduced ratio set for the sample of 60 companies, was the input to the MDA that generated a linear function which best separated the failed and non-failed companies.

It gives a single function Z, called the discriminant function which is a linear combination of the various discriminating variables used in the model. The Z equation is stated generally as follows:

$$Z = f(X_1, X_2, X_3, X_4, X_5) \ldots . (1)$$

where X_1 = Earnings before Interest and Taxes/current liabilities
X_2 = Quick Assets/Total Assets
X_3 = Working Capital/Sales
X_4 = Stock/Sales
X_5 = Current Assets/Total Assets.

The ordering of these five variables is derived from the discriminant computer program which selects variables in the order of their contributory importance. The process, a stepwise discriminant analysis, first chooses the variable with the smallest Wilks' lambda[1] and correspondingly the largest F-to-enter. Table 7.5 presents the means and standard deviations for the two groups of companies. The differences in means of some of the ratios are glaring.

1. Wilks' lambda is the ratio of the within-groups sum of squares to the total sum of squares. It is the proportion of the total variance in the discriminant scores not explained by differences among groups. Small values of lambda are associated with functions that have much variability between groups and little variability within groups. A lambda of 1 occurs when the mean of the discriminant scores is the same in all groups and there is no between-groups variability.

Table 7.5

GROUP MEANS AND STANDARD DEVIATION

Variable	Non-Failing Group (%) N = 30	Failing Group (%) N = 30
X1 (EBIT/CL)	45.10 (15.90)	-11.87 (17.73)
X2 (QA/TA)	29.49 (13.28)	25.55 (9.49)
X3 (WC/SALES)	17.62 (13.03)	8.90 (18.24)
X4 (STOCK/SALES)	16.19 (8.45)	30.16 (13.13)
X5 (CA/TA)	51.50 (18.50)	66.88 (12.69)

Figures in parentheses are the group standard deviation.

7.2.6 Test of Equality of Group Means: (Univariate Method):

Table 7.6 shows significance tests for the equality of group means for each variable. The F values and their significance are shown in columns 3 and 4. (The F value is the square of the t value from the two-sample t test). If the observed significance level is small (usually less than 0.05), the hypothesis that all group means are equal is rejected. From Table 7.6, Variable X2 (QA/TA) is not statisitically significant at any reasonable level of testing. However, Cochran (1964) has shown, that seemingly insignificant or unimportant variables on a univariate basis may be very important when combined with other variables, hence the justification to retain the variable for further analysis.

Table 7.6

Group Univariate F-Ratio

Variable	Wilks' Lambda[1]	F	Sig. Level
X1 (EBIT/CL)	0.2549	169.5	0.0000
X2 (QA/TA)	0.9708	1.74	0.1920
X3 (WC/SALES)	0.9275	4.53	0.0375
X4 (STOCK/SALES)	0.7072	24.01	0.0000
X5 (CA/TA)	0.8046	14.09	0.0004

Notes: 1. The higher a variable's F-value, the lower its Wilks' Lambda.

7.2.7 Prior Probabilities:

As pointed out in the previous chapter, the use of arbitrary cut-off probabilities of 0.5 tends to underestimate the classification error rates of a model. It was also argued that the optimal prior probabilities should reflect the decision context of the model. Instead of the 'usual' 0.5 prior probability, the PRIORS were set at 0.98 : 0.02 to reflect the decision context (i.e. 2% failure likelihood).

7.2.8 Estimating the Coefficients:

The linear combination of the independent variables formed serves as a basis for assigning cases to groups. Thus, information contained in multiple independent variables is summarized in a simple index. For example, by finding a weighted average of the five variables, a score that distinguished between failed and non-failed companies was obtained. In other words, the following discriminant function was derived.

$$Z = 0.053X_1 + 0.021X_2 + 0.028X_3 - 0.063X_4 - 0.026X_5 + 1.142$$

where X_1 = Earnings Before interests and Taxes/current liabilities;
X_2 = Quick Assets/Total Assets;
X_3 = Working Capital/Sales
X_4 = Stock/Sales
X_5 = Current Assets/Total Assets.

7.3 CLASSIFICATION: USING THE MODEL:

Table 7.7 shows the classification summary of applying the derived model to the original sample of 60 companies (30 failed and 30 nonfailed) (Appendix D). Correctly classified cases appear on the diagonal of the Table since the predicted and actual groups are the same. Thirty cases of non-failed companies were predicted correctly (100.0%). Similarly, 28 out of 30 of the failed companies were identified correctly and 2 (6.7%) were misclassified. The overall percentage of cases classified correctly was 96.7% (58 out of 60 cases).

Table 7.7

CLASSIFICATION RESULTS: ORIGINAL SAMPLE:

Actual Group		No of Cases	Predicted Group Membership	
			1	2
Non-Failed	1	30	30 (100.0%)	0 (0.0%)
Failed	2	30	2 (6.7%)	28 (93.3%)

PERCENT OF 'COMBINED' CASES CORRECTLY CLASSIFIED: 96.7%

The overall accuracy rate of the discriminant model was 100.00% when the 0.5 prior probability was used. However, when the prior probability was adjusted to reflect the decision context, the accuracy rate of the model decreased to 96.7% (with two misclassifications when applied to sample data). This is the nature of the underestimation error of previous models which ignored the adjustment of the prior probability.

The misclassification is in the form of Type I error. Type I error is the misclassification of a failed company as non-failed. A cut-off of -0.1795 for the discriminant score was selected. Stated in a different way, no non-failed company scored less than -0.1795 and the two failed companies that scored above this point were 'misclassified' as non-failed. It is to be noted that the cut-off point would have been different if the prior probability was set at 0.50.

Figure 7.2 shows the all-groups histogram for the discriminant function. Symbols used in the plots are (1) for non-failed companies and (2) for failed companies. Four symbols represent each company, there are 120 symbols. The failed companies had negative values, while the non-failed companies had positive values. There was

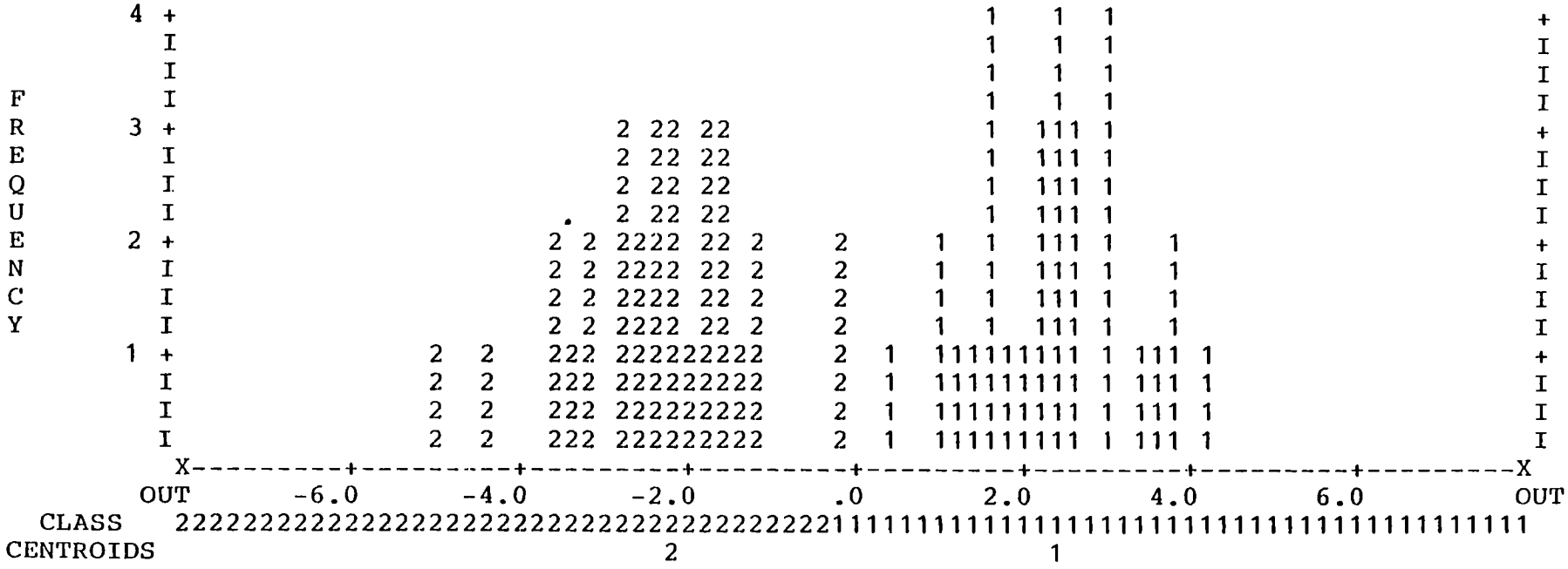
FIGURE 7.2

SYMBOLS USED IN PLOTS

SYMBOL	GROUP	LABEL
1	1	(NON-FAILED)
2	2	(FAILED)

ALL-GROUPS STACKED HISTOGRAM

CANONICAL DISCRIMINANT FUNCTION 1



no overlap in the classification of the model. However, the two misclassified failed companies scored a little less than zero. If zero was used as the cut-off point, the model could have produced a 100% accuracy rate.

For the overall purpose of the present study, the result appears encouraging, in the sense that the model is unlikely to misclassify acquired companies as possessing financial characterisitics similar to previous failed companies. This allays the danger of giving undue weight to the 'failing company' hypothesis of mergers.

The reported results of the model on the original sample of failed and non-failed companies appear impressive. However, it is important that the model is validated to ensure the results are not sample specific. In addition, for a more meaningful interpretation of the results to be made, closer examination of the relative significance of the individual variables is necessary. In other words, it is necessary to ensure that the relationship between variables and bankruptcy seem valid.

7.4 THE RELATIVE SIGNIFICANCE OF INDIVIDUAL VARIABLES:

In Chapter 6, several methods were discussed for ranking the relative contributions of each of the variables. The results of these methods are presented in Table 7.8.

Table 7.8

RELATIVE CONTRIBUTION OF INDIVIDUAL VARIABLES:

Variables		Methods					
		Standardized Coefficients[1]	R^2	Rao's V	R^2	Mahalanobis D^2	R^2
X1	EBIT/CL	0.90641	1	169.54	1	11.30(52%)	1
X4	ST/SALES	-0.69509	2	96.89	2	17.76(30%)	2
X3	WC/SALES	0.44578	3	38.43	3	20.32(12%)	3
X5	CA/TA	-0.41520	4	13.54	4	21.22 (4%)	4
X2	QA/TA	0.25331	5	7.40	5	21.72 (2%)	5

Notes:

1. The larger the magnitude, the greater is the contribution of the variable, (ignoring the sign).

2 R denotes the ranking of the variables.

3. Figures in percentage are relative contributions of the individual variables using Mosteller and Wallace (1963) criteria.

The three separate methods produced identical ranking of the contribution of the individual variables.

7.4.1 Discussion of the Ranking of the Variables:

The high contributions of the profitability and asset turnover dimensions indicate their importance. For example, the variable (EBIT/CL) measuring profitability contributed most in distinguishing between the failed and non-failed companies. This indicates the ability of a company to cover its current liabilities through its earning power. The positive sign (Standard Coefficients) indicates the correlation of the ratio with the survival of the company. It may be argued that for any business to survive, it has to make profits. If a business continuously sustains a loss, it is bound to go bankrupt eventually. However, a firm can be liquidated with positive profit records.

The next variable that contributes most in distinguishing between failed and non-failed companies is Stock/Sales. This ratio measures the relationship between stock and sales (the inverse of stock turnover), and is negatively correlated with business survival. Although, the ratio varies with the nature of business, a high ratio in comparison with companies of the same business portends danger. A high ratio would result from a comparatively high stock level or alternatively a comparatively low turnover of stock. These may result from poor stock control by management or from poor trading conditions leading to a build-up of stocks.

Further, a high build-up of stock implies additional interest charges (or loss of interest) on funds tied up in stocks. Similarly, there may be further costs for storage, and the risk of being left with obsolete goods. These extra costs have the effect of reducing the company's profitability. The reduction in profitability will lead in due course to decreases in the previous variable (EBIT/CL), which is very important for the survival of a business. In fact, the high ranking of the two variables is sufficient for an adequate bankruptcy prediction model.

The third variable that contributes most in the discriminant function is Working Capital/Sales. This ratio shows how much capital is required to finance operations in addition to capital invested in fixed assets. It gives some indication of the likely additional cash needed with increased turnover. Although the ratio can vary, depending upon the type of business, it is generally viewed that a falling of the ratio indicates a sign of overtrading. The positive sign of the ratio in the present model indicates that the greater the ratio, the less likelihood of failure.

The fourth ranked variable is Current Assets/Total Assets. This ratio represents the extent of a company's commitments and investment both in stock and in uncollected debts. Companies increase their level of bankruptcy risk as the rate of stock turnover declines and there is a build-up in uncollected debts. The negative sign indicates the larger the proportion, the higher the probability of failure.

The Quick Assets/Total Assets variable contributed the least. However, it is positively correlated with business survival. It represents another form of measuring the liquid asset of a company. In the short-term liquid resources are needed to pay liabilities as they fall due. A shortage of quick assets can precipitate business failure.

The five variables taken together measure the risk profile of the company which is summarized by the Z-score in the discriminant analysis. This can be interpreted as showing the level of similarity of a company's financial structure to that of companies which have gone out of business or are still in business. The model established two main characteristics of a firm with a high level bankruptcy risk. Firstly, a firm with a poor profit generating capability and secondly, a decline in sales

(cash flow) from trading operations which could lead to a build-up in stocks and results in less funds being available from internal sources to finance its activities.

The relative contribution of the individual variables to the discriminant function as well as the significance of the variables have been discussed. In the next section, an assessment of the effectiveness of the discriminant function is made.

7.5 ASSESSING THE EFFECTIVENESS OF THE DISCRIMINANT FUNCTION:

Norusis (1985) suggested two indicators for measuring the effectiveness of the discriminant function. One indicator is the actual percentage of cases classified correctly, discussed above in Section 7.3; the other is a test of the null hypothesis that in the populations from which the samples are drawn there is no difference between the group means.

The test of the null hypothesis is based on Wilks' lambda. Lambda is transformed to a variable which has approximately a chi-square distribution. The SPSS-X output shows that a lambda of 0.151143 is transformed to a chi-square value of 104.88. The observed significance level is 0.0000 (i.e. shows likely error of less than 1%). Thus, it appears unlikely that failed companies and non-failed companies have the same means on the discriminant function.

However, Norusis pointed out that even though Wilks' lambda may be statistically significant, it may not provide enough information about the effectiveness of the discriminant function in classification. What it does provide, he argued is a test of the null hypothesis that the population means are equal. He concluded that small differences may be statistically significant but still not permit good discrimination among the groups. However, if the means and covariance matrices are equal, discrimination is not possible.

If the effectiveness of a discriminant function can be measured on Norusis' criteria, one may reasonably assume that the discriminant function of this study appears effective. The reasons for such suppositions are (a) the percentage of cases classified correctly is high (96.67%), and (b) the null hypothesis that there is no difference between the means of the two groups is strongly rejected.

7.6 VALIDATION OF THE MODEL:

In chapter six, various methods for evaluating the classification error rates of discriminate analysis were discussed. Some of these methods (those likely to enhance the achievement of the objective of the present study)

were applied to the derived model. The following methods were employed to validate the derived model:

(i) The Lachenbruch (1967) Method:

The Lachenbruch (jackknife) method was used for developing and testing the accuracy of the discriminant function. This method requires the calculation of (60) separate discriminant functions holding out a different company for each calculation. That company is then classified using the function calculated while it was held out. The misclassified observations for each group are used as "almost unbiased" estimates of the classification error rates. The result of the validation test produced two misclassifications (see Table 7.9). The same two companies were also misclassified by the original model.

Table 7.9

LACHENBRUCH CLASSIFICATION RESULTS: ORIGINAL SAMPLE:

Actual Group		No of Cases	Predicted Group Membership	
			1	2
Non-Failed	1	30	30	0
			(100.0%)	(0.0%)
Failed	2	30	2	28
			(6.7%)	(93.3%)

PERCENT OF 'COMBINED' CASES CORRECTLY CLASSIFIED: 96.7%

(ii) Hold-Out Method:

This involves the validation of a model using a time-coincident holdout sample. In order to test the stability of the ratios over the study period, the derived model was tested on a 'new' group of companies. This group consisted of 24 failed and 24 non-failed companies during the study period (see Appendix F). The model misclassified 5 companies (almost a 90% accuracy rate). The breakdown of the misclassification shows that 4 failed companies (Type I error) and one non-failed company (type II error) were misclassified (see Table 7.10).

Table 7.10

Hold-Out Sample Method

Classification Results for Hold-out Companies:

Actual Group		No of Cases	Predicted Group Membership	
			1	2
Non-Failed	1	24	23 (95.8%)	1 (4.2%)
Failed	2	24	4 (16.7%)	20 (83.3%)

Percent of "Combined" Cases correctly classified: 89.6%

The result of the hold-out test shows a decline in the accuracy of the original model. However, the slight decline in the accuracy of the model is to be expected because of the intensive search bias in the original model (Frank, et al (1965) and Morrison (1969)). The shrinkage in the accuracy also illustrates that some companies still trading possess financial characteristics similar to previous failed companies. This misclassification result of the validation is similar to those obtained from the original sample and the other validation technique subsequently employed. The major misclassification problem was of Type I nature. This type of error could imply that the model had a slight tendency to classify failed companies as non-failed and not vice versa. Thus, it might be argued that the classification of companies as failing is slightly understated by the model.

Joy and Tollefson (1975) argued that cross-validations "are not predictions of corporate bankruptcy but merely ex post discriminations". They contended that a holdout sample should be drawn from a future period completely distinct from the original (or analysis) sample period in order to illustrate the predictive ability of the model. In other words, evidence of ex ante predictive power requires intertemporal validation and not merely cross-validation. However, Joy and Tollefson did admit that under the assumption of

stationarity (of the parameters and variables of the discriminant function) ex post discrimination (or validation) is tantamount to prediction, provided the researcher proves that stationarity indeed exists.

The objections raised by Joy and Tollefson do not invalidate the use of the technique in the present study. This is because the primary objective of model derivation in this study is not to predict bankruptcy per se, but to classify companies (ex post discriminations). Their suggestion that the technique is useful in testing the stability of the variables over a period is also helpful. One can assume that cross-validation provides a means of testing the stability of the variables (ratios) for the period under review.

7.7 COMPARISON WITH PREVIOUS STUDIES:

As noted in Chapter 5, several studies have adopted discriminant analysis to assess the likelihood of bankruptcy. The misclassification error rates reported in these studies are summarised in Table 7.11 in order to provide a form of comparison with the present study. Although, the prevailing economic condition during the relative period of these studies are not homogeneous, the results of the present study appear to be on comparable terms with the previous studies.

Table 7.11

Misclassification Rates of Bankruptcy Prediction Studies:

Study by	Error Rates			
	Type 1	Type II	Overall	Holdout
Beaver (1966)	22%	5%	10%	13%
Altman (1968)	6%	3%	5%	27%
Deakin (1974)	3%	3%	3%	22%
Blum (1976)	4%	7%	7%	5%
Altman et al (1977)	7%	10%	9%	7%
Taffler (1983)	4.3%	0%	2%	15.3%[1]
Present Study	6.7%	0%	3.3%	10%

Notes: 1. The holdout sample was constructed in a different manner from other studies. The holdout sample consisted of sample population in EXSTAT tape from 1973 to 1980. The error rate indicates the average percentage of companies 'at risk' over the eight-year period.

7.8 VIOLATION OF LINEAR DISCRIMINANT ANALYSIS ASSUMPTIONS:

In Chapter 6, Section 6.3, two important assumptions which underlie the application of linear discriminant analysis were stated - multivariate normal distribution and identical population co-variance matrices. The latter assumption implies not only that the K variables are the same in the two populations, but also that the same relationship (covariance) holds between any two variables, for example, profitability and liquidity. It is important to discover the extent to which the assumptions have been violated in the present study. This issue is discussed below.

7.8.1 Sensitivity Analysis:

As stated in Chapter 6, Section 6.3.13, the similarity of the variance-covariance matrices can be tested using Box's M Test, which is based on the determinants of the group covariance matrices. However, this test was not used in the present study because of its interpretational difficulties. Instead, the Mahalanobis distance D^2 statistic was used (in addition to other methods, see Section 7.4). Singh (1971) invoked Reyment (1962) to argue that a notable property of the D^2 statistic is its insensitivity to moderate departures from the homogeneity of dispersion matrices, provided the numbers of observations in the two groups are equal.

The second assumption which may affect the outcome of the present study is the assumption of multivariate normality. Although there is no evidence that the sampling distribution of the groups in the present study is seriously non-normal, it is difficult to obtain a normally distributed sample in practice. However, the central limit theorem may imply a reduction in the seriousness of non-normality. According to the theorem, the sampling distribution of any mean will approach normality as the sample size increases, regardless of the form of the distribution of the variable in the population from which the samples are drawn, provided only that the population distribution has a finite mean and variance.

Lachenbruch (1975) has shown that discriminant analysis is not particularly sensitive to minor violations of the normality assumption. The consequence is some reduction in efficiency and accuracy. If classificatory accuracy is a benchmark for violation of the normality assumption, one can conclude that it was not violated in the present study, since a high accuracy rate was achieved.

The relevant question is whether an alternative model could have achieved the same or better degree of accuracy and at the same time fulfilled the intended objectives of the present study. An alternative method of classification is possible: the use of quadratic discrimination rule to classify failed and non-failed companies.

7.8.2 Quadratic Discrimination Rule

The quadratic discrimination rule uses individual group covariance matrices for computing the probability of membership. However, empirical evidence (already referred to in Chapter 6) has shown that the method performs poorly with small sample sizes. Equally, deviations from normality seriously affect the quadratic discriminant function. Taffler (1982) invoked Lachenbruch (1975, p29) to state "..although in theory this is a fine procedure (quadratic), it is not robust to non-normality, particularly if the distribution has longer tails than the normal" p.350.

According to Taffler, none of the related empirical studies has shown the superior discriminatory ability of a quadratic function "on other data than those from which the function was derived".

The implication of the foregoing statement is that even though the quadratic function may have succeeded in the classification of the original sample in the present chapter, it would probably have been ineffective in testing the failing-company hypothesis which formed one of the major objectives of the present study. This technique was therefore not used in testing the data in the current study.

7.9 SUMMARY OF CHAPTER:

A bankruptcy model was derived from a sample of thirty failed and thirty non-failed companies. The overall accuracy rate of the discriminant model was 96.7% (with two misclassifications) when applied to the same sample data. A series of validation tests were carried out in order to establish the robustness of the model. Both the Lachenbruch test (96.7% overall accuracy) and application of the model to an independent time-coincident sample (89.6%) suggest that the derived bankruptcy model is not sample-specific. In the next chapter, the model is utilized in testing the failing company hypothesis of mergers.

CHAPTER 8

FAILING COMPANY MERGER MOTIVE

THE EVIDENCE

8.1 Introduction:

One of the objectives of the present study is to determine if acquired companies possessed financial characteristics similar to previous failed companies. In order to achieve the objective, a bankruptcy prediction model was derived from a group of failed and non-failed companies (chapter 7). The model exhibited a high degree of accuracy. Subsequent validations of the model illustrated its robustness for the particular time-period and also the non-sample-specific nature of the model. The purpose of this chapter is to apply the model derived in testing the failing company hypothesis of merger.

8.2 PROCEDURES USED FOR SPECIFIC HYPOTHESIS:

The bankruptcy prediction model was developed in order to test the following hypothesis:

H_o: There is no significant difference between the proportion of firms possessing 'failing' characteristics in the sets of acquired and non-acquired companies:

H_1: There is a larger proportion of firms possessing failing characteristics in the set of acquired companies:

8.3 THE TEST GROUP (ACQUIRED COMPANIES):

The derived model was applied to a group of acquired companies. As stated in chapter chapter, they were comprised of the largest acquisitions in the period from January 1979 to June 1983 listed in the 'Times 1000'. A total of 104 companies met the selection criteria.

8.3.1 Result of the Test Group:

On the application of the discriminant function to the group of 104 acquired companies, thirty-seven

companies (35.6%)[1] exhibited financial characteristics similar to failed companies from which the model was derived (see Appendix E). At a glance, this appears to be an impressive result, if one takes into consideration the nature of the misclassification in the original model and the subsequent validations. The misclassification was of Type I nature, this type of error could imply that the model had a slight tendency to classify failed companies as non-failed and not vice versa. Thus it might be argued that the classification of companies as failing is slightly understated by the model.

8.4 THE CONTROL GROUP:

In order to interpret the above results consideration needs to be given to the result of applying the model to the alternative group of companies (Control group). The control group consisted of companies similar to the Test group, but which were not acquired during the period under review. A random sample of 104 companies, listed consistently in the 'Financial Times' over the five year period (1979-1983) (see Appendix G) was selected.

1. If the prior probability was set at 0.5, the acquired companies classified as possessing financial characteristics similar to failed companies would have been 42 (40.4%).

8.4.1. Result of the Control Group:

On the application of the model to the control group of 104 companies, 16 (15.4%) exhibited financial characteristics similar to previous failed companies (see Table 8.1). Of the 16 companies, four have been acquired in subsequent years, two have been declared bankrupt and the rest are still trading. The results illustrate once more that some of the companies still trading possess financial characterisitics similar to previous failed companies.

However, the test of merger as an alternative to bankruptcy does not depend on the absolute magnitude of the frequency at which acquired firms might have failed, but upon whether this frequency is larger or smaller than that observed in non-acquired firms.

Table 8.1

NUMBER OF PREDICTED BANKRUPTCIES IN SUBSAMPLES OF ACQUIRED AND NON-ACQUIRED COMPANIES

Model Prediction	Samples	
	Group 2 (Nonacquired)	Group 1 (Acquired)
Non-Failing	88 (84.6%)	67 (64.4%)
Failing[1,2]	16 (15.4%)	37 (35.6%)
Total Companies	104 (100.0%)	104 (100.0%)

Notes: 1. The observed difference between the proportion of failing firms in Group 1 and Group 2 is different from 0 at the 0.1% level of significance (one tail test).

The Test statistic is

$$\frac{(Ps_1 - Ps_2) - (P_1 - P_2)}{\sqrt{P\ (1 - P)\ (1/n_1 + 1/n_2)}}$$

where $Ps_1 = x_1/n_1$: $Ps_2 = x_2/n_2$

- Ps_1 = sample proportion obtained from population 1
- Ps_2 = sample proportion obtained from population 2
- $p_1 - p_2$ = hypothesised population differences between proportions (i.e. = 0)
- x_1 = number of failures in Sample 1
- x_2 = number of failures in Sample 2
- n_1 = size of sample taken from population 1
- n_2 = size of sample taken from population 2
- P = pooled estimate of the population proportion. The estimate P is the number of 'failures' in the two samples combined $(x_1 + x_2)$ divided by the total sample size $(n_1 + n_2)$

2. The observed difference is also significant at the 0.2% level when tested using χ^2 with Yates Correction ($\chi^2 = 10.1$).

There is strong evidence to reject the null hypothesis. It seems most likely that there are statistically significantly more companies having failing characteristics in the acquired set.

This evidence lends credence to bankruptcy avoidance as a motive for mergers for the acquired companies. The result is therefore in line with the argument advanced by Dawey (1961) and the empirical findings of Shrieves and Stevens (1979) and Taffler and Soper (1983). However, the finding is only evidence that some companies possessed financial characteristics similar to failed companies and may not imply bankruptcy avoidance per se since it is impossible to observe the bankruptcy.

Moreover, Taffler and Soper suggested that the evidence of merger as an alternative to bankruptcy varies with the state of the economy. In order to investigate if this assertion holds for the data used in the present study, the companies were split into financial years to reflect the state of the economy. The financial years up to 1980/81 were regarded as a pre-recession period, while the later years were regarded as recession period. Table 8.2 shows the z-score distribution of the companies. In the pre-recession years (1979/80 and 1980/81), there was no evidence to reject the null hypothesis. In other words, it seems most unlikely that there were statistically significantly[1] more companies possessing failing characteristics in the acquired set.

1. Test statistic as in Table 8.1

Table 8.2

CLASSIFICATION OF Z-SCORES BY STATE OF THE ECONOMY

Predicted	1979/80	1980/81	1981/82	1982/83	1983/84	Total
ACQUIRED:						
Failing	6	6	6	6	13	37
Non-Failing	15	20	9	13	10	67
Total	21	26	15	19	23	104
% Failing	28.6	23.1	40.0	31.6	56.6	35.6
NON-ACQUIRED:						
Failing	4	7	1	2	2	16
Non-Failing	27	16	21	19	5	88
Total	31	23	22	21	7	104
% Failing	12.9	30.4	4.5	9.5	28.6	15.4

Table 8.3 shows a comparison of the size (net assets) of the two groups of acquired companies. The evidence indicates a significant difference between the net assets of the two groups. This implies that acquired companies with financial characteristics similar to previous failed companies are smaller in size compared with the other set of acquired companies. This finding may reinforce the notion that the mortality rate of small companies is higher than larger companies. However, this evidence does not warrant an inferrence that firms fail because they are small.

Table 8.3

SIZE (NET ASSETS) DISTRIBUTION OF ACQUIRED COMPANIES:

Acquired Companies	Mean (£M)	Std Deviation	No of Companies
'Failing'	38.33	43.09	37
'Non-Failing'	69.99	137.24	67
T-Statistic		1.35*	

*statistically different from 0 at 1% level (one-tailed test).

8.4.2 Paired-Sample Procedure:

In order to eliminate possible bias as a result of industry, year and size of companies, another group of acquired and non-acquired companies was selected. The acquired group (Group 3) consisted of forty randomly selected companies from the one hundred and four acquired companies in Group 1. The non-acquired group (Group 4) consisted of a 'fresh' forty companies selected to match the acquired companies (in Group 3) by size (net assets), industrial classification and year of account. By such an approach, a non-acquired company is considered as an alternative acquisition target. (This extra new group of non-acquired companies has not been involved in any part of the analysis so far) (see Appendix H).

Table 8.4 shows the size distribution of the two groups of companies. The minimum net asset value for the acquired companies was £m3.90 and the maximum was £m377.60 with a mean of £m63.06. Similarly, the minimum and maximum net asset values for the non-acquired companies were £m 4.05 and £m 341.63 respectively with a mean of £m 62.41. There was no significant difference between the net asset values of the two groups.

Table 8.4

SIZE (NET ASSETS) DISTRIBUTION OF THE ACQUIRED AND NON-ACQUIRED COMPANIES (GROUP 3 AND GROUP 4)

Classification of Companies	Mean (£M)	Std Deviation	Std Error	N
Acquired	63.06	80.89	12.79	40
Non-Acquired	62.41	79.10	12.50	40
T-statistic	0.04			

The results of the matched-pairs are presented in Table 8.5. The result confirms the significant difference between the acquired and non-acquired companies, though at the 5% significance level. The observed percentage of failing in the set of acquired companies is very similar to Table 8.1.

Table 8.5

NUMBER OF PREDICTED BANKRUPTCIES IN SUBSAMPLES OF ACQUIRED AND NON-ACQUIRED COMPANIES

Model Prediction	Samples	
	Group 4 (Non-acquired)	Group 3 (Acquired)
Non-Failing	34 (85.0%)	25 (63.0%)
Failing[1,2]	6 (15.0%)	15 (37.5%)
Total Companies	40 (100.0%)	40 (100.0%)

Notes: 1. The observed difference between the proportion of failing firms in Group 3 and Group 4 is statistically different from 0 at the 0.5% level of significance (one tail test).

2. The observed difference is also significant at the 0.5% level when tested using χ^2 with Yates Correction ($\chi^2 = 4.12$).

8.4.3 Comparison With Previous Studies:

As stated in Chapter 4, the bankruptcy avoidance rationale has been previously investigated using a bankruptcy prediction model. The results of these studies together with the findings of the present study are summarised in Table 8.6.

Table 8.6

NUMBER OF PREDICTED BANKRUPTCIES IN SUB-SAMPLES OF ACQUIRED AND NON-ACQUIRED COMPANIES IN PREVIOUS STUDIES

Author	Country	Predicted Bankruptcies	
		Non-acquired Companies	Acquired Companies
Shrieves and Stevens (1979)	(USA)	5 (4.5%)	17(15.2%)
No. of companies		112	112
Taffler and Soper (1983)	(UK)	10(12.5%)	14(17.5%)
No. of companies		80	80
Present Study (Paired Control Group)	(UK)	6(15.0%)	15(37.5%)
No of companies		40	40
Present Study (Random Control Group)	(UK)	16(15.4%)	37(35.6%)
No. of Companies		104	104

The low prediction rate for the non-acquired companies in the Shrieves and Steven's study is surprising. It is possible that this results from different general failure rates in the USA, but it seems out of line with other studies using the same model (Taffler and Soper (1983)). This led Taffler and Soper to suggest "some methodological problems despite the valid paired sample approach used". However, it is reasonable to argue that some industries are more failure prone than others. So if acquisition activity is low in a particular industry during a study period, it could invariably exclude companies from the industry for the pair-match procedure.

Further, an alternative reason which appears plausible is that the pair-matching procedure is necessary to eliminate possible bias arising from different asset size and accounting year. By this approach, a matched non-acquired company is considered as an alternative acquisition target to the acquired company. The advantages of the procedure notwithstanding, the problem of matching companies by size and industry should also be noted. Theoretically, it is possible to match companies by size and industrial classifications. However, in practice, (especially for acquisition purposes), it is difficult to match companies by such criteria. The major

problem is matching the actual size of the acquired company, either by net assets value or sales. For example, if the acquired company is the 'largest' company in the industrial grouping, and other companies are clustered within the lower decile of the industry, it is difficult to match the acquired company with the remaining companies. Conversely, if the acquired company is the 'smallest' in the industrial classification group, matching it with a non-acquired company appears somewhat arbitrary. Therefore, caution should be applied in the interpretation of the matched-pair procedure.

In the next section, the failing-company hypothesis for the acquiring companies is tested.

8.5 FAILING-COMPANY HYPOTHESIS FOR THE ACQUIRING COMPANY:

As already stated, Weston and Manshingka (1971) provided empirical evidence to suggest that some companies adopt an acquisition strategy in order to avoid bankruptcy. This version of the failing-company hypothesis is tested in this section.

8.5.1 Formal Hypothesis:

H_o: There is no significant difference between the proportion of firms possessing 'failing' characteristics in the sets of acquiring and non-acquiring companies:

H_1: There is a larger proportion of firms possessing failing characteristics in the set of acquiring firms:

8.5.2. The Test Group (Acquiring Companies):

In order to test the failing company hypothesis for the acquiring companies, the model derived in the previous chapter and used in the previous section was applied to a group of acquiring companies. This group consisted of companies that made 'large' acquisition during the period under review. The number was less than 104, (see Appendix E) because of the exclusion of foreign and unlisted companies. Eleven companies out of seventy-six companies were classified as possessing failure characteristics (see Table 8.7). This result contrasts sharply with the one obtained when the model was applied to the group of acquired companies. A comparison was also made with the group of non-acquiring companies during the review period (see Appendix I). This group consisted of companies that did not make any significant acquisition during the study period. Twelve companies out of seventy-six

non-acquiring companies were classified as possessing financial characteristics similar to previous failed companies.

Table 8.7

NUMBER OF PREDICTED BANKRUPTCIES IN SUB-SAMPLES OF ACQUIRING AND NON-ACQUIRING COMPANIES

Model Prediction	Samples	
	Group 2 (Non-acquiring)	Group 1 (Acquiring)
Non-Failing	64 (84.2%)	65 (85.5%)
Failing[1]	12 (15.8%)	11 (14.5%)
Total Companies	76 (100.0%)	76[2] (100.0%)

Note: 1. This is not statistically significant, i.e., there is no evidence to reject the null hypothesis. It seems likely that there is no significant difference between the proportion of companies possessing failing characteristics in the two sets of companies.

2. Five companies were involved in the derivation of the discriminant model (Chapter 7). However, in four cases, the financial statements were drawn from different accounting years, hence the retention of these companies does not imply double counting. One of the five companies was excluded from the analysis because the financial statements would have been drawn from the same accounting year.

The result presented in Table 8.7 indicate that there is no difference between the proportion of companies possessing failing characteristics in the two sets of companies.

Based on the outcome of the test, there is therefore no evidence to suggest that acquiring companies during the period of this study embarked on acquisition in order to avoid bankruptcy. The failing-company hypothesis as advanced by Weston and Manshingka (1971) is therefore refuted.

However, an examination of the financial characteristics of the companies they acquired indicated the following pattern. Of the eleven acquiring companies, with 'danger' z-scores, five acquired companies with similar z-scores, three acquired companies with better z-scores than theirs and the targets of the other three were not eligible for consideration in the present study (see Appendix E).

The findings of this study are in the direction that theory might suggest - that is, that acquiring companies would be stronger performers than the acquired companies. This is consistent with the findings of Tzoannos and Samuels (1972), Firth (1976) and Taffler and Soper (1983). The rejection of the failing-company hypothesis for the

acquiring companies is not surprising. In a climate of contested takeover bids as has been prevalent in recent times, it is unlikely that a potential acquirer with a 'weak' financial record could make a successful acquisition. Defensive 'rhetorics' have included the criticism of the profitability, growth records or the managerial 'competence' of the acquiring companies. It is possible that any evidence to support the criticism might 'help' to influence the outcome of the takeover bid. However, the size of a company appears to be an important factor in takeover decision (see Table 8.8).

Table 8.8 shows the difference in size between the acquired and acquiring companies. The findings confirm previous studies (summarized in Chapter 2, Appendix A.) that size is a strategic factor in takeover decision. Smaller companies are more likely to be taken over than larger companies.

Table 8.8

SIZE DISTRIBUTION:
ACQUIRED AND ACQUIRING COMPANIES

Type of Company	Mean (£M)	Std Deviation	No of Companies
Acquired	58.93	114.26	104
Acquiring	218.38	280.78	75[1]
T-Statistic	-5.21*		

*statistically different from 0 at 1% level (one-tailed test).

Notes. 1. Two companies had net assets value over £1b and were excluded from the number. (One of the two companies was involved in the derivation of the model and was excluded from the analyses in Tables 8.6 and 8.7 and were excluded from the number).

8.6. Conclusion and Summary:

The bankruptcy prediction model developed in chapter seven was applied to a group of acquired and non-acquired companies. The result indicated that a higher proportion (statistically significant at the 1% level) of acquired companies possessed failing characteristics than non-acquired companies. The result tends to support the merger as an alternative to bankruptcy rationale. This evidence is in line with the theoretical framework discussed in Chapter 4, and consistent with other recent empirical findings (Shrieves and Stevens (1979) and Taffler and Soper (1983)).

The bankruptcy prediction model was also applied to a group of acquiring and non-acquiring companies in an attempt to test the failing company hypothesis for the acquiring companies. The results obtained indicate that there was no difference between the proportion of companies possessing failing characteristics in the two sets of companies. Following this result, the failing-company hypothesis for the acquiring companies is therefore refuted. The outcome is consistent with previous empirical studies which have tended to suggest that acquiring companies are stronger performers than the acquired companies or perhaps to the view that it is the strong firms that take over the weak.

The empirical approach adopted in this chapter allowed the dichotomisation of the acquiring companies (i.e. into those firms who acquired others which possessed 'failing' characteristics and those who acquired 'non-failing' firms). In the next chapter, the post acquisition performance of the acquiring companies is considered.

CHAPTER NINE

POST-MERGER PERFORMANCE OF ACQUIRING COMPANIES

9.1. INTRODUCTION:

In Chapter 3, it was reported that previous studies by Singh (1971), Utton (1974) and Meeks (1977) showed that acquisitions did not improve the profitability of the acquirer, and in most cases, they suffer a decline in profitability subsequent to acquisition. However, these studies treated acquisitions as a homogeneous set. It is hypothesized in the present study, that such an approach might mask differential effects resulting from the nature (failing or not) of the firms being acquired. To investigate this possibility, it was first necessary to split the acquiring companies into two groups - those acquiring others with 'failing' characteristics and those acquiring others with 'non-failing' characteristics - and to measure the post-combination performance of each group separately.

In chapter eight, fairly convincing evidence that mergers seem to have provided a more attractive

alternative to bankruptcy has been presented. The procedures adopted enabled acquiring companies to be classified according to the financial characteristics of the firm acquired. The post-acquisition performance of the two groups will be considered in the current chapter to see whether any differential performance is observed. The observation of superior performance by either group would have fairly obvious policy implications.

9.2 PERFORMANCE MEASURES:

The performance measurements used in this study were mainly 'accounting-based', including profitability and gearing ratios (see Table 9.1). Other measures used were the Meeks' (1977) industry-standardized profitability measure and Taffler's (1982) performance analysis score (PAS), which seeks to measure relative strength by ranking company 'Z-scores'.

Table 9.1

Accounting Based Ratios[1]

Terms	Meaning
EBIT/TA	Earnings before interests and taxes/total assets
EBIT/NA	Earnings before interests and taxes/net assets
PBT/TA	Profit before taxes/total assets
PBT/NA	Profit before taxes/net assets
PBT/SA	Profit before taxes/sales
TD/EQT	Total Debts/Equity
SALES/TA	Sales/Total assets

1. These are the ratios used by InterCompany Comparisons (ICC) for their interfirm comparisons.

9.3 THE EFFECT OF ACQUISITION ON PROFITABILITY:

In Chapter three, the likely effects of acquisition on profitability were discussed. Most of the studies to date show that on average profitability declined after merger. Singh (1971) and Meeks (1977) showed that on average profitability declined after merger, whilst Cosh, Hughes and Singh (1980) showed that profitability either increased, or remained the same following merger. It is therefore important to investigate the effect on profitability for the sample in the present study.

However, as Steiner (1975) pointed out, there are a number of motivational factors which would influence the outcome of a merger. For example, if the acquirer's management aims at maximising profits, they would expect an increase in the profitability of the combined company, over what the weighted average of the profitability of the two combining companies would have been had they not merged. Similarly, as Hindley (1973) has argued, the sale of a business takes place only when "the buyer has higher expectations of its future profitability than the seller". If these higher expectations are fulfilled after sale, then an increase in profitability should result. However, that may not be a sufficient condition even for a profit-maximising acquirer. It may be that the

expectations of the profitability of the company by the participants (buyer and seller) are at equilibrium, and the buyer takes the view that the independent existence of the companies will result in a lower profit for both of them than would be the case if they merged.

In the behavioural theories, a merger may exhibit a potential for higher profitability, either through increased market power or lower average costs for the combined firm, and yet the profitability may not be achieved in practice. This may be due to relaxation of effort on the part of management. As Leibenstein (1966) stated:

> "... firms and economies do not operate on an outer-bound production possibility surface consistent with their resources. Rather they actually work on a production surface that is well within that outer bound. This means that for a variety of reasons people and organisations normally work neither as hard nor as effectively as they could. In situations where competitive pressure is light, many people will trade the disutility of greater effort, of search, and the control of other peoples' activities for the utility of feeling less pressure and of better interpersonal relations" p.413.

Leibenstein refers to the relaxation of effort in terms of an increase in 'X-inefficiency'.

Following from Cyert and March (1963), it may be argued that a company's performance depends to a considerable extent on managerial aspirations. The aspirations are relatively stable in the short run. In such situation, a change in the environment which exhibits potentiality for higher profitability may not in the circumstance lead to it; either the company may not realise the potential benefits or they may be absorbed in less efficient production or administration.

In view of the foregoing discussions, it appears that the use of profit indicators as a measurement of merger success is not a simple one. However, of particular relevance in the present study is whether by acquisition, the acquiring companies have prevented impending failures, in other words, generating a 'social' gain. In such situations, the observation of no decline in profitability might still be considered beneficial.

9.4 THE FORMAL HYPOTHESIS:

Using the variables defined in Table 9.1, the formal hypothesis tested can be stated in the following manner:

H_0: There is no significant difference between the post-acquisition and pre-acquisition performance of the acquiring companies:

H_1: There is significant difference between the post-acquisition and pre-acquisition performance of the acquiring companies.

9.5 SAMPLE SELECTION:

In order to test the above hypothesis and others, financial variables were computed from the financial statements of the acquiring companies defined in chapter eight. To be considered eligible for inclusion, it was required that in the two years immediately following the acquisition the company made no further acquisitions. This is important if the impact of the particular acquisition is to be observed. A longer acquisition-free period would have allowed longer-term effects to be observed (as in Meeks,(1977)). Although the two-year period appears arbitrary, it was considered a reasonable compromise given that many of the firms in the sample did not have a longer acquisition-free period. It could also be argued that a shorter period is more likely to capture

the 'impact' of acquisition on the acquiring firms' performance. In a longer period, assuming no further acquisitions, the impact of the merger is more likely to be neutralized and polluted by other environmental influences.

9.6 TEST OF SIGNIFICANCE USED:

The student-t test was employed to test the differences between the pre-and post-performance of the acquiring companies. Similarly, the two-sample-t test was employed to test the difference in the performance of the two groups of companies. Based on the sampling distributions of the stated statistic, one can calculate the probability that a difference at least as large as the one observed would occur if the two population means are equal. This probability is called the observed significance level. If the observed significance level is small enough, usually less than 0.05 or 0.01, the hypothesis that the population means are equal is rejected.

One objection of using parametric instead of non-parametric tests is the distributional assumptions of the former. The parametric tests assume that the samples are normally distributed. In practice, however, the

assumption of normality is rarely met, but the central limit theorem implies that as the sample size gets large enough, the sampling distribution of the mean can be approximated by the normal distribution, even when the population distribution is significantly non-normal. In most of the tests this condition appears to be met. The power of the parametric test makes it appropriate for the present analysis, because it is more likely than the non-parametric in detecting the true differences between two populations.

9.7 SIMPLE RATIO MEASURES:

9.7.1 Initial Tests:

As a first step toward testing the hypothesis, the average (arithmetic mean) values of variables Y1..Y7 were computed for all acquiring companies (see Appendix J). The results are shown in Tables 9.2 and 9.3. The changes in the ratios following the acquisition are reported as well as the result of testing whether the observed change was different from zero.

TABLE 9.2

ABSOLUTE CHANGES IN MEANS OF THE VARIABLES FOR THE ACQUIRING COMPANIES

(t + 1)[1] One year Post

	Variables	Pre-Merger Means[2]	Post-Merger Means	D (note 3)	T-Value	Sig level	N (note 4)
1	EBIT/TA	12.76	10.51	-2.25	-2.82	0.00*	48
2	EBIT/NA	21.22	17.34	-3.88	-2.36	0.02**	48
3	PBT/TA	11.09	7.90	-3.19	-3.54	0.00*	48
4	PBT/NA	17.96	13.04	-4.92	-2.83	0.00*	48
5	PBT/SA	7.39	5.29	-2.10	-3.27	0.00*	48
6	TD/EQT	122.52	144.80	22.28	2.71	0.00*	48
7	SALES/TA	174.96	167.61	-7.35	-1.54	0.13	48

Notes:

1. Changes in the means: (t + 1) - (t - 1) where t + 1 = One year after the merger and t - 1, one year before merger.
2. Units of measurements are in percentages.
3. Difference between post-merger and pre-merger means.
4. Number of companies.

* statistically different from 0 at the 1% level (using a two-tail t-test)

** statistically different from 0 at the 5% level.

TABLE 9.3

ABSOLUTE CHANGES IN MEANS OF THE VARIABLES FOR THE ACQUIRING COMPANIES

(t + 2)[1] two year Post

	Variables	Pre-Merger Means[2]	Post-Merger Means	D (note 3)	T-Value	Sig level	N (note 4)
1	EBIT/TA	12.76	10.56	-2.20	-2.46	0.01*	48
2	EBIT/NA	21.22	17.74	-3.48	-1.98	0.05**	48
3	PBT/TA	11.09	7.99	-3.10	-3.15	0.00*	48
4	PBT/NA	17.96	13.29	-4.67	-2.58	0.01*	48
5	PBT/SA	7.39	5.27	-2.12	-3.11	0.00*	48
6	TD/EQT	122.52	138.99	16.47	2.14	0.03**	48
7	SALES/TA	174.96	174.00	-0.96	-0.21	0.83	48

Notes as in Table 9.2

The results indicate that the profit-related performance variables (1 - 5 in Tables) decreased one and two years after acquisition. The decline is statistically significant at levels ranging from 0.0% to 2% for the first year, and 0.0% to 5% for the second year after acquisitions. Conversely the gearing ratio increased for the two years; the increase is statistically significant from zero in both years. However, no causation can be inferred until a comparison is made with the performance of non-acquiring companies. The differences in means of Sales/Total Assets pre and post-mergers are not statistically significant.

9.7.2 Further Tests Holding Industry Constant:

The statistical test employed implicitly assumes that except for the classificatory variables, there are no other omitted variables which exert systematic effects upon the dependent variables. The most obvious variable omitted from the initial tests is the performance of non-acquiring companies during the study period. There are reasons to believe that mergers occur more frequently in some industries than in others and growth in the financial variables generally differ from one industry to

another. In order to determine whether the effects revealed in Tables 9.2 and 9.3 could be due entirely to acquisition, further statistical tests were conducted in order to eliminate industry and economy related factors.

To test the performance of non-acquiring companies during the period, forty-eight companies were selected and matched with the acquiring companies according to their industrial classification, year of acquisition and year of accounts (see also Appendix J). The comparable results of pre- and post-merger performance measurements for non-acquiring companies are shown in Tables 9.4 and 9.5.

TABLE 9.4

ABSOLUTE CHANGES IN MEANS OF THE VARIABLES FOR THE NON-ACQUIRING COMPANIES (t + 1)[1] One Year Post

	Variables	Pre-Merger Means[2]	Post-Merger Means	D (note 3)	T-Value	Sig level	N (note 4)
1	EBIT/TA	11.91	11.79	-0.12	-0.29	0.77	48
2	EBIT/NA	17.54	17.43	-0.11	-0.16	0.88	48
3	PBT/TA	9.90	9.43	-0.47	-1.04	0.30	48
4	PBT/NA	14.61	13.64	-0.97	-1.12	0.27	48
5	PBT/SA	7.24	7.00	-0.24	-0.73	0.47	48
6	TD/EQT	113.59	117.14	3.55	0.70	0.48	48
7	SALES/TA	157.35	160.46	3.11	0.70	0.49	48

Notes as in Table 9.2

TABLE 9.5

ABSOLUTE CHANGES IN MEANS OF THE VARIABLES FOR THE NON-ACQUIRING COMPANIES (t + 2)[1] Two Year Post

	Variables	Pre-Merger Means[2]	Post-Merger Means	D (note 3)	T-Value	Sig level	N (note 4)
1	EBIT/TA	11.91	11.25	-0.66	-1.07	0.29	48
2	EBIT/NA	17.54	16.65	-0.89	-0.86	0.40	48
3	PBT/TA	9.90	9.12	-0.78	-1.25	0.22	48
4	PBT/NA	14.61	13.48	-1.13	-1.09	0.28	48
5	PBT/SA	7.24	6.95	-0.29	-0.71	0.47	48
6	TD/EQT	113.59	119.51	5.92	0.82	0.42	48
7	SALES/TA	157.35	162.28	4.93	0.84	0.41	48

Notes as in Table 9.2

The results shown in Tables 9.4 and 9.5 for the first and second year respectively indicate a very slight decrease in the profit-related variables of the non-acquiring companies. These decreases are not only much smaller than those obtained for the acquiring companies, but they indicate a decline which is of no statistical significance. The decline in profitability measures of the non-acquiring companies is to be expected, because the period between December 1978 and December 1981 saw British industry as a whole having to weather the worst effect of the world recession. It is to be noted that the majority of the companies in this study were selected from this time period.

What is important, however, is whether the impact of the recession was more severe on the acquiring than on the non-acquiring companies. To shed more light on the difference between the performance of the two groups, two-sample-t tests were conducted on the differences in means between the acquiring and non-acquiring companies. The results are presented in Tables 9.6 and 9.7.

TABLE 9.6

DIFFERENCES IN MEANS[1] OF ACQUIRING AND NON-ACQUIRING COMPANIES: (One-Year Post)

Variables	Acquiring Means	Non-Acq. Means	D (note 2)	T-Value	Sig level	N
1. EBIT/TA	-2.25	-0.12	-2.13	2.37	0.02**	48
2. EBIT/NA	-3.88	-0.11	-3.77	2.10	0.03**	48
3. PBT/TA	-3.20	-0.47	-2.73	2.70	0.00*	48
4. PBT/NA	-4.92	-0.97	-3.95	2.04	0.04**	48
5. PBT/SA	-2.09	-0.24	-1.85	2.56	0.01*	48
6. TD/EQT	22.28	3.55	18.73	-1.94	0.05**	48
7. SALES/TA	-7.35	3.11	-10.46	1.60	0.11	48

Notes:

1. A two-sample-t test on the difference between the 'differences in the means' of the variables for the two independent groups. This approach is considered appropriate in order to determine the severity or otherwise of the changes incurred by each of the two groups.

2. Difference between the mean change in ratio observed for acquiring and non-acquiring groups.

* statistically different from 0 at 1% level;
** statisfically different from 0 at 5%

The results shown in Table 9.6 indicate that there is a significant difference between the changes incurred in the profitability variables of the two groups of companies. There was a small difference (not statistically significant) in the asset-utilisation variable. However, the change observed in the gearing ratio was significant, perhaps suggesting that the acquiring companies may have increased the variable in order to finance the acquisitions.

TABLE 9.7

DIFFERENCES IN MEANS[1] OF ACQUIRING AND NON-ACQUIRING COMPANIES: (TWO YEAR POST)

Variables		Acquiring Means	Non-acq. Means	D (note 2)	T-value	Sig level	N
1.	EBIT/TA	-0.20	-0.66	-0.46	1.41	0.16	48
2.	EBIT/NA	-3.48	-0.88	-2.60	1.27	0.21	48
3.	PBT/TA	-3.10	-0.78	-2.32	2.00	0.04**	48
4.	PBT/NA	-4.67	-1.13	-3.54	1.70	0.09	48
5	PBT/SA	-2.12	-0.29	-1.83	2.29	0.02**	48
6	TD/EQT	16.49	5.92	10.57	-1.00	0.32	48
7	SALES/TA	-0.96	4.94	-5.90	0.80	0.43	48

** Statistically different from 0 at 5% level

Notes as in Table 9.6

Table 9.7 presents the result of the second year after acquisiton. The gap in the changes between the two groups of companies narrowed indicating perhaps the 'severe' impact of acquisition on the year immediately after the incidence. This result may indicate that in the long-run, the 'adverse' effect of acquisition may become negligible. However, there is little evidence to support the proposition, given that studies like Utton (1974) and Meeks (1977) which considered the impact of acquisition on profitability for a longer period of time also showed continued decline in profitability.

The foregoing evidence illustrates the effect of acquisition on the measurement variables used in the present study. The results show that the profit-related performance

variables of the acquiring companies decreased one and two years after acquisition. The findings confirm to some extent the findings of previous studies that acquisition does not improve profitability, thus kindling some support for the managerial motive for mergers.

However, while the profitability measures decline at statistically significant levels for the two years, the gearing ratio increased. The increase is statistically significant for both years. This perhaps suggests that the acquiring companies have increased gearing ratios in order to finance the acquisitions. On the asset utilisation variable, the acquiring companies incurred a slight decline (not statistically significant) for the two years after acquisition. This indicates, albeit weakly, that in the first year after acquisition the acquiring companies' management may possibly have lost control over the combined assets or perhaps more likely that it took at least one year to "prune-out" duplicated or wasteful assets.

In view of the above evidence, there appear to be convincing reasons to reject the null hypothesis that there is no difference between the post-acquisition and pre-acquisition performance of the acquiring companies, where performance is measured by the profitability variables (1 - 5) in Table 9.1.

9.7.3 Summary of the results on acquisition generally:

The results presented above indicate that on average acquiring companies appear to experience a decline in their profit related financial variables one and two years after acquisition. The differences are significant when compared with a control group of non-acquiring companies of the same industry and same time period. The tentative conclusion of this Section is in line with previous studies reviewed in Chapter 3. These studies hold the view that merging does not improve profitability.

However, while both the previous studies and the current study generally uphold the non-positive effect (often negative) of acquisition on profitability, no evidence has been advanced on how this effect might be "distributed" between the two sets of acquiring companies. In other words, whether the general decline in profitability is as a result of acquisition of potentially failing companies (or even previously 'successful' companies), or the general negative effect of acquisitions. In the next section, tests are carried out to determine the differential effects on the performance of the two sets of acquiring companies.

9.8 SIMPLE RATIO MEASURES - COMPARISON BETWEEN ACQUIRERS: 'NON-FAILING' (SNF) AND 'FAILING' (SF):

9.8.1 Introduction:

The results obtained in the previous section suggest a significant difference between the post-acquisition performance of acquiring and non-acquiring companies. Acquiring companies generally seem to suffer decline in profitability variables. It would be interesting to know whether such a decline is experienced equally by companies which have acquired firms with 'failing' characteristics ('SF') and those which have acquired 'non-failing' ('SNF') firms.

9.8.2 Formal Hypothesis:

H_o: There is no significant difference between the performance of the group acquiring others with 'non-failing' characteristics and those with 'failing' characteristics:

H_1: There is significant difference between the performance of the group acquiring others with 'non-failing' characteristics and those with 'failing' characteristics.

9.8.3 Discussion of Results:

Tables 9.8 and 9.9 present the individual results for the groups for the first year and Tables 9.10 and 9.11 for the second year respectively. The results in these Tables confirm the evidence already obtained in the previous

section that acquiring companies suffered decline in their post-acquisition profitability measures. However, the additional information added by splitting the group into two is that it shows how the decline in post-acquisition profitability was distributed. Tables 9.12 and 9.13 report the differential effects observed for those that acquired 'non-failing' companies and those that acquired 'failing' companies. The SNF group suffered greater decline in their profitability measures. While the decline is statistically significant for the SNF group, decline in the SF group was not. However, the SF group incurred an increase in their gearing ratio.

Table 9.8

ABSOLUTE CHANGES IN MEANS[1] OF THE VARIABLES FOR THE ACQUIRERS: 'NON-FAILING GROUP': ONE YEAR POST-MERGER

Variables	Pre-Merger Means[2]	Post-Merger Means	D (note 3)	T-Value	Sig Level	N (note 4)
1. EBIT/TA	13.74	11.03	-2.71	-2.64	0.01*	26
2. EBIT/NA	21.90	17.53	-4.37	-2.00	0.05**	26
3 PBT/TA	12.24	8.46	-3.78	-3.19	0.00*	26
4 PBT/NA	19.54	13.57	-5.97	-2.48	0.02**	26
5. PBT/SA	8.42	5.24	-3.18	-4.11	0.00*	26
6. TD/EQT	117.83	129.65	11.82	1.53	0.14	26
7. SALES/TA	179.57	179.58	0.01	0.00	1.00	26

Notes:

1. changes in the means: (t + 1) - (t - 1) where t + 1 = one year after the merger and t - 1, one year before merger.

2. difference between post-merger and pre-merger means.

3. Number of companies.

*statistically different from 0 at 1% level (using a two-tail test)
**statistically different from 0 at 5% level.

Table 9.9

ABSOLUTE CHANGES IN MEANS[1] OF THE VARIABLES FOR THE ACQUIRERS: 'FAILING GROUP': ONE YEAR POST-MERGER

Variables	Pre-Merger Means[2]	Post-Merger Means	D (note 3)	T-Value	Sig Level	N (note 4)
1. EBIT/TA	11.60	9.87	-1.73	-1.35	0.09	22
2. EBIT/NA	20.41	17.11	-3.30	-1.30	0.11	22
3 PBT/TA	9.74	7.23	-2.51	-1.79	0.04**	22
4 PBT/NA	16.09	12.40	-3.69	-1.45	0.08	22
5. PBT/SA	6.17	5.35	-0.82	-0.81	0.21	22
6. TD/EQT	128.06	162.69	34.63	2.27	0.01*	22
7. SALES/TA	169.52	153.46	-16.06	-1.86	0.04**	22

Notes as in Table 9.8

Table 9.10

ABSOLUTE CHANGES IN MEANS[1] OF THE VARIABLES FOR THE ACQUIRERS: 'NON-FAILING GROUP': TWO YEAR POST-MERGER

Variables	Pre-Merger Means[2]	Post-Merger Means	D (note 3)	T-Value	Sig Level	N (note 4)
1. EBIT/TA	13.74	10.54	-3.20	-2.89	0.00*	26
2. EBIT/NA	21.90	17.60	-4.30	-1.78	0.08**	26
3 PBT/TA	12.24	8.15	-4.09	-3.54	0.00*	26
4 PBT/NA	19.54	13.52	-6.02	-2.44	0.02**	26
5. PBT/SA	8.42	5.26	-3.16	-4.60	0.00*	26
6. TD/EQT	117.83	128.37	10.54	1.41	0.17	26
7. SALES/TA	179.57	181.48	1.91	0.30	0.77	26

Notes as in Table 9.8

Table 9.11

ABSOLUTE CHANGES IN MEANS[1] OF THE VARIABLES FOR THE ACQUIRERS: 'FAILING GROUP': TWO YEAR POST-MERGER

Variables	Pre-Merger Means[2]	Post-Merger Means	D (note 3)	T-Value	Sig Level	N (note 4)
1. EBIT/TA	11.60	10.58	-1.02	-0.71	0.24	22
2. EBIT/NA	20.41	17.91	-2.50	-0.96	0.18	22
3 PBT/TA	9.74	7.80	-1.94	-1.17	0.13	22
4 PBT/NA	16.09	13.01	-3.08	-1.14	0.14	22
5. PBT/SA	6.17	5.29	-0.88	-0.73	0.24	22
6. TD/EQT	128.06	151.54	23.48	1.64	0.06	22
7. SALES/TA	169.52	165.17	-4.35	-0.70	0.25	22

Notes as in Table 9.8

The differences in the performance of the two groups of acquiring companies could be attributed to the financial strength of the target companies. It may be fairly assumed that acquirers of potentially failing companies are likely to pay less for their acquisitions (other things being equal) than acquirers of non-failing companies. The difference in the 'cost' of acquisition might affect the post-acquisition profitability in three major ways.

Firstly, one theoretical explanation is the working mechanism of the stock market. The basis for this supposition is that if companies are valued by the stock market on the platform of their achieved performance (in other words, performance under existing management), it will be beneficial for the acquirer's management to purchase (other things being equal) a company whose performance is below average within an industry. There are two justifications for this: (a) a company performing less well than others would be relatively cheaper to acquire in relation to its assets and (b) there will be more opportunity for improving the performance of the firm with a lower performance index relative to its industry.

The second possible explanation for the difference in performance between the two groups of acquiring companies is that since the acquirers of non-failing companies are likely to pay more than the other acquirers, this could give rise to a higher 'goodwill', which has the effect of understating the post-acquisition profitability position of the acquiring company[1]. Consider two companies with equal book values of assets (other things being equal), one failing and the other not failing. It is fair to assume that the acquirer of the non-failing company is likely to pay substantially higher than the acquirer of the failing company. Invariably, the higher acquisition costs gives rise to a higher value of goodwill which can reduce the post-merger profitability. However, the validity of this argument is reduced by the imposition of SSAP 22 on Goodwill which requires companies to consolidate the assets of the acquired companies at 'fair value'.

Thirdly, the acquisitions of non-failing companies are more likely to be contested, higher defence (attack!) costs being incurred. These incidental costs are likely to be written off in the profit and loss account, which in turn reduces profitability, either in the year of acquisition or soon after.

1. The effect of goodwill on post-merger profitability is discussed in Section 9.11.4

The increase in the gearing ratio of the group acquiring 'failing' companies could be attributed to the leverage-related acquisition motive suggested by Lewellen (1971) and to a lesser extent by Lintner (1971). They argued that firms might adopt an acquisition strategy in order to take advantage of 'latent debt capacity' because borrowing costs decline with size of firm. One can therefore argue that by acquiring potentially failing companies, the acquirers aimed at reducing their borrowing costs which in turn led to an improvement in their profitability record as compared with the acquirers of non-failing companies.

Tables 9.12 and 9.13 present two-sample t tests for the differences in changes in means reported in Tables 9.8 to 9.11 for the first year and second year after acquisition respectively. The results indicate that a higher decline in profitability measures was incurred by the group acquiring non-failing companies. The reported differences were not statistically significant (except for one variable) possibly partly as a result of the small sample sizes; the differences are nevertheless, quite interesting.

Table 9.12

DIFFERENCES IN MEANS[1] BETWEEN THE ACQUIRERS:
FAILING AND NON-FAILING GROUP
(ONE-YEAR POST-ACQUISITION)

Variables	Failing Group	Non-Failing Group	D (note 2)	T-value	Sig. level
EBIT/TA	-1.73	-2.71	-0.98	-0.60	0.28
EBIT/NA	-3.30	-4.37	-1.07	-0.31	0.38
PBT/TA	-2.51	-3.78	-1.27	-0.69	0.25
PBT/NA	-3.69	-5.97	-2.28	-0.65	0.26
PBT/SA	-0.82	-3.18	-2.36	-1.85	0.04**
TD/EQT	34.63	11.82	22.81	-1.33	0.10
SALES/TA	-16.06	00.01	-16.07	1.64	0.06

Notes:
1. A two-sample t test on the difference between the 'differences in the means' of the variables for the two independent groups. This approach is considered appropriate in order to determine the severity or otherwise of the changes incurred by each of the two groups.

2. Difference between the mean change in ratio observed for acquirers of non-failing and failing companies.

**statistically different from 0 at 5% level.

Tables 9.13

DIFFERENCES IN MEANS[1] BETWEEN THE ACQUIRERS:
FAILING AND NON-FAILING GROUPS
TWO-YEAR POST-ACQUISITION

Variables	Failing Group	Non-Failing Group	D (note 2)	T-value	Sig level
EBIT/TA	-1.02	-3.20	-2.18	-1.20	0.12
EBIT/NA	-2.50	-4.30	-1.80	-0.51	0.31
PBT/TA	-1.94	-4.09	-2.15	-1.07	0.15
PBT/NA	-3.08	-6.02	-2.94	-0.80	0.22
PBT/SA	-0.88	-3.16	-2.28	-1.63	0.06
TD/EQT	23.48	10.54	12.94	-0.80	0.22
SALES/TA	-4.35	1.91	-6.26	0.70	0.25

Notes as in Table 9.12.

9.8.4 Summary of the Results of Comparing Acquirers: 'Non-failing' (SNF) and 'Failing' (SF):

The foregoing results indicate how the decline in profitability variables of the acquiring companies was distributed. Based on the profit-related variables used, the hypothesis of no apparent difference between the two groups of acquiring companies cannot be formally rejected. However, the findings indicate that the group acquiring others with 'non-failing' characteristics generally suffer a greater decline in their performance variables. In other words, it could be argued that companies acquiring others with 'failing' characteristics perform better than the other group.

However, the results obtained so far have only partially taken into consideration the systematic influences on profitability measures other than acquisitions. In the next Section, a methodology which seeks to consider changes in the companies' environment during the period of comparison is adopted.

9.9 NORMALISED PROFITABILITY MEASURES:

9.9.1 Introduction:

The 'normalised profitability' methodology aims at taking into account external influences on mergers by expressing each individual firm's profitability as a proportion of the current year's mean profitability observed in its own industry in aggregate. This is a type of 'profitability index'. Profitability is taken as a proxy for internal efficiency, and therefore observation of the effect of mergers on this normalised profitability is expected to give some indication of whether mergers have improved efficiency.

9.9.2 The Approach:

The empirical approach adopted is to isolate the effect of acquisitions on profitability. There are three steps in the methodology. First, for each merger, the pre-merger profitability of the merging firms was calculated in relation to the relevant industries' profitability. The pre-merger reference period was taken to be an average of two years. Second, post-merger profitability was calculated for the amalgamation, again in relation to the relevant industries' profitability. Third, the difference in the pre-merger and post-merger profitability of merging firms was averaged across the firms and tested for statistical significance.

9.9.3 Hypothesis:

The main null hypotheses can be stated thus:

(a) H_0: There is no change in normalised profitability as a result of merger:

The alternative hypothesis is:

H_1: There is change in normalised profitability as a result of merger

(b) H_0: The proportion of companies showing increase in normalised profitability = 0.50

The alternative hypothesis is:

H_1: The proportion of companies showing increase in normalised profitability is not equal to 0.50.

The sample of mergers eligible for inclusion was reduced from forty-eight to thirty-five in the first year, and thirty in the second year after acquisition. This was because of the non-availability of either the ICC industrial data or the Department of Trade equivalent figures for 1984/85 onwards. These figures had not been published at the time of writing.

The results obtained for the sample eligible for inclusion appear in Table 9.14. A profitability index, for a particular firm, of 1.0 would show that its return on capital employed (profit before tax/average net assets) (ROCE) was equal to the industry average ROCE. Row 1, for example, shows that for the thirty-five mergers for which a comparison could be made, the mean profitability index

was 1.02, i.e. on average the companies had ROCE measures 2% above their respective industry ROCE. For the first year after merger, this increased slightly to 1.04 (a 2% per cent increase). The marked feature of these results is that the average relative profitability of merging firms shows an improvement over the pre-merger level for both post-merger years, although it is not statistically significant. (Note also that the year of merger has been excluded in all the analyses).

Table 9.14

THE CHANGE IN MEAN NORMALISED PROFITABILITY: ALL ACQUISITIONS:

Year	N[1]	Pre-Merger[2] normalised profitability	Post-Merger normalised profitability	D[3]	T-value[4]	P[5]
t + 1	35	1.02	1.04	0.02	0.15	0.54
t + 2	30	1.07	1.18	0.11	0.66	0.47
Note 6	30	1.07	1.11	0.04	0.27	0.43

Notes: 1 N denotes number of companies
2. Average of two years pre-merger profitability
3. Difference between pre-and post- merger profitability.
4 None of the differences is statistically different from 0 when applying a two-tail t-test.
5. P denotes the proportion of firms which had an increase in post-merger normalised profitability.
6. average of two years post-merger profitability.

The statistic P (column 7, Table 9.14) shows the proportion of mergers showing an improvement, regardless of the actual magnitude of the improvement. It indicates, for example, that for the first year after merger, 46 per cent of the companies showed some decline (P = 0.54) and for the second year after merger 53 per cent were in a similar position (P = 0.47). Although, the majority of the firms showed an increase in their post-merger profitability, the proportion of firms showing an improvement in profitability was not different from 0.50 at a reasonable level of statistical significance. (The null hypothesis is that P = 0.50, and the standard binomial probability test is used)[1].

1. The binominal test is constructed thus: For each pair of merging firms, denote the difference (post-merger - pre-merger performance) being positive as a 'success'.

Let n be the number of pairs of firms. Then if the null hypothesis (that there is no change in firms' performance) is true, the number of successes is a binomial variable, say x, corresponding to independent trials for an experiment for which the probability of success = 0.5

The binomial distribution can be approximated by a normal distribution, the approximation being accurate even for small n. The test of the null hypothesis P = (p_o = 0.50 in this case) is then based on the statistic

$$t = \frac{(x - np_o)}{\sqrt{np_o\,(1 - p_o)}}$$

Since the binomial distribution is discrete, to set up a correspondence between the set of binomial ordinates and the areas under the normal curve, the standard correction was applied (that is decrease the absolute value of $x - np_o$ by 0.50). Such a test not only has an obvious intuitive appeal, but also possesses the advantage of being distribution free.

An objection may be raised to the results presented in Table 9.14. in that there may be aggregation bias present as a result of aggregating the results of the mergers irrespective of the size of the acquired company in relation to the size of the acquiring company. It may therefore be less appropriate to compare the combined performance of the firm with the aggregate pre-merger performance of the firms. This is because when the size of the acquired firm is relatively disproportionate with the size of the acquirer, the outcome of any post-merger comparison may present a distorted figure as a result of the likely insignificant 'contribution' of the acquired firm to the performance of the combined firm.

Table 9.15

SIZE OF ACQUISITION: NET ASSETS EXPRESSED AS A PERCENTAGE OF THE ACQUIRING COMPANIES NET ASSETS

Net Assets of the Acquired as a % of Net Assets of the Acquirer	Number of Companies
≤ 10 %	8
10 - 20%	4
20 - 30%	5
30 - 40%	3
40% and above[1]	15
Total	35

Notes: 1. In six cases, the net assets of the acquired companies were greater than that of the acquiring companies.

To eliminate the potential bias, those mergers where the net assets of the acquired firm were less than 10% of the acquirer's net assets were excluded (see Table 9.15). This approach further reduced the sample to twenty-seven for the first year and twenty-two for the second year after merger. The results are presented in Table 9.16.

The results show a similar pattern to those presented in Table 9.14. Based on that outcome, one may not argue convincingly that the inclusion of 'insignificant' acquisitions seriously affected the earlier results.

There are, however other distortions which are likely to be encountered in the use of profitability measures as indicators of average post-merger efficiency. These factors are discussed in Section 9.11.

Table 9.16

THE CHANGE IN MEAN NORMALISED PROFITABILITY: ACQUISITIONS OVER 10% OF NET ASSETS OF THE ACQUIRED TO THE ACQUIRER

Year	N[1]	Pre-Merger[2] normalised profitability	Post-Merger normalised profitability	D[3]	T-value[4]	p[5]
t + 1	27	1.02	1.06	0.04	0.21	0.59
t + 2	22	1.09	1.14	0.05	0.26	0.50
Note 6	22	1.09	1.11	0.02	0.08	0.45

notes as in Table 9.14.

9.9.4 Comparison of Results with Meeks (1977):.

Meeks employed a similar methodology but obtained different results. However, there are several differences between this study and that of Meeks. In the Meeks study, the pre-acquisition reference period was defined as 'the average of three pre-merger years'. In this study, the pre-acquisition reference period was defined as the average of two pre-merger years. Although, Meeks suggested (footnote 24 p.17) that the choice of pre-acquisition reference period was unlikely to make much difference, the effect, of the one year difference is unclear.

The number of companies used in the Meeks study was greater than in the present study. In his study, 211 acquiring companies were involved in the first year after merger compared with 35 in this study. The outcome of the present study may have been affected by the comparatively small number of companies analysed.

Moreover, his study covered a nine year period, (1964 - 1972) while the present study covered only a five-year period. During the period of the two studies, there have been changes in the economic environment and also in the financial reporting framework. This however, does not suggest that acquisition has become more 'profitable' than in the earlier days.

In the next section, the post combination performance of the acquiring companies are further analysed with a view to ascertaining which of the two groups (SNF or SF) 'performed' better.

9.10. NORMALISED PROFITABILITY INDEX: ACQUIRING COMPANIES 'NON-FAILING GROUP' AND 'FAILING Group':

9.10.1 Introduction:

In Section 9.8. it was observed that the acquiring companies suffered decline in their profitability after the merger when profitability was measured using simple accounting ratios. On closer examination, it was observed that the SNF group suffered a greater decline than the SF group. This result could imply that the SF group 'performed' better than the SNF on acquisition. A similar analysis using the normalised profitability measure was carried out.

9.10.2 Formal Hypothesis:

The main null hypothesis can be stated thus:

(a) H_o: There is no difference between the normalised profitability of the group acquiring others with non-failing characteristics and those with failing characteristics:

The alternative hypothesis is:

H_1: There is difference between the normalised profitability of the group acquiring others with non-failing characteristic and those with failing characteristics.

The second hypothesis is stated thus:

(b) H_o: There is no difference between the proportion of companies showing an increase in normalised profitability in the two groups of acquiring companies (i.e. SF and SNF):

The alternative hypothesis is stated thus:

H_1: There is significant difference between the proportion of companies showing an increase in normalised profitability in the two groups of acquiring companies (i.e. SF and SNF).

Tables 9.17 and 9.18 present the performance of each of the groups when the environmental effects are taken into consideration. The thirty-five acquiring companies reported in the previous section were split into two. Of the 35, 22 companies fall into the SNF group and 13 into the SF group.

In the second year after acquisition, the thirty companies were split into nineteen for the SNF and eleven for the SF. The reduction in the size of the sample is as a result of unavailability of the ICC industrial data for 1984/85 onwards.

Table 9.17

CHANGES IN MEAN NORMALISED PROFITABILITY OF ACQUIRERS: 'NON-FAILING Group'

Year	N[1]	Pre-Merger[2] Normalised	Post-Merger Normalised	D[3]	T-value[4]	p[5]
t + 1	22	1.26	1.07	-0.19	-1.14	0.45
t + 2	19	1.25	1.14	-0.11	-0.62	0.47
Note 6	19	1.25	1.10	-0.15	-0.84	0.36

Notes as in Table 9.14.

Table 9.18

CHANGES IN MEAN NORMALISED PROFITABILITY OF ACQUIRERS: 'FAILING GROUP'

Year	N[1]	Pre-merger[2] Normalised Profitability	Post-merger Normalised Profitability	D[3]	T-value[4]	p[5]
t + 1	13	0.63	1.02	0.39	1.53	0.69
t + 2	11	0.77	1.25	0.48	1.54	0.45
Note 6	11	0.77	1.14	0.37	1.33	0 45

Notes as in Table 9.14.

The clear impression given by the results presented in Tables 9.17 and 9.18 is that on average, there was an increase in industry-relative profitability following acquisition by the SF group. In contrast, the results of SNF group, showed a decline over the 2-year post-acquisition period. Whilst the observations are not statistically significant, they nevertheless seem to be persistent.

However, the relative pre-merger profitability of each of the groups, (see Column 3 of Tables 9.17 and 9.18) shows that the SF group was performing below expectation before the merger. This result is not too surprising, given that the companies acquired were potentially failing companies. (The pre-merger profitability in the Tables is a combination of the weighted average profitability of the two firms involved in the merger).

In the first year after acquisition, the proportion of mergers for which the normalised post-merger profitability was greater than the pre-merger value was 0.69 for the SF group and 0.45 for the SNF group. Using a binomial test, the difference was found not to be statistically significant. In the second year, the values were 0.45 for the SF group and 0.47 for the SNF (the extra-ordinary result for the SF group in the second year is accounted by 'outliers'). Although, the differences were not statistically significant, they were persistent.

Table 9.19 shows the difference between the changes incurred by the two groups of acquiring companies as a result of their acquisitions. The results indicate significant differences between the nature of changes incurred by the groups.

Table 9.19

DIFFERENCES IN MEAN NORMALISED PROFITABILITY BETWEEN THE TWO GROUPS OF ACQUIRERS:

Year	SF	SNF	Difference	T-value	Sig Level
t + 1	0.39	-0.19	0.58	1.90	0.03**
t + 2	0.48	-0.11	0.59	1.64	0.06
Note 1	0.37	-0.15	0.52	1.57	0.07

Notes: 1. average of two years post-merger profitability.

** statistically different from 0 at 5% level.

Table 9.20 and 9.21 show the outcome of each of the individual group of mergers after those acquisitions where the relative size of the acquired company was small (less than 10%) have been excluded. This approach further reduced the sample size.

Table 9.20

CHANGES IN MEAN NORMALISED PROFITABILITY FOR ACQUISITIONS OVER 10%: 'NON-FAILING GROUP'

Year	N1	Pre-merger2 Normalised Profitability	Post-merger Normalised Profitability	D3	T-value[4]	P5
t + 1	17	1.31	1.03	-0.28	-1.37	0.47
t + 2	14	1.31	1.07	-0.24	-1.31	0.42
Note 6	14	1.31[7]	1.05	-0.26	-1.28	0 35

Notes as in Table 9.14.

7. The apparent coincidence of the pre-merger normalised profitability is noted.

Table 9.21

CHANGES IN MEAN NORMALISED PROFITABILITY FOR ACQUISITIONS ABOVE 10%: 'FAILING GROUP'

Year	N[1]	Pre-merger[2] Normalised Profitability	Post-merger Normalised Profitability	D[3]	T-value[4]	P[5]
t + 1	10	0.53	1.11	0.58	1.88	0.80
t + 2	08	0.70	1.26	0.56	1.36	0.63
Note 6	08	0.70	1.21	0.51	1.38	0 63

Notes as in Table 9.14.

Table 9.22 presents the difference between the changes incurred by each of the two groups using two-sample t test.

Table 9.22

DIFFERENCES IN MEAN NORMALISED PROFITABILITY BETWEEN THE TWO GROUPS OF ACQUIRERS:

Year	SF	SNF	Difference	T-value	Sig Level
t + 1	0.58	-0.28	0.86	2.32	0.01*
t + 2	0.56	-0.24	0.80	1.77	0.06
t + 3[3]	0.51	-0.26	0.77	1.83	0.05**

Notes as in Table 9.19
* statistically different from 0 at 1% level
** statistically different from 0 at 5% level.

The evidence presented in Tables 9.20-9.22 is consistent with the conclusion reached when all acquisitions were considered that the group which acquired failing companies 'performed' better than the other group. When only material acquisitions were considered the differential performance is of greater magnitude and of greater statistical significance.

It is to be recalled that in Section 9.8, it was observed that the group acquiring failing companies suffered a lesser decline in profitability than the other group. In this section, however, it was observed that the group acquiring failing companies showed an improvement in their post-merger profitability. The implication of the findings of the two sections, is that the group acquiring failing companies exhibited a 'superior' performance over the other group.

While this outcome is interesting, it is also important to examine whether the type of merger has any influence on the results. This enquiry is necessary because a considerable majority of the acquisitions of failing companies were horizontal in contrast to the acquisitions of non-failing companies (see Table 9.23). This might suggest that horizontal mergers seem to be more successful than others.

In order to test the impact of type of merger on the performance of the acquirers, each type of acquisition was grouped irrespective of the financial characteristics of the acquired company. By such a process, 20 companies were readily classified as horizontal and 15 as non-horizontal[1].

Tables 9.24 and 9.25 present the individual results of each of the groups. In Table 9.24, for example, the horizontal mergers achieved a 12 percent increase over their pre-merger normalised profitability level. Conversely, Table 9.25 shows that the non-horizontal mergers sustained a 10% decline in their profitability in the first year after the acquisition.

Table 9.23

CLASSIFICATION OF ACQUISITIONS BY TYPE OF MERGER

Predicted Group	Type of Acquisition		Total
	Horizontal	Non-Horizontal	
Failing	11	2	13
Non-Failing	9	13	22
Total	20	15	35

1. The difficulties in classifying companies accurately according to the type of merger should be noted. However, the procedure adopted here follows Cosh et al (1980) - mergers are classified as either horizontal or non-horizontal.

Table 9.24

ANALYSIS OF MEAN NORMALISED PROFITABILITY
BY TYPE OF MERGER: HORIZONTAL MERGERS

Year	N[1]	Pre-merger[2] Normalised Profitability	Post-merger Normalised Profitability	D[3]	T-value[4]	P[5]
t + 1	20	0.99	1.11	0.12	0.56	0.50
t + 2	16	0.95	1.07	0.12	0.59	0.50

Notes as in Table 9.14.

Table 9.25

ANALYSIS OF MEAN NORMALISED PROFITABILITY
BY TYPE OF MERGER: NON-HORIZONTAL MERGERS

Year	N[1]	Pre-merger[2] Normalised Profitability	Post-merger Normalised Profitability	D[3]	T-value[4]	P[5]
t + 1	15	1.23	1.13	-0.10	-0.47	0.40
t + 2	14	1.21	1.30	0.09	0.35	0.57

Notes as in Table 9.14.

However, a different picture emerged in the second year after the mergers. While the horizontal group seemed to have maintained the increase of the post-merger profitability, the non-horizontal turned the decline incurred in the first year to a 9% increase in the second year.

The result of the first year after merger is in the direction that theory would suggest, that is the relative ease with which the operations of the two firms could be integrated. This may be as a result of a common managerial experience, in both the inputs and outputs markets. In the second year, it might be argued that the management of non-horizontal mergers tend to have overcome the initial adjustments in integrating the combined operations of the two groups.

The implication of the above is that the group acquiring failing companies did not necessarily perform better than the other group because of the financial characteristics of the company acquired. Part of the relatively good performance of the SF group might easily be ascribed to the preponderence of horizontal mergers in this group.

The foregoing findings also have empirical support. For example, Kitching (1967) suggested that success in mergers depended on four key factors[1]. The first is the existence of 'managers of change', being managers who could handle the immediate and transitional consequences of the merger. Secondly, the post-merger organization of the company, with a senior executive to manage the newly acquired company, and, in particular to ensure that the management information and control systems of the two companies are compatible and that good lines of communication exist. These two factors are more likely to be achieved quickly with horizontal than with non-horizontal mergers, hence the 'superior' performance of the former in the first year after the acquisition.

However, in order to examine the extent in which the horizontal acquisitions might have influenced the performance of the SF group, all horizontal acquirers were split into SNF and SF groups (see Table 9.23), and a comparison of their performances are presented in Tables 9.26 and 9.27.

1. The third factor is that merger must be part of an overall strategic plan rather than the consequence of an opportunist reaction and fourthly, there must be a careful analysis of the future needs of the merged company, especially regarding financial resources.

Table 9.26

ANALYSIS OF MEAN NORMALISED PROFITABILITY
HORIZONTAL ACQUIRERS: FAILING GROUP (SF)

Year	N[1]	Pre-merger[2] Normalised Profitability	Post-merger Normalised Profitability	D[3]	T-value[4]	p[5]
t + 1	11	0.59	0.91	0.32	1.12	0.64
t + 2	9	0.76	1.05	0.29	1.11	0.56

Notes as in Table 9.14.

Table 9.27

ANALYSIS OF MEAN NORMALISED PROFITABILITY
HORIZONTAL ACQUIRERS: NON-FAILING GROUP

Year	N[1]	Pre-merger[2] Normalised Profitability	Post-merger Normalised Profitability	D[3]	T-value[4]	p[5]
t + 1	9	1.21	1.08	-0.13	-0.39	0.33
t + 2	7	1.19	1.09	-0.10	-0.33	0.43

Notes as in Table 9.14.

The results in Tables 9.26 and 9.27 show that the SF horizontal acquirers performed better than their SNF counterpart. In both years, the SF group experienced an increase in their pre-merger normalised profitability, while the SNF group incurred a decline in both years. Although the change incurred by each of the groups is not statistically significant (perhaps due to small sample), there is strong evidence to support the superior performance of the acquirers of failing companies generally.

However, before further inference could be made on the outcome of the normalised profitability measures, the factors likely to distort the results should be discussed. These factors are discussed below.

9.11 BIAS AND DISTORTIONS WHICH AFFECT PROFITABILITY MEASURES WHEN USED AS INDICATORS OF AVERAGE POST-MERGER EFFICIENCY:

9.11.1 Introduction:

Meeks and Meeks (1981) discussed three elements of distortion which can affect the normalised profitability measure used in the present study. They are (a) change in bargaining power (b) accounting in year of merger and (c) goodwill arising on merger. The first two elements lead to upward bias in the post-merger profitability, while the

third leads to an underestimate of the profitability. These elements are discussed below.

9.11.2 Change in Bargaining Power:

It has been argued (Meeks (1980), Hannah and Kay (1977) and Singh (1971)) that merger, on average, enhances the bargaining power of the participants and consequently an increase in post-merger profitability may not be synonymous with an increase in efficiency. Therefore, because of the problem of disentangling the effect on profit of efficiency changes from that of changes in bargaining power, the post-merger profitability is viewed as possessing an upward bias element.

However, Meeks and Meeks (1981) suggested that in order to mitigate the effect of changes in bargaining power, one could attempt to adjust for changes in input and output prices associated with the merger. However, they conceded that even where such data can be obtained, "it is a very costly exercise normally feasible only for small samples and in any case subject to various qualifications". In view of the problems associated with disentangling the 'bargaining power element', no attempt was made in the present study for the suggested adjustment. Therefore, the post-merger normalised profitability figures presented in the present study should be interpreted with the upwards bias element in mind.

9.11.3 Accounting in the Year of Merger:

A second possible upward bias in the post-merger profitability arises in accounting for the year of merger as a result of the accounting convention adopted. According to Meeks's (1977) equation, if the two companies involved in the merger drew up independent accounts for the year of merger and then pool them, the following expression for their weighted average rate of return would be obtained:

$$r_{m*y} = \frac{P_{qy} + P_{vy}}{1/2(A_{q(y-1)} + A_{v(y-1)} + A_{qy} + A_{vy})} \quad .....(1)$$

Where
- A: Net Assets
- m: amalgamation
- P: Profit
- q: Acquirer
- t: proportion of the merger year for which the victim has contributed to the amalgamation's profit
- v: Victim
- y: year of merger.

i.e. twelve months' profit flow for each of the firms divided by the average net assets for the two firms together. The approach implies that the same term for both the acquired and acquirer is included in the actual profitability formula for the amalgamation. However, since the acquired company was not part of the amalgamation at the beginning of the year, its opening net assets do not appear in the denominator whilst in the numerator there appears on the acquired's side, the profit for the number of months', the victim has belonged to the group.

Meeks and Meeks argue that if t is the proportion of the year for which the acquired has contributed to the amalgamation's profit, then the profitability measure derived from the acquirer's accounts could be stated thus:

$$r_{my} = \frac{P_{qy} + tP_{vy}}{1/2(A_{q\,(y-1)} + (A_{qy} + A_{vy}))} \quad ...(2)$$

The issue is whether r_{my} (equation 2) can represent r_{m*y} (equation 1). There is however, no reason to believe that r_{my} is unbiased in view of the imposition of t, which may take on any value from 0 to 1. The significance of t can be noticed, if for example, the merger took place at the beginning of the holding company's financial year (in this case, t = 1), then r_{my} would exceed r_{m*y} (the numerator for the two measures being the same, but the denominator of r_{my} being smaller by 1/2 $A_{v(y-1)}$.

Meeks and Meeks (1981) also pointed out that in the opposite direction where the merger occurs at the very end of the acquirer's financial year (t = 0), r_{my} will similarly fall short of r_{m*y}. They further argued that even where mergers are distributed over a series of years so that average t = 0.50, the equality of r_{my} and r_{m*y} may not be achieved. They stated thus:

> ".. whenever t is less than 1, the outcome will depend not only on t but also on the specific values of profit and net asset figures and no general conclusion can be drawn" p.340

It therefore appears that the inclusion of the year of merger in the analysis will not only present an upward bias in the post-merger profitability but also an ambiguous result.

Meeks and Meeks (1981) suggested that the bias element of the year of merger can be avoided by adjusting each amalgamation's profitability for the merger year, using information from the accounts on the timing of merger to remove any distortion. However, they acknowledged that the clerical effort would be very high for a sizeable sample, and suggested that it can perhaps be bypassed by isolating the figures for the year of merger itself and concentrating on the subsequent record (with years of any further merger excluded). In order to avoid any ambiguities in the interpretation of the results of the present study, the year of merger was excluded in all the analyses.

9.11.4 Goodwill Arising on Merger:

Goodwill arising on merger can lead to a downward bias in post-merger profitability relative to a pre-merger level. The bias arises because in an inflationary environment, the book value of companies' assets, based on historic cost accounting, usually understates their realisation value. In most cases, when a company is acquired, the acquiring company pays more than its book value. It may then enter the acquired company in its books at a value exceeding that in the acquired's books before the merger (since it must include them at their

'fair value', according to SSAP 14, when adopting the acquisition accounting method of consolidation). The excess is in most cases recorded in the acquirer's balance sheet as 'goodwill'[1], the acquired firm's assets are then added to the other elements of the balance sheet at historic cost.

The effect of the revaluation is that the profitability of the amalgamated group will be lower than the weighted average profitability for the separate companies would have been in the absence of merger. This is so because a larger denominator (incorporating goodwill) is used in calculating profitability.

1. There are many factors which may explain why goodwill arises. Examples are a skilled management team, good labour relations and a strategic location. These factors are intangible and it is difficult to place a money value on them. For this reason, it is not usual to show goodwill as an asset in the balance sheet; any amount at which it was valued would be arbitrary and subject to fluctuations.

In practice, some companies write-off 'goodwill' immediately against reserves (i.e. against retained reserves brought forward, not as a charge in the current years profit and loss account). Equally, some companies capitalise goodwill and amortise over its estimated useful life, hence profit would be reduced as well as assets increased (much lower return on assets values). These two methods are recommended by SSAP 22 'Accounting for Goodwill'. The first method has been the common practice prior to the imposition of SSAP and majority of the companies during the period of the present study adopted the approach.

However, Meeks (1977) developed a procedure for estimating the goodwill arising on consolidation. His calculations showed it to be on average around a third of the book value of the acquired firms for mergers during 1964-71. It was found to be generally stable across the years, so that any bias which it produces in profitability measures is unlikely to vary greatly between mergers undertaken in different years. By subtracting goodwill from the assets of the amalgamation, Meeks obtained the effect on profitability of the goodwill increment. Based on his estimates, in the year of acquisition, adjusted profitability (with goodwill removed from the denominator) was on average between 1% and 3.5% higher than unadjusted profitability. In the subsequent year, however, it was higher by between 1.3% and 5.5%.

Although, the majority of the companies in the present study wrote-off goodwill immediately against retained reserves brought forward, it does seem that the observed increase in profitability may have been understated because of the treatment of goodwill.

9.12 IS CHANGE IN PROFITABILITY TANTAMOUNT TO CHANGE IN EFFICIENCY?

As stated earlier, the normalised profitability is used in the present section as a proxy for internal efficiency. The question is whether profitability is an adequate surrogate for efficiency. Profitability has been used in the free-market economy as a performance index for particular companies. As Meeks (1977) puts it, "an improvement in the efficiency of a firm (defined, say, as a reduction in the resources actually used to produce a given output) will be sufficient for an improvement in profitability".

However, it can be argued that in an environment of imperfect competition (that which is obtained in real life), improvement in profitability, for example, is not a necessary condition for an improvement in efficiency. The improvement in profitability may arise from improved market power, so that an increase in efficiency cannot be inferred from an increase in profitability alone (Hughes, 1978).

Meeks (1977) suggested, however, that in some cases, it may be possible to infer changes in efficiency from changes in profitability. For example, if the bargaining power is unchanged as a result of merger, then the other influences on profitability change, change in efficiency will determine whether profitability rises, falls or remains unchanged. With constant bargaining power, a decline in profitability would imply a decline in a firm's efficiency.

However, the assumption of constant bargaining power in a competitive environment is unrealistic. A more plausible assumption that has been made (Hannay and Kay (1977) and Singh (1971)) is that bargaining power is enhanced as a result of merger. Therefore, in such a setting, a decline in efficiency may be inferred not just from reduced but also from constant profitability, whilst even an increase in profitability would present an ambiguous implication for efficiency.

Several sources of gains arising from increased bargaining power could be identified. Gains may occur in the capital market and in the market for inputs as well as in product markets. As discussed in Chapter 3, a merger may lead to easier, and cheaper availablility of funds, and similarly, the supply of material inputs may be more

certain and may be obtained at a discount. The foregoing sources of gains suggest that the power of the firm in the various markets in which it operates may indeed be enhanced by merger, and consequently if profitability remains constant after merger or even increases, it could still be compatiable with a decline in efficiency. As Meeks and Meeks (1981) further explained:

> "...if, however, merging firms record a fall in profitability, or even simply no change, one could conclude that, with bargaining power on average enhanced, efficiency had declined. Even in this case, of course, an estimate based on profitability of the size of the decline will be biased upwards" p 335.

In view of the foregoing discussion, one is placed in a quandary as to what level of profitability improvement could be interpreted as an improvement in efficiency, since an increase in profitability may well be compatible with a decline in efficiency.

In the absence of any guidelines, it is reasonable to argue that for an improvement in profitability to be interpreted as an improvement in efficiency, the size of the improvement must be very substantial. Based on this premise, it is concluded that the slight increment in the normalised profitability shown by acquiring companies in the present study indicates no improvement in efficiency. This is because the size of the reported increment is small and not statistically significant.

9.13 Summary and Conclusion:

In the preceding sections, profitability or profit-related variables have been employed to assess the post-acquisition performance of the acquiring companies. It has to be emphasised that although in both sections, a similar profitability variable was used, the emphasis of the variable is not the same. The non-normalised profitability measures used in Section 9.8 seek to determine the impact of acquisition on the return to the shareholders. While, the normalised measures in Section 9.9 seek to measure the internal efficiency of the firm in combining the individual operations of the two merged firms. Because both measures are not measuring the same thing, they may present different answers. However, results of the two sections are reconciliable.

The variables used in the previous sections, though useful, may not be the only measures of merger success. As has been pointed out, there are a number of motivational factors which would influence the outcome of post-acquisition profitability. Therefore, profitability as a single measurement unit may be unable to capture other aspects of success or otherwise of acquisition. In the next section, a methodology which may capture several dimensions of a company's viability is employed to test the hypothesis of no apparent difference.

9.14 THE PERFORMANCE ANALYSIS SCORE (PAS) PARADIGM:

9.14.1 Introduction:

As was pointed out in Chapter 6, the performance analysis score (PAS) seeks to measure the relative strength by ranking company 'Z-scores'. The Z-score measures several important dimensions of a company and has been shown to possess a bankruptcy predictive ability. Unlike the profitability variables, a bankruptcy prediction model takes into consideration several aspects of a company's viability, notably, profitability, liquidity, gearing and activity. It can therefore be argued that the higher a company is on the PAS scale, the farther away is the company from the risk of bankruptcy. For example, a company with a PAS-score of 60 has a lower risk of bankruptcy than a company with a score of 40.

One of the reasons often advocated for merger is diversification. It could be argued that, through diversification, a company reduces 'risk', (including bankruptcy risk). It is therefore hypothesized in the present study that a measurement of risk reduction is the enhancement of relative PAS-score. The PAS-score is

therefore used to test this aspect of the post-acquisition performance of the acquiring companies.

9.14.2 Formal Hypothesis:

(a) H_o: There is no significant difference between the post-acquisition and pre-acquisition performance of the acquiring companies when performance is measured by the PAS-score.

H_1: There is significant difference between the post-acquisition and pre-acquisition performance of the acquiring companies when performance is measured by the PAS-score

Again, the need to control for industry and other environmental factors requires comparison with the control group of matched non-acquiring companies. This leads to a second null hypothesis:

(b) H_o: There is no significant difference between the performance of acquiring and non-acquiring companies when performance is measured by the PAS-score:

H_1: There is significant difference between the performance of acquiring and non-acquiring companies when performance is measured by the PAS-score.

9.14.3 Discussion of Results:

The results in Table 9.28 indicate that the PAS-score for the acquiring companies declined on acquisition. The decline is consistent for the first and second years after acquisition and is statistically significant. This result is in conformity with that obtained when profitability-related variables were employed in the previous sections. A more meaningful interpretation can be given when the results are compared with those of the non-acquiring group. The results of the non-acquiring group indicate a slight increase in their relative PAS-score in both years. There was no significant difference in the pre-merger PAS-score of acquiring and non-acquiring companies, indicating that neither of the two groups was a 'superior' performer. However, the difference between the post-merger PAS-score of the two groups is statistically significant.

This lends weight to the argument that acquiring companies are generally no weaker/stronger than non-acquiring companies which tends to negate the merger as an alternative to bankruptcy' hypothesis as far as acquirers are concerned since a lower pre-acquisition PAS score for acquirers would be expected.

Table 9.28

PRE-MERGER AND POST-MERGER PAS-SCORE
FOR ACQUIRING AND NON-ACQUIRING COMPANIES

	1-YEAR PAS-SCORE PRE-MERGER	1-YEAR PAS-SCORE POST-MERGER	2-YEAR PAS-SCORE POST-MERGER
Acquiring Companies:			
Mean PAS-Score	57.72	49.09	49.50
Std. deviation	21.34	24.23	23.39
No. of Companies	45	45	45
t-statistic[1]		-3.06*	-2.89*
Non-Acquiring Companies:			
Mean PAS-Score	60.43	61.81	61.09
Std. deviation	26.23	22.85	24.13
No of Companies	45	45	45
t-statistic[1]		0.73	0.25
t-statistic[2]	-0.55	-2.60**	-2.35**

* statistically different from 0 at 1% level
**statistically different from 0 at 5% level.

Notes: 1. The t-statistic on the difference between pre-merger PAS-score and the one and two-year post-merger PAS-scores.

2. A two-sample-t test on the difference between the changes in the PAS-score of acquiring and non-acquiring group.

In addition, if diversification may be defined in terms of reduction of risk and may be measured by PAS, the acquiring companies failed to achieve it. On average, acquiring companies have significantly lower PAS scores post-acquisition, and seem to have an increased risk of bankruptcy. Although, the non-acquiring companies did not increase their PAS-scores significantly, neither, did they suffer decline.

Following the outcome of the PAS-score test, there is compelling evidence to reject the null hypothesis that there is no significant difference between the pre- and post-merger performance of the acquiring companies, and similarly between acquiring and non-acquiring companies. In the next section, the hypothesis of no apparent difference between the two groups of acquiring companies is tested.

9.15 PAS-SCORES - COMPARISON BETWEEN ACQUIRERS: 'NON-FAILING GROUP' (SNF) AND 'FAILING-GROUP' (SF):

9.15.1 Introduction:

In the previous sections, using profit and normalised profitability measures, it was observed that the group acquiring others with failing characteristics performed better than the group acquiring others with non-failing

characteristics. It was also observed that generally, acquiring companies suffered decline in their PAS-scores, implying an increase in bankruptcy risk. However, it is unknown whether the deterioration in the PAS-scores is as a result of acquiring potentially failing companies with apparently weak PAS-scores. The purpose of this section is to examine how the decline in the PAS-scores of the acquiring companies was distributed. In other words, whether or not by acquiring a potentially weak company, a company increases its own bankruptcy risk.

9.15.2 Formal Hypothesis:

H_0: There is no significant difference between the performance of the group acquiring others with 'non-failing' characteristics and those with 'failing' characteristics, when performance is measured by PAS-score:

H_1: There is significant difference between the performance of the group acquiring others with 'non-failing' characteristics and those with 'failing' characteristics, when performance is measured by PAS-score.

9.15.3 Discussion of Results:

Table 9.29 show the results for the two groups. Both groups experienced decline in their PAS-score as has already been noted in Section 9.14. Of more importance is how the level of decline is apportioned between the two groups of acquiring companies.

Table 9.29

PRE-MERGER AND POST-MERGER PAS-SCORES FOR ACQUIRERS:

	1-YEAR PAS-SCORE PRE-MERGER		1-YEAR PAS-SCORE POST-MERGER		2-YEAR PAS-SCORE POST-MERGER
Non-Failing Group:					
Mean PAS-Score	55.96		52.36		52.84
Std Deviation	22.84		22.61		22.09
No of Companies	24		24		24
t-statistic[1]		-1.03		-0.87	
Failing Group					
Mean PAS-score	59.81		45.19		45.52
Std Deviation	19.77		26.04		24.79
No of Companies	21		21		21
t-statistic[1]		-3.40*		-3.37*	

Notes as in Table 9.28
*statistically different from 0 at 1% level.

Table 9.30 shows that the SF companies experienced greater decline in PAS score than the SNF group, and the difference is statistically significant. This result might, at first, appear to be inconsistent with the conclusion that SF group performed better than SNF, which was reached in Sections 9.8 and 9.10, where profitability and similar measures were employed. However, the apparent discrepancy is not too surprising. Certainly, SF appeared to suffer a smaller decline in profitability post-acquisition than SNF but a significant rise in gearing was also noted for SF. The PAS-score measure, based on Z-scores, includes elements of profitability, gearing and other financial facets of a company. It is not unreasonable to argue that a "less poor" profitability performance coupled with increased gearing might well lead to a greater risk of bankruptcy and consequently a lower PAS-score.

Table 9.30.

CHANGES IN PAS-SCORES
FOR ACQUIRERS: (NON-FAILING AND FAILING GROUP)

	One Year Post-Merger changes in PAS-Scores	No of companies	Two-year post-merger changes in PAS-Scores
Acquiring Companies:			
Non-Failing Group	-3 6	24	-3.1
Failing Group	-14.6	21	-14.3
t-statistic[1]	1.99**		2.01**

**statistically different from 0 at 5% level.

1. Notes as in Table 9.28.

The foregoing evidence indicates that a higher proportion of the decline in the PAS-score of the acquiring companies can be attributed to the SF group than the SNF group. However, even the SNF group suffered a decline in PAS-score post-acquisition. We can therefore conclude that acquisition, whether the target-company was potentially failing or not, reduces the PAS-score of the acquirer, at least in the short period after the acquisition. This conclusion to some extent reinforces the belief held by the 'managerial' theories of merger that acquisition leads to no 'obvious' benefit to the acquiring companies.

9.16 Summary and Conclusion:

The purpose of this chapter was to examine the post-acquisition performance of the acquiring companies. Three different performance measures were used; (a) simple profitability and ratio measures; (b) normalised profitability measures and (c) performance analysis scores (PAS-scores). The profitability measures indicated that on average acquiring companies suffered a decline in their profitability-related variables subsequent to acquisition. This result is in conformity with previous studies which have indicated that acquisitions do not improve profitability. However, the normalised profitability measure which seeks to measure the internal efficiency of the combined firm showed a slight increase over the pre-merger level. In view of the inherent upwards bais as a result of changes in the bargaining power of the merged firms, this slight increase in the profitability should not necessarily be interpreted as an improvement in the efficiency of the acquiring companies.

An alternative methodology (PAS-score) was employed to measure the relative strength of the acquiring companies. The PAS-score paradigm takes into consideration the general environmental influences and it was considered an adequate surrogate to measure the risk

reduction of the acquiring companies. Unlike the profitability measures, it takes account of other dimensions of a company. The PAS-score tests showed that the performance of the acquiring companies declined. The decline was also evidenced by a comparison of the performance of non-acquiring companies. The result does indicate that if risk reduction as measured by the PAS-score, was the major objective of the acquirers, it was not achieved.

The approach adopted in chapter eight, was to split the acquiring companies into two groups based on the financial characteristics of the acquired companies. In the present chapter, the financial performance of the two sets of acquiring companies was compared using the three methodologies already stated. The results obtained by the profitability measures indicated that although, in general, acquiring firms suffered decline in profitability subsequent to acquisition, the set acquiring non-failing companies suffered a greater degree of decline. Even where the 'normalised' profitability method showed that acquiring companies, as a whole, experienced a slight increase in their profitability, the group acquiring non-failing companies was shown to have exhibited a decline in its profitability. One can therefore conclude that the group acquiring failing companies seemed to "performed" better than the group acquiring non-failing companies.

The PAS-score paradigm on the other hand, showed a general decline in the PAS-score of acquiring companies, as a whole. On the issue of which of the two groups performed better, the results indicated that the group acquiring failing companies suffered a greater decline in its PAS-scores. It is, however, to be noted that the group acquiring failing companies increased its gearing significantly, which probably has affected its post-merger PAS-score. This outcome is however to be expected. As has been pointed out, the PAS-score measures the 'bankruptcy risk' of a company. It is fair to assume that the acquired companies with failing characteristics possess 'low' PAS-scores. Therefore any company acquiring them might be expected to dilute its pre-acquisition PAS-score, especially in the short-run (as was the case in this study). Whether the PAS-scores improve in the long-run would require further research using much larger samples.

On the general issue of which of the acquiring sets of companies renders a 'social' service to the community, evidence from this study suggests that the set acquiring failing companies does that. This is because by acquiring potentially failing companies, they have avoided both the indirect and direct costs of bankruptcy. As was discussed in chapter 4, although both the direct and indirect costs

of bankruptcy are difficult to quantify, it can be assumed that the impact of corporate bankruptcy on society is significant. Therefore, any group, individual or organization that prevents corporate failure, even possible at the expense of a decline in profitability does a great service to the society in general. Evidence from this study suggests that the group acquiring failing companies (SF) avoids the bankruptcy and at the same time improves the pre-merger profitability position of the separate companies operating individually.

The overall conclusion of the current study and consideration of the possible avenues for future research is presented in the next, and final, chapter.

CHAPTER TEN

SUMMARY AND CONCLUSION

10.1 Introduction:

The major implications of this study concern the failure company doctrine for companies involved in mergers and the post-acquistion performance of the acquiring companies. This chapter briefly summarizes the study, examines the implications, discusses its limitations and suggests areas for future research.

10.2 Model Development:

Financial ratio analysis formed the basis of the present study. To further the understanding of the state-of-the-art of financial ratio analysis, the literature that represents the history of progress in this field was reviewed. In order to share with readers some

perceptions that resulted from careful study of materials previously published on the subject, the reviewed literature was evaluated.

The financial data analyzed in the study were those of medium to large companies quoted on the London Stock Exchange between 1978 and 1984. The study analyzed financial statements of over 550 companies engaged in manufacturing, wholesaling and retailing.

10.3 Multivariate Discriminant Analysis (MDA):

MDA forms a major analytic technique in deriving a bankruptcy prediction model. Results of the analysis indicate that MDA can be applied to financial ratios to determine their association with business outcome and these associations provided a basis for classifying companies as failed or non-failed. When the MDA model developed was tested on the companies from which it was derived, it achieved an accuracy rate of 96.7%. This accuracy rate is favourably biased, and strongly so, by the intensive search inherent in the analysis. However, the unbiased result achieved in classifying members of the holdout sample indicated that the analytical method was effective. The 89.9% success rate was substantially higher than the rate expected by chance and was similar to that achieved in other studies.

10.4 Financial Ratios:

The success rate achieved by the analysis attests to the effectiveness of the analytical model and is a favourable factor in the argument for the usefulness of financial ratios as predictors of business failure. Once results are interpreted to be successful, it follows not only that an effective means of analyzing data has been used but also that the data analyzed contain information that is worthy of analysis. The present study therefore strongly suggests, as have other studies of this nature, that financial ratios possess predictive ability of business outcome.

10.5 Failing Company Hypothesis: The Acquired Companies:

One of the objectives of the present study was to determine whether the "failing company hypothesis" rationale for mergers has any validity. The bankruptcy prediction model was applied to a group of acquired and non-acquired companies. The results indicated that a higher proportion of acquired companies possessed financial characteristics similar to previous failed companies than the sample of non-acquired. The null hypothesis that there was no significant difference between the proportion of firms possessing 'failing' characteristics in the set of acquired and non-acquired companies was strongly rejected.

The findings support previous empirical studies that have sought to test the failing company hypothesis for acquired firms (e.g. Shrieves and Stevens, 1979; Taffler and Soper, 1983)). These empirical findings support the theoretical arguments that have been put forward that some acquisitions are 'merely a civilized alternative to bankruptcy....' (Dawey 1961), and Marris (1964))

The findings of the present study and previous studies raise a further policy issue. If some acquisitions are an alternative to bankruptcy, why do management of the acquiring companies want to acquire failing companies at high premiums? Two reasons have been offered in this direction. Firstly, Marris (1964) suggested that acquisition is a spring-board for growth maximizing by a firm and by growth a firm 'insulates' itself from a takeover threat[1]. Secondly, Weston and Mansinghka (1971) (and to a lesser extent, Lynch (1971) and Rush and Melicher (1974)) provided evidence that some acquiring companies adopt a 'defensive' acquisition strategy in order to avoid their own impending bankruptcy, (a "failing-company hypothesis" for the acquiring companies). This second version of the failing company hypothesis formed a second objective of the present study.

10.6 The Failing Company Hypothesis: The Acquiring Company:

The bankruptcy prediction model generated was applied to the group of acquiring companies to determine if the proportion possessing failing characteristics was higher than in the group of non-acquiring companies. The evidence obtained indicated that there was no difference in the two groups of companies. There is therefore no evidence in the present study to support the Weston and Mansinghka conclusion.

The outcome of this study is not surprising given the nature of modern corporate takeover 'battles'. Because modern takeover battles are often protracted and acrimonious, it is perhaps less likely that a potential acquirer in a weak financial position can make a successful acquisition. The target's 'Defence Document' has been an avenue to launch an attack on the bidder's management as well as on their performance record.

1. Recently, Levine and Aaronovitch (1981) have argued that size is a strategic element in both making acquisitions and in avoiding being acquired. "...within this framework mergers are primarily strategic decisions"..p.151.

10.7 Post Acquisition Performance of Acquiring Companies:

In chapter 3, two predominant merger motives were discussed. The neoclassical theory states that firms will engage in takeovers if this venture leads to an increase in wealth for the shareholders of the acquiring company. The managerial theory upholds the view that management will seek to maximize its own utility whether or not this is consistent with the maximization of shareholder wealth. Following from these merger motives, it is expected that any attempt to measure pre- and post-merger performance of the acquiring companies could give an indication to which of the merger motives tends to be predominant. The measurement of post-acquisition performance of the acquiring companies formed the third objective of the present study.

Three different measurement criteria were employed: simple financial ratios, normalised profitability measures and performance analysis scores. The simple ratio criteria indicated that on average the profitability variables of acquiring companies in general declined one and two years after the acquisition. The results were compared with those obtained for a control group of non-acquiring companies and showed that the difference between the performance of acquiring and non-acquiring companies was statistically significant; lower

profitability was observed for the acquiring companies as well as an increase in gearing level. This result was in conformity with previous studies (e.g. Singh (1971) and Utton (1974)) that acquisition does not improve profitability. The outcome tends to support the managerial theory of merger motivation.

The second measurement criterion employed was the normalized profitability index which takes into account industry and economic bias (Meeks (1977)). The result obtained showed that, on average, acquiring companies increased their post-acquisition profitability record (although the level of improvement was, perhaps due to the small sample sizes, not statistically significant). These results were not consistent with those obtained when simple profitability measures were employed. However, it was shown that certain factors may have been responsible for the upward bias in the post-merger profitability. Taking into consideration the inherent upward bias in the methodology and the small size of the increment in normalised profitability, it was concluded that the acquiring companies did not improve their efficiency.

The third criterion used adopted the Performance Analysis Scores measurement. The methodology may be regarded as a way of testing the risk reduction of the acquiring companies. The evidence obtained indicated that the PAS-scores of the acquiring companies declined compared with a very small observed increase experienced by non-acquiring companies. If the change in PAS-score can be considered a reasonable surrogate measure of risk reduction, then it would appear that acquisition leads to increased risk.

The aggregate evidence from the current study, albeit fairly weak, is that acquisition does not improve profitability neither does it lead to risk reduction. An important question to be asked is why should the management of the acquiring companies embark on such an expensive venture[1].

Levinson (1970) pointed out that there may be valid economic and other reasons for merging (already discussed in Chapter 4) but that

> "..between the lines of these rational reasons for acquisitions, often there are two more subtle reasons which are rarely discussed in these terms: fear and obsolescence. These unrecognized feelings constitute psychological traps because they lead to impulsive actions which compound the very problems that a merger is intended to resolve" p.65

1. For example, it was reported that it cost the Argyll Group up to £50m in their unsuccessful bid for Distillers (in 1986).

Fear, Levinson stated, derives from the feeling that unless the company grows, larger companies will destroy (acquire) it. Therefore, destruction will be avoided only by becoming more powerful. The fastest way of so doing is to acquire other companies. The notable factor is that the managers feel threatened, and the pre-merger size of the company appears to be quite irrelevant. With regard to obsolescence, Levinson argued that organisations become more stereotyped and rigid as they age, and less able to cope with changes in their environment. They become obsolescent, and so do their senior managers, who are to be found controlling enterprising organisations and very often it will be necessary to buy the companies to buy the managers. Behind fear and obsolescence lie unconscious attitudes which are the actual destructive forces which can make mergers unsuccessful, as the results of the present study have indicated.

Managers, for these various reasons (fear, obsolescence, etc), begin to examine merger possibilities. Whether or not a merger actually occurs depends on the degree of 'corporate hesitancy'. Newbould (1970) described corporate hesitancy as a mixture of indigestion and reluctance. Indigestion, in the corporate sense, is where the company cannot undertake another merger because it does not have the managerial capacity to deal with it, so that managers become reluctant to expose

themselves to the various problems which mergers usually create. If hesitancy is overcome, potential merger activity becomes actual merger activity. Whether or not it succeeds in bringing about the reduction in uncertainty depends upon the success with which the merger proposal is evaluated, executed and subsequently managed. If Newbould's analysis is correct, managers of the acquiring companies do not, except by coincidence, act to maximize shareholder wealth, but react to perceived changes in uncertainty in the corporate environment.

It is therefore not surprising that the abundant evidence on the post-acquisition performance of the acquiring companies shows decline in the profitability of the acquirers. The reported decline has not been an exclusive domain of one research methodology: both 'market-based' and 'accounting-based' models seem to provide consistent evidence. The implication of these studies is that acquisition does not generate shareholders' wealth, or if it does, the research tools have been unable to capture the latent 'benefits'.

10.8 COMPARISON OF POST-ACQUISITION PERFORMANCE OF ACQUIRING FIRMS ACCORDING TO THE FINANCIAL PROFILE OF THE ACQUIRED COMPANIES:

Until now, no empirical study has sought to compare the performance of acquiring companies according to the financial profile of the acquired companies. Previous studies have concentrated on the post-performance of the acquiring companies in general. The results show that, on average, the acquiring companies suffer decline on their profitability records. Evidence on how the decline (or otherwise) in profitability is shared amongst the two groups of acquiring companies is lacking. In this study, a comparison of the post-acquisition performance of the two groups of acquiring companies was made.

As stated earlier, three types of measurement criteria were employed to compare the post-acquisition performance of the two groups of companies. The results obtained using the simple profitability variables indicate that although, on average, the acquiring companies suffered decline in profitability, the magnitude incurred by the group acquiring non-failing companies was greater; the increase in gearing was also greater for this group. With the normalized profitability method, a higher increase in profitability was observed for the group acquiring failing companies. Stated in a different way,

the group acquiring others with failing characteristics (SF) performed better than the acquirers of non-failing companies (SNF).

However, when the PAS-scores was used, the group acquiring non-failing companies showed a lesser decline in their relative PAS-scores. This result is not surprising, given that potentially failing companies possess 'low' PAS-scores prior to acquisition, and their scores could 'dilute' the post-merger PAS-scores of the acquiring companies.

The outcome of the study is interesting, in that one might have expected the group acquiring non-failing targets to have performed the better of the two groups. One possible explanation is that the acquisition of target companies in strong financial positions is often expensive, in the way of premium and other incidental expenses. This means that in those years after the acquisitions, most of these expenses were written off through the profit and loss accounts, hence the decline in the profitability records of the acquiring companies.

A decline in the average industrial profitability of the acquired and acquiring companies is unlikely to have caused the observations since, when the performance measures used allowed for the performance of the respective industries, the group acquiring failing companies still performed better than the other group. The implication is that the group acquiring failing companies not only 'rescued' the failing companies, they also bettered the pre-merger performance level of the separate companies. By so doing, the group eliminated the hazardous cost of bankruptcy to society in general and at the same time enhanced the wealth of the acquiring companies' shareholders.

As the performance of the group acquiring non-failing companies was not better than the pre-merger level of the individual companies in their respective industries, the motives for such acquisitions become questionable. The companies they acquired were apparently not failing, and one cannot therefore argue that they prevented the effect of bankruptcy on society. On that count, they did not render a 'social' service. Given this, an alternative motive for acquisition would have required management of the acquirer to seek to maximise shareholders' wealth, for example by improving profitability: this objective does not appear to have been achieved. Management either must

have been poor (at negotiation of the price or in unrealistic profit expectations) or must have had motives other than wealth/profit maximisation.

One may conclude that the motive of management in acquiring non-failing companies at a very high cost seems to support the managerial theory of acquisition. Conversely, it could be concluded, that management acquiring potentially failing companies at a 'nominal' cost and improving their post-acquisition performance typifies the neo-classical motive of acquisition.

10.9 Policy Towards Mergers:

The findings of the present study call for a review of general public policy towards mergers - should mergers be actively encouraged or discouraged, or should policy be neutral.

In the United Kingdom, there have been institutional mechanisms to encourage competition. The Monopolies Commission was created in 1948, since then there have been the Restrictive Trade Practices Act of 1956, the Resale Prices Act, 1964, the Restrictive Trade Practices Act, 1968, the Fair Trading Act, 1973 and the 1976 consolidating Acts. Most of this legislation has been about the prevention of collusion among separate and independent suppliers in the setting of prices and other terms of sale.

Alongside these Acts, there has been the growth of statutory monopolies in the form of nationalized industries, and some attempt to control the concentration of industrial and commercial power in the hands of companies.

However, despite attempts to control mergers through investigation by the Monopolies and Mergers Commission[1], merger has continued to flourish at the expense of competition which the initial Acts tried to encourage[2]. Concentration often involves barriers to entry into a market, price collusion and a tendency to monopoly power. These factors are potentially harmful to the general public. To prevent the harmful effects of concentration (as a result of mergers), and encourage competition, mergers should be encouraged only if they are in the 'public interest'. Public interest might, for the purpose of the present study be defined as preventing impending bankruptcies by the acquisition of failing companies.

1. Mergers which may be referred are those where the gross value of assets transferred exceeds £5m, or where it would create or enhance a 'monopoly share' of the relevant U.K. market. A 'monopoly share' is defined as 25%, or more, of a market (Green Paper, 1978, p.24).

2. O'Brien (1978) described policy towards mergers in the U.K. as 'benign', despite their role in increasing concentration.

Generally, there seem to be reasonable grounds for arguing that acquisition of non-failing (profitable) companies should be discouraged, as evidence from the present study (and several others) has shown that such acquisitions only lead to maximisation of managerial utility function.

10.10 LIMITATIONS:

The results of this study should be considered with knowledge of its limitations. The first limitation is the use of single-period financial ratios in deriving the discriminant model. In real life decision making, both multi-period financial data and an abundance of qualitative information are available for analysis. However, the information set used in the present study was chosen because of the apparent theoretical and empirical support concerning the relationship between single period financial ratios and business outcome.

Another limitation relating to the model derivation is the use of factor analysis as a primary descriptive and/or data reduction technique. This technique inevitably 'omits' certain financial dimension of the companies unless these dimensions are included to the extent that they are not discarded.

Like the use of a single-period financial variables in deriving the discriminant model, the use of the model to classify acquired companies may be defective. This is because firms are 'judged' on the basis of a single year's financial information.

On the impact of each acquisition on the performance of the acquiring company, an acquisition free-period was arbitrarily set and the value of the acquisition was required to be above £2m. Notwithstanding these requirements, it is possible that an acquisition may not have a significant impact on the post-acquisition performance of the acquiring company because of what has often been referred to as 'size-mismatch' (Kitching (1967)) or 'small-company' effect. For example, a £6m acquisition by companies like GEC plc or BTR, may not have a significant effect on their post-acquisition performance.

Related to the above, is the matching procedure adopted to control the 'impact' of acquisition by considering the performance of non-acquiring companies. In theory, the matching procedure used seems efficient in isolating the impact of acquisitions. However, in practice, the 'matched-pair' technique may have a drawback since in view of the widespread nature of acquisition activity, it is not always possible to obtain appropriate 'matched' firms.

Similarly, although, the ICC industrial data (the industrial averages used in the present study) classifies companies into industries according to certain criteria, it is difficult, if not impossible to classify some companies, especially those with varied activities, into one specific industry. The classification in some cases may be subjective.

Another limitation to the present study is its time-span. If the study had been extended to several years, the number of companies involved in the post-acquisition measurement part of the present study could have been greater. However, the choice of a short-time in this study was made because of the stability of the variables over a short period.

Finally, the sample of companies in the present study by design, excluded mergers in which at least one of the companies had a great deal of merger activity (for example, BTR., Hanson Trust). This eliminates the larger and more profitable acquirers, thus causing a downward bias in the results. However, Utton's (1974) study concentrated on such 'multiple' acquirers, and also found a decline in profitability.

In general, the assessment of post-performance of acquiring companies is one-sided. It cannot accurately determine what would have happened if the merged companies had gone their separate ways, or if they had merged with other companies. This problem is an example of opportunity cost measurement. Once, the decision to merge is taken, the alternative (not to merge) disappears, and with it, the cost. Similarly, efforts to compare the outcome of a merger with what had been forecast before the merger are fraught with problems. This raises fundamental issues: if the forecast performance is not achieved, is this because of some subsequent managerial failure, or was the forecast unreasonable in the first instance? In the uncertain (sometimes, tense) atmosphere of a merger, it appears unlikely that careful, rational and non-exaggerated forecasts will be made. In most cases, the stated objectives of an acquisition (against which performance might later be measured) are usually expressed in vague qualitative terms, such as "to make our presence noticeable in the other side of the Atlantic"; "to increase our size for defensive and competitive reasons". Increased size does usually follow from acquisitions, but may not always be justified in terms of efficiency.

10.11 AREAS FOR FUTURE RESEARCH:

The bankruptcy prediction model adopted in the present study has opened areas for future studies. One area is the application of the model to contested and non-contested bids. (Although, one of the reasons for contesting a bid is for an improve offer). The purpose of the approach is to determine if there is a failure likelihood for non-contested target companies, hence the decision of their management not to contest the bid.

Recently, the use of 'management buyout' has provided an alternative to 'hostile' bids, the application of the bankruptcy prediction model will indicate whether companies bought-out by their management were in no danger of failure than other companies.

In the present study, the post-acquisition performance of the two sets of acquiring companies (those acquiring potentially failing companies and others whose targets were not so failing) was made using 'accounting-based' model. In the past, 'market-based' model have been used to measure the post-performance of acquirers. In view of the approach adopted in the present study, it is recommended that a market-based model be used in comparing the performance of the two groups of acquiring companies. The outcome will confirm or refute the findings of the present study.

As pointed out, no U.K. study has modelled the direct cost of bankruptcy. This avenue appears fruitful in order to determine the magnitude of the direct costs of bankruptcy.

APPENDIX D

LIST OF NON-FAILED AND FAILED COMPANIES

	Non-Failed Companies Name of Company	Accounting Year End		Failed Companies Name of Company	Accounting Year End
1.	AAH Holdings	31/3/83	1.	Acrow plc	31/3/83
2.	Allied Lyons	31/3/84	2.	Airfix	31/3/80
3.	Arthur Bell & Sons	30/6/82	3.	Bambers Stores	31/3/83
4.	Arthur Guinness	30/9/83	4.	Berwick Timpo	31/12/80
5.	Ash & Lacy	31/12/82	5.	Blackman & Conrad	31/1/80
6.	Associated British Foods	02/04/83	6.	Brocks Group of Companies	31/12/79
7.	Automated Securities	30/11/83	7.	Caird (Dundee)	31/3/80
8.	Avana	30/4/82	8.	Capper Neil	31/3/80
9.	Bass Group	30/9/79	9.	Caravans International	30/8/81*
10	BAT Industries	31/12/81	10.	Carron Co. Holdings	31/12/81
11	Beatson Clarke	31/12/83	11.	Dennis (J.H.)	31/3/80
12	BICC	31/12/83	12.	Gartons plc	31/12/80
13	Bibby (J)	31/12/82	13.	Johnson & Barnes	31/12/79
14	BPB Industries	31/3/84	14	Lesney Products	31/12/81
15	Burton	27/8/83	15	Lockwoods Foods	31/5/79
16	Cable & Wireless	31/3/83	16	Mellins	27/5/82
17	Coalite Industries	31/3/84	17	Melody Mills	31/3/82
18	Flight Refuelling	31/12/82	18	Mettoy	31/12/81
19	Glaxo Holdings	30/6/83	19	Modern Engineers of Bristol	31/12/82
20	Hawley plc	31/12/83	20	Pawson (W.L.)	31/3/80
21	Kwik Save Discount	25/8/83	21	Radley Fashion Group	19/05/80
22	Magnet & Southern	31/3/82	22	Scotcros	31/3/82 *
23	Marks & Spencer	31/3/84	23	Sonic Sound	31/10/81
24	Reckitt & Colman	31/3/82	24	Staflex International	31/12/77
25	Rowntree Mackintosh	31/12/83	25	Stone-Platt	31/12/79
26	Scottish & Newcastle	01/05/83	26	Tomatin Distillers	31/12/80
27	Syltone	31/3/84	27	Viners	31/12/80
28	Smiths Industries	04/08/83	28	Wharf Furnishers	06/07/79
29	Ward White	01/01/82	29	Woodrow Wyatt	31/3/81
30	Whitbread & Sons	26/2/83	30	Yorkshire Fine	31/12/80

* classified as 'non-failing'.

APPENDIX E

LIST OF ACQUIRED AND ACQUIRING COMPANIES

	Acquired Companies Name of Company	Accounting Year End	Acquiring Companies Name of Company	Accounting Year End
1.	Aberthaw Cement	31/12/81	Blue Circle	n.a.
2.	Aero Needles	31/12/82**	Coats Paton	31/12/82
3.	Amalgamated Power Engr.	31/12/80**	Northern Engr.	31/12/80**
4.	Anderson Strathclyde	31/3/81	Charter Consolidated	n.a.
5.	Armitage Shanks	31/3/80	Blue Circle	31/12/79
6.	Arthur Holden	31/3/82	Imperial Chemicals Indus.	31/12/81
7.	Averys	30/9/78	G.E.C.	31/3/79
8.	B & Q Retail	17/5/79	Woolworth (F.W.)	31/12/79
9.	Barton Group	31/12/82	Caparo Industries	31/12/82**
10	Benn Brothers	30/6/82	Extel	31/3/83
11	Berec Group	31/3/81	Hanson Trust	n.a.
12	Bernard Wardle	30/11/79	Ferguson Investments	n.a.
13	Bishops Group	28/2/82**	Booker McConnell	31/12/82
14	Booth International	30/12/79**	Garnar Scotblair	31/1/80
15	Brady Industries	31/3/82**	Tarmac	n.a.
16	British Aluminium	31/12/81**	Alcan Aluminium	31/12/81**
17	British Sugar	27/9/81	Berisford (S & W)	30/9/81
18	Brown Brothers	31/12/80	Dana Engineering	n.a.
19	Cableform Group	31/3/79	Tricentrol	n.a.
20	Caledonian Holdings	n.a.	Comet Radiovision	31/8/78**
21	Camrex	31/12/82	Ruberoid	31/12/82
22	Cartiers Superfoods	27/1/79	Tesco Stores	24/2/79
23	Caplan Profile Group	30/8/78	Pentos	31/12/78**
24	Carrington Viyella	31/12/81**	Vantona Group	30/11/81**
25	Cawoods Holdings	31/3/81	Redland	31/3/81
26	Central Manufacturing Co.	31/12/80**	L.K. Industrial Investments	n.a.
27	Compair	30/9/78	Imperial Cont. Gas	31/3/79
28	Coral Leisure	n.a.	Bass	30/9/79
29	Crest Int. Securities	n.a.	Kwik-Fit Holdings	28/2/83
30	Decca	31/3/79**	Racal	31/3/79
31	Downing, G.H.	31/3/80	Steetley	n.a.
32	Downs Surgical	31/3/83**	Smiths Industries	31/12/82
33	Drake & Scull	30/10/82**	Simon Engineering	31/12/82

** classified as 'failing'

n.a. denotes 'not applicable'.

Appendix E (Contd)

	Acquired Companies Name of Company	Accounting Year End	Acquiring Companies Name of Company	Accounting Year End
34	Ductile Steels	30/12/81**	Glynwed International	n.a.
35	Duple International	31/8/82**	Hestair	31/1/83**
36	Durapipe International	31/3/80	Glynwed	31/12/80
37	Dutton-Forshaw Group	31/3/78	Scottish & Universal Inv.	n.a.
38	Eagle Star Holdings	n.a.	BAT Industries	31/12/82
39	E.M.I.	30/6/78	Thorn	31/3/79
40	Edgar, Allen & Balfour	31/3/79**	Aurora Holdings	31/12/78
41	F.M.C. plc	30/4/82**	Hillsdown Holdings	n.a.
42	Fairclough Construc.	31/3/81	AMEC	n.a.
43	Francis Parker	31/12/82	Tarmac	31/12/79
44	Gibbons Dubley	31/12/78	Steetley	31/12/78
45	Giltspur	31/3/80	Unigate	31/3/80
46	Glass & Metal	31/10/78	HAT Group	28/2/79
47	Gosforth Industrial	31/12/79**	Ferguson Industrial	28/2/79
48	Gough Brothers	28/1/78 **	Scottish & Newcastle Br.	30/4/79
49	Hardy & Sons Furnishers	3/4/78**	Harris Queensway	31/12/78
50	Heal & Sons Holdings	31/3/83**	Habitat Mothercare	n.a.
51	Henderson Kenton	31/3/79	Harris Queensway	n.a.
52	Hoffnugg, S.	31/3/79	Burns Philip	n.a.
53	Hoover plc	31/12/82**	Hoover (U.S.)	n.a.
54	Huntley & Palmer Foods	31/12/81	Nabisco Brands	n.a.
55	Illingworth Morris	31/3/83**	Abele	n.a.
56	International Paints	31/12/82	Courtaulds	31/3/83
57	International Timber	31/3/81**	Meyer International	n.a.
58	Inveresk Group	31/12/80**	Georgia Pacific Corpn.	n.a.
59	Jeavons Engineering	31/12/80	Newman-Tonks	31/7/82**
60	John James Group	31/3/78	Wolseley-Hughes	31/7/78
61	Joseph Stocks & Co.	31/3/79	Fitch Lovell	28/3/79
62	K. Shoes	30/9/79	C & J Clarks	n.a.
63	Laurence Scott	31/3/80**	Mining Supplies	30/4/80
64	Letraset	30/4/80	Esselte AB	n.a.

Notes as in Page 378.

Appendix E (Contd)

	Acquired Companies Name of Company	Accounting Year End	Acquiring Companies Name of Company	Accounting Year End
65	Lindustries	1/4/78	Hanson Trust	n.a.
66	London Bricks	31/12/82	Hanson Trust	n.a.
67	London & Montrose Investment	n.a.	Electronic Rentals Group	31/3/82
68	London & Prov. Poster	31/12/78	Reed International	31/3/79
69	London Sumatra	30/12/78	Harrisons & Crosfield	31/12/78
70	Lonsdale Universal	30/9/81	John Menzies	31/1/82
71	M.D.W. Holdings	31/12/80**	Lilley F.J.C.	31/1/81
72	Mackinson of Scotland	31/10/79*	Dawson International	31/3/80
73	Mallison-Denny	12/12/79	Brooke Bond	30/6/79
74	Maple & Co.	03/02/79**	Waring & Gillow	31/3/80
75	Mining Investment Corpn.	n.a.	Burnett & Hallamshire	31/3/79
76	Mixconcrete Holdings	30/11/80	Pioneer Concrete Holdings	n.a.
77	Mothercare plc	31/3/80	Habitat Group	30/6/80
78	Myson Group	31/12/80**	Moorick	n.a.
79	Ofrex Group	31/12/80**	Gallaher Investments	n.a.
80	Proprietors of Hay's Wharf	30/9/79	St. Martin's Indus.	n.a.
81	Rediffusion	n.a.	British Electric Traction	31/3/83
82	Renwick Group	31/3/80	Kangra International	n.a.
83	Revertex Chemicals	31/12/79	Yule Catto	31/12/79
84	Robertson Foods	31/3/79	Avana	31/3/79
85	Rolls Royce Motors	30/9/79**	Vickers	31/12/79**

notes as in Page 378.

Appendix E (Contd)

	Acquired Companies Name of Company	Accounting Year End	Acquiring Companies Name of Company	Accounting Year End
86	Royal Worcester	31/12/82**	Crystalate Holdings	30/9/82
87	Sanderson Kayser	31/12/78	GEI Inter.	31/3/79
88	Scottish & Universal Inv.	n.a.	Lonrho	30/9/78
89	Serck	30/9/80	BTR	31/12/80
90	Second City Properties	n.a.	Beazer (C.H.)	30/6/82**
91	Sheepbridge Engr.	31/3/78	GKN	31/12/78
92	South Crofty	31/3/82	Charter Consol.	n.a.
93	Spillers	31/1/79	Dalgety	30/6/79
94	Spring Grove	31/12/82**	Pritchard Services Group	31/12/82
95	Status Discount	30/11/79	M.F.I.	26/5/79
96	Tecalemit	31/3/83**	Siebe Gorman	31/3/83
97	Thomas Tilling	31/12/82	BTR	n.a.
98	Thomas Witter	31/12/79	Tarmac	31/12/79
99	Thos. W. Ward	30/9/80	RTZ	31/12/80
100	Transparent Paper	02/04/83**	Bunzl	31/12/82
101	Tunnel Holdings	31/3/81	RTZ	n.a.
102	Turner (W & E)	n.a.	Hepworth (J)	31/8/79
103	U.D.S. Group	31/1/82	Hanson Trust	n.a.
104	Unicorn Industries	31/12/79	Foseco Minsep	31/12/79
105	United Electronic Hldgs	n.a.	Brammer plc	31/12/82
106	United Gas Industries	31/3/81**	Hanson Trust	n.a.
107	Vita-Tex	30/04/78	British Vita	31/12/78
108	Wallis Fashion Co	31/01/80**	Sears Holdings	31/1/79
109	Westinghouse Brake	30/9/79**	Hawker Siddeley Group	30/6/79
110	Whittingham (William)	n.a.	Comben Group	31/12/82**
111	Wilkinson Match	31/3/79	Allegheny Ludlum	n.a.
112	William Press	31/12/81	AMEC	n.a.
113	Wilson Brothers	30/12/79	Fine Art Developments	31/3/80
114	Wilmot Breeden	30/7/78	Rockwell Inter. Holdings	n.a.
115	Wolf Electric	31/12/79	Dobson Park Inds.	30/9/79
116	Wood Hall Trust	30/6/80	Elder Smith & Co.	n.a.

notes as in Page 378.

APPENDIX F

HOLDOUT SAMPLE: FAILED AND NON-FAILED COMPANIES

	Non-Failed Companies Name of Company	Accounting Year End		Failed Companies Name of Company	Accounting Year End
1.	Argyll Group	31/3/84	1.	Bamfords Ltd	31/12/78
2.	Bellway plc	31/7/83**	2.	Blackwood & Morton	30/6/80
3.	Benford Concrete Mach.	31/12/81	3.	Brigray Group	19/4/79
4.	British Mohair Holdings	31/12/82	4.	British Enkalon	31/12/79
5.	British Vending Machines	31/12/82	5	Burrell & Co. Ltd	31/12/79
6	Bruntons (Mussleburgh)	31/12/81	6	Cawdaw Industries	31/12/80
7.	Bulmer & Lamb (Holdings)	31/3/81	7.	Cope Sportswear	31/10/78
8	Castings plc	31/3/81	8.	Dundee-Combex-Marx	31/10/78
9	Cope Allman	2/7/83	9.	Dykes (J)	31/01/79*
10	Electro Components	31/12/82	10.	Findlay Hardware	31/12/80
11	Great Universal Stores	31/3/83	11	Homfray & Co.	31/3/79
12	J & H.B. Jackson	30/9/83	12	Liden Holdings	30/12/78
13	Marston, Thompson & Evershed	31/3/83	13	Midland Industries	31/12/82*
14	Matthew Hall	31/12/82	14	Oxley Printing Group	31/12/80
15	Molins plc	31/12/82	15	Paradise (B) Ltd	31/1/80
16	J.N. Nichols	31/12/81	16	P.M.A.	31/3/80
17	Norcros plc	31/3/83	17	Pickles (W)	31/12/80
18	Redfearn National Glass	30/9/78	18	Richards & Wallington Indus.	31/12/79
19	Sound Diffusion	31/12/83	19	Rivington Reed Ltd	18/3/79*
20	United Biscuits	31/12/83	20	Southern Construction	31/12/78
21	Wearwell Ltd	02/5/80	21	W 'Ribbons'	30/6/82*
22	Whessoe	31/3/83	22	William Hubson	31/3/79
23	William Leech	30/8/81	23	Wombwell Foundary	31/7/80
24	Watts, Blake, Bearne & Co.	31/3/80	24	Wood & Sons	31/12/79

* classified as 'non-failing'.

** classified as 'failing'.

APPENDIX G

LIST OF NON-ACQUIRED COMPANIES

	Name of Company	Accounting Year End
1	Adwest	30/6/82
2	Allied Colloid	31/3/79
3	Alpine Soft Drinks	31/3/79
4	Amstrad Electronics	30/6/82
5	Associated Diaries	30/4/83
6	Austin (F)	31/12/80**
7	Austin Reed	31/1/81
8	Baker Perkins	31/3/79
9	Barrat Developments	30/6/80
10	Beecham Group	31/3/82
11	Bestobell	31/12/81
12	Black (P)	30/4/82
13	Blackwood Hodge	31/12/78**
14	Blagdon & Noakes	31/3/79
15	Bowater Corporation	31/12/81
16	Brent Chemicals	31/12/81
17	British Home Stores	31/3/82
18	British Printing & Comm. Corpn.	31/12/82
19	British Steam Specialists Group	31/3/81
20	Brockhouse plc	30/9/82**
21	Brown & Jackson	31/12/80**
22	Bullough	31/10/82
23	Bulmer (H.P.)	24/4/80**
24	Canning (W)	31/12/81
25	Carpets International	31/12/80**
26	Chadburn Porter	31/1/81**
27	Christie Tyler	31/12/78
28	Chubb & Sons	31/3/80**
29	Crest Nicholson	31/10/81
30	Croda	31/12/81
31	Crouch (D)	31/12/81
32	De la Rue	31/3/80
33	Dubilier	30/9/82
34	Dunlop Holdings	31/12/81**
35	Edbro Holdings	31/3/83
36	Electro Components	31/12/82
37	Empire Stores	31/1/79
38	English China Clays	30/9/79
39	Farnell Electronics	31/1/82
40	Foster Bros	31/3/79

Appendix G (Contd).

	Name of Company	Accounting Year End
41	Freemans	31/1/80
42	Friedland Doggart	31/3/83
43	Forward Technology	31/12/79
44	Galliford Bros.	30/6/80
45	Gill & Duffs Group	31/12/79
46	Grattan plc	31/8/81
47	Greenall Whitley	30/9/80
48	Greene, King & Sons	30/4/81
49	Haden Carrier	31/12/79**
50	Halma plc	31/3/82
51	Hazlewood Foods	31/3/82
52	Henderson Group	26/2/83
53	Hepworth Ceramics	31/12/78
54	Hewden-Stuart	31/1/79
55	Highland Distillers	30/8/81
56	Hillards	28/4/79
57	Home Charm	31/12/83
58	Hunting Associated	31/12/82
59	Invergordon Dist.	31/12/79
60	Johnson & Firth Brown	30/6/78
61	Johnston Group	31/12/80
62	Jones & Shipman	31/12/80
63	Kalamazoo	31/7/79
64	Lennons	31/3/79
65	London & Midland	31/3/82
66	M.K. Electric	29/3/80
67	Marley plc	31/10/80
68	Martonair	31/7/82
69	Matthews (Bernard)	1/1/83
70	McKechnie Brothers	31/7/81
71	Metalrax Group	31/12/80
72	Moben Group	31/8/82
73	Morgan Crucible	31/12/79
74	Moss Engineering	31/12/80**
75	Mowlem (J)	31/12/80
76	Multitone Electronics	31/3/81
77	Neil (James)	31/12/79
78	Oceonics Group plc	31/3/83
79	Polly Peck	28/8/83

Appendix G (Contd).

	Name of Company	Accounting Year End
80	Prestige Group	30/12/80
81	RHP Group	30/9/83**
82	RMC Group	31/12/82**
83	Ransom William	31/3/80
84	Raybeck	26/6/83**
85	Ricardo Con. Eng.	30/6/82
86	Robinson (T)	31/12/80**
87	Rockware Group	31/12/80
88	Rotork	31/12/80
89	Ruberoid	31/12/81
90	Sainsbury (J)	28/2/82
91	Smith & Nephew	30/12/82
92	Spirax-Sarco Eng.	31/12/82
93	Stewart Plastics	30/4/81
94	Tate & Lyle	30/9/81
95	Trafalgar House	30/9/82
96	Ultramar	31/12/83
97	Unilever	31/12/80
98	Unitech	31/5/83
99	United Wire Group	29/9/79
100	Wm Low	1/9/78
101	Ward & Goldstone	31/3/81
102	Whitecroft	31/3/80
103	Young Breweries	31/3/80
104	Yorkshire Chemicals	31/12/79**

** classified as 'failing'

APPENDIX H

LIST OF ACQUIRED AND NON-ACQUIRED COMPANIES
(Matched by Size, Industry and Accounting Year End)

	Acquired Companies Name of Company	Accounting Year End		Non-Acquired Companies Name of Company	Accounting Year End
1.	Amalgamated Power Engr.	31/12/80**	1.	Hall (M)	31/12/80**
2.	Anderson Strathclyde	31/3/81	2.	Pegler Hatterley	31/3/81
3.	Armitage Shanks	31/3/80	3.	Wedgewood	29/3/80
4.	Arthur Holden	31/3/82	4.	Johnson Paints	30/1/82
5.	Averys	30/9/78	5	Brown Boveri Kent	31/12/83
6	Berec Group	31/3/81	6.	Chloride Group	31/3/81
7.	Bishop Group	28/2/82**	7.	Bejam Group	30/6/82
8	British Sugar	29/8/81	8	Northern Foods	31/3/82
9	Brown Brothers	31/12/80	9	Metal Closures	31/12/81
10	Cableform	31/3/79	10	Vinten Group	31/3/79
11	Carrington Viyella	31/12/81**	11	Tootal Group	31/1/82**
12	Central Manufacturing Co.	31/12/80**	12	Renold plc	31/3/81
13	Decca	31/3/79 **	13	Electronic Rentals	31/3/79
14	Drake & Scull	30/10/82**	14	Bett Bros.	31/6/82**
15	Ductile Steels	30/12/81**	15	Lloyds (F.H.)	31/3/82**
16	F.M.C. plc	30/4/82**	16	Basset Foods	31/3/82
17	Fairclough Contruct.	31/3/81	17	S.G.B.	30/9/80
18	Glass & Metals	30/10/78	18	Arthur Lee	30/9/78**
19	Gibbons Dubley	31/12/78	19	Grampian	31/12/78
20	Heal & Sons	31/3/83**	20	Walker (C & W)	31/3/83
21	Hoover plc	31/12/82**	21	Pifco Holdings	30/4/82
22	Illingworth Morris	31/3/83**	22	Lee Cooper	31/12/82
23	International Timber	31/3/81**	23	Travis & Arnold	31/12/80
24	K Shoes	30/9/79	24	Ellis & Goldstein	31/1/80
25	London Bricks	31/12/82	25	Ibstock Johnson	31/12/82**
26	Lonsdale Universal	30/9/81**	26	UKO International	31/3/82
27	Mallinson-Denny	21/12/79	27	Aaronson Bros	30/9/79
28	Mixconcrete	31/11/80	28	Nottingham Brick	30/9/80
29	Mothercare	31/3/80	29	Courts (Furnishers)	31/3/80
30	Myson Group	30/12/80**	30	Victor Products	30/4/81
31	Ofrex Group	31/12/80**	31	Office & Electronic	31/12/80
32	Revertex Chemicals	31/12/79	32	Marcarthy Phar.	30/4/79
33	Robertson's Foods	31/3/79	33	Nurdin & Peacock	31/12/79
34	Royal Worcester	31/12/82**	34	Hargreaves	31/3/83
35	Sanderson-Kayer	31/12/78	35	Petbow Holdings	31/3/79
36	Serck	30/8/80	36	Wagon Industries	31/3/81
37	Sheepbridge Eng.	31/3/78	37	Central & Sheerwood	31/12/78
38	Spillers	31/1/79	38	Tiger Oats	31/12/78
39	U.D.S. Group	31/1/82	39	British Home Stores	31/3/82
40	Wolf Electric	31/12/79	40	Bowthorpe Holdings	31/12/79

** classified as 'failing'.

APPENDIX I

LIST OF NON-ACQUIRING COMPANIES

	Name of Company	Accounting Year End
1.	APV Ltd	31/12/80
2.	Aquascutum & Associated Constr.	31/1/79
3.	Associated Fisheries plc	30/9/82
4.	Avon Rubber Co.	30/9/79**
5.	Bespak plc	30/4/82
6.	Billam (J) Ltd	31/12/79
7.	Birmid Qaulcast Ltd	30/10/79
8.	Birmingham Mint (The)	31/3/79
9.	Blundell-Permoglaze Hldgs.	30/10/80
10	Blue Bird Confectionery Hldgs.	30/6/80
11	Bogod-Pelepah Ltd	31/3/79
12	Bolton Textile Mill & Co.	30/4/80**
13	Bridon plc	31/12/81
14	Brown (John)	31/3/83**
15	Burco Dean Ltd	30/9/78
16	Buckley's Brewery Ltd	31/3/80
17	Carlton Communications plc	30/9/82
18	Casket (S) Holdings	30/6/82
19	Cray Electronics Hldgs.	30/4/83
20	Dart (M.Y.)	30/6/79
21	Dee Corporation	30/3/81**
22	Dickinson Robinson Gr.	31/12/77
23	Dowding & Mills Ltd	30/6/80
24	Donald Macpherson Group	26/11/80
25	Duport	31/1/83**
26	Dwek Group Ltd	31/12/79**
27	Eleco Holdings	30/6/82
28	Elson & Robbins	30/9/82**
29	Evered Holdings	31/12/82
30	Evode Group	30/12/80
31	Folkes (J. H.)	31/09/79**
32	Fothergill & Harvey plc	31/12/81
33	French Kier	31/12/82
34	Gent (S.R.) plc	30/6/83
35	HTV Group plc	31/7/84
36	Hickson International	30/9/83
37	Hickson & Welch	30/9/78
38	Higgs & Hill plc	31/12/82
39	Hopkinsons Holdings	28/1/83
40	Jackson Bourne	31/3/82
41	James Walkers Goldsmith	30/4/81**
42	John Carr (Doncaster)	30/9/82
43	John Waddington	31/3/83**
44	Johnson Group Cleaners	26/12/80

Appendix I (Contd)

	Name of Company	Accounting Year End
45	LRC International	31/3/82
46	Liberty plc	28/1/84
47	Low & Bonar plc	30/11/82
48	Management Agency & Music	31/7/79
49	Martin the Newsagent	3/10/80
50	McCorquodale & Co	30/9/78
51	Mitchell Cotts Group	30/6/79
52	Monk (A)	28/2/81
53	Muirhead plc	30/9/83
54	NSS Newsagents	30/3/80
55	Neepsend Ltd	31/3/78
56	Norton Opax plc	31/3/83
57	Northern Bricks plc	30/9/81
58	Owen Owen plc	29/1/83
59	Pauls plc	31/3/83
60	Peter Stores	30/6/80
61	Petrocon Group Ltd	31/12/80
62	Plysu plc	31/3/82
63	Prestige Group plc	31/12/82
64	Readicut Int.	31/3/79
65	Rugby Portland Cement	31/12/80
66	Selincourt plc	31/1/83**
67	Scapa Group	31/3/84
68	Scott & Robertson	31/3/83
69	Sharpe (W.N.) Holdings	31/12/79
70	Standard Telephones & Cables	31/12/82
71	Staveley Industries	31/3/81
72	Tunstall Telecom. Group	30/9/82
73	United Carries Ltd	26/1/80
74	Vaux Breweries	30/9/79
75	Vibroplant Holdings Ltd	30/4/82
76	Volex Group	31/3/83**

** classified as 'failing'

APPENDIX J

LIST OF ACQUIRING AND NON-ACQUIRING COMPANIES
(Post-merger Performance)

	Acquiring Companies	Industry Class.	Non-Acquiring Companies
1.	Alcan Aluminium**	Bldg Mat.	Hepworth Ceremics
2.	Avana Industries	Food Man.	Tate & Lyle
3.	Berisford S & W	Food Man.	Northern Foods
4.	Booker McConnell	Misc.	De la Rue
5	British Vita	Chemicals	Brent Chemicals
6	Brooke Bond	Food Man.	Rank Hovis
7	Bunzl	Pack. & Pap.	Metal Box
8	Coats Patons	Textiles	Tootal Group
9	Courtaulds	Textiles	Baird (W) Holdings
10	Crystalate	Electrical	Eurotherm Int.
11	Dobson Park	Eng. Mech.	Pegler-Hattersely
12	Extel	Misc	Portals Group
13	Ferguson Indus.	Misc	L.C.P. (Holdings)
14	Fine Art Development	Stores	Empire Stores
15	Fitch Lovell	Food Ret.	Morrison (W) Super.
16	Foseco Minsep	Indl. Mat.	Cookson Group
17	G.E.C.	Electronics	Ferranti
18	G.E.I.	Eng. Mech.	Ricardo & Co Eng.
19	G.K.N.	Metals	IMI plc
20	Garnar Booth	Stores	Stead and Simpson
21	H.A.T. Group	Cnt. & Cnst.	Bryant Holdings
22	Habitat Mothercare	Stores	British Home Stores
23	Harris Queensway	Stores	House of Fraser
24	Hestair	Misc.	Associate Heat Services**
25	Imperial Cont. Gas**.	Oil	Burmah Oil**
26	Lilly (FJC)	Cnt. & Cnst.	Wilson (C) Holdings
27	M.F.I.	Stores	Burton Group
28	Menzies (John)	Stores	Freemans (London)
29	Mining Supplies	Eng. Mech.	Ransomes, Sims & Jeffe.
30	Northern Engineers	Eng. Mech.	Davy Corporation
31	Pentos	Misc	Grampian Holdings
32	Racal	Electronic	Plessey
33	Redland Industries	Bldg. Mat.	BPB Industries
34	Reed International	Pack & Pap.	Bowater Corporation
35	Ruberiod	Bldg. Mat.	Marshalls Halifax
36	Sears Holdings	Stores	Boots (The) Co.
37	Senior Engineering	Eng. Mech.	Rotork
38	Scot. & Newcastle Br.	Brewers	Whitbread
39	Siebe Gorman Hldgs.	Misc.	London & Northern
40	Simon Engineering	Eng. Mech.	TI Group
41	Tesco	Stores	Kwik-Save Discounts
42	Thorn	Leisure	Electronic Rentals
43	Unigate	Food Man.	Rowntree & Mackintosh
44	Vantona	Textiles	Dewhurst (I.J.) Hldgs
45	Waring & Gillow	Stores	Stanley (A.G.)
46	Wolseley-Hughes	Bldg. Mat.	Marley plc
47	Woolworth	Stores	Dixons
48	Yule Catto	Misc.	Hargreaves

** Unavailability of PAS-scores.

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