THE FINANCIAL PERFORMANCE OF SMALL AND MEDIUM SIZED COMPANIES

"A model based on accountancy data is developed to predict the financial performance of small and medium sized companies."

By

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D E D I C A T I O N

To :

My father

Memory of my mother (R.I.P)

Memory of my wife Bassima (R.I.P)

My son Rody

My daughters Lida and Verva

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ABSTRACT

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Keywords : Financial ratios, Discriminant analysis, Company failure, Small-medium companies, Accountancy data, Failure prediction, Z-scores, Financial reporting, Financial performance, Trend analysis.

This study is concerned with developing a model to identify small-medium U.K. companies at risk of financial failure up to five years in advance.

The importance of small companies in an economy, the impact of their failures, and the lack of failure research with respect to this population, provided justification for this study.

The research was undertaken in two stages. The first stage included a detailed description and discussion of the nature and role of small business in the UK economy, Their relevance, problems and Government involvement in this sector, together with literature review and assessment of past research relevant to this study.

The second stage was involved with construction of the models using multiple discriminant analysis, applied to published accountancy data for two groups of failed and nonfailed companies. The later stage was performed in three parts: (1) evaluating five discriminant models for each of five years prior to failure; (2) testing the performance of each of the five models over time on data not used in their construction; (3) testing the discriminant models on a validation sample. The purpose was to establish the "best" discriminant model. "Best" was determined according to classification ability of the model and interpretation of variables.

Finally a model comprising seven financial ratios measuring four aspects of a company's financial profile, such as profitability, gearing, capital turnover and liquidity was chosen. The model has shown to be a valid tool for predicting companies' health up to five years in advance.

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CHAPTER ONE

INTRODUCTION

1.1 THE NATURE OF THE PROBLEM:

In recent years the small company sector has become an increasingly interesting subject to most western governments. This is primarily because it has been seen as having an increasingly important role to play in providing new products and employment opportunities. It is now widely believed that small companies contribute to the economy by increasing the level of competition in the economy through competing with large companies and by providing inputs to large companies in world markets. Birch (1979) found in his study of the Dun and Bradstreet data files that 66 percent of the increase in employment in the United States between 1969 and 1978 was generated by companies employing twenty or fewer employees, and fifty percent of these jobs were by independent small entrepreneurs.

There are at least 1 1/4 million small firms in the U.K. They give employment to some 6 million people or 25% of the employed population, and are responsible for nearly 20% of the gross national product. (Bolton, 1971).

However the poor performance of the U.K. economy in recent years has been marked by an upturn of business failures in all sectors, but especially in small business. Coupled with the current drive by the British Government to promote small businesses, failures have increased along with successes. The worth of a successful business is measured by increased employment rising with the continued success and expansion of the business, increased profit for investors, and wealth to the economy in taxes, and social services. Successful small companies also provide the base for future key companies. Failures, however, cause personal crises, heavy financial losses and wastage.

The major factor which distinguishes small companies from large is their relatively high probability of failure. Out of companies which fail within ten years of starting business, 50 percent of failures occur in the first two and a half years, 33 percent in the next two and a half years, and only 17 percent in the following five years, Ganguly, (1985).

It seems there are two important issues related to company failure :

First: how a company gets on to the failure track and whether it is then possible to prevent failure.

Second: whether the failure of a company is predictable prior to the actual event and what is the probability that any business on the failure track will fail in the near future.

Regarding the first issue, the factors that contribute to a company's performance can be broadly divided into two categories; macroeconomic and microeconomic. At the macroeconomic level, the performance of a company is linked to all economic factors, such as the prevailing monetary policy of the country, investors' expectations, the state of the economy, etc. Once a measurable (quantitative) historical relationship among a set of explanatory economic indicators and the performance of a company is established, and if one is prepared to assume that the future is an extrapolation of the past, then it is possible to predict whether a company is expected to continue or fail in the near future. At the microeconomic level, a company's performance is believed to be the result of many internal factors, such as liquidity, level of inventory, product selection, marketing policy, etc. These are of course, linked to macroeconomic events. Therefore, the micro/macro dichotomy is simply a rough one. Argenti (1976) argues that these micro causes of failure are attributable to management either directly or indirectly and he developed a descriptive theory of the causes and symptoms of failure. Indeed most of the causes he accounted for are not sufficiently measurable to be incorporated into a predictive model.

Concerning the second issue which is very relevant to this study , early researches in this area were of a univariate nature whereby a single accounting ratio such as the traditional current ratio (current assets to current liabilities) was considered in isolation. The growing realisation that a single ratio could not fully reflect a company's financial profile, and that a method of simultaneously dealing with several ratios could add significantly to the effectiveness of a company bankruptcy prediction model, led to the development of the multivariate approach. Studies from 1968 onwards have used multivariate statistical techniques, particularly "discriminant analysis". Altman (1968) perhaps has been most influential in adopting multivariate discriminant analysis to bankruptcy prediction. Among the early studies Taffler (1977) is the only one based on UK data concentrating on the industrial sector. More recently Betts (1984) made a significant contribution to the field of company failure by incorporated measures of stability in his model based in U.K. data. In general, small companies have been neglected somewhat because of the general paucity of financial information available on them. Edminster's study (1972) is an exception which was carried out on American small businesses and because his research is very relevant to this study which is based on small and medium sized companies in the UK. His model is discussed in detail in chapter three.

Before attempting to build a model, one should define "failure". It is however, difficult to define precisely the point of failure because it encompasses a wide range of financial difficulties. For example, a company is regarded as being technically insolvent if it is unable to meet its current obligations as they fall due. However, such insolvency may be only temporary and subject to remedy. The remedies applicable to a company can vary in severity according to the degrees of financial difficulty. If the outlook is hopeless, liquidation may be the only feasible alternative, which is the end point of the process of failure. Financial failure includes the entire range of possibilities between the two extremes ; temporary hardship and liquidation.

Existing empirical studies reflect this problem in that there is no consensus of what constitutes "failure" with definitions varying significantly, and arbitrarily, across studies. "failure" for this study constitutes companies which had:

A. entered into receivership; or

B. gone into voluntary liquidation; or

C. entered into creditors' liquidation; or

D. been compulsorily wound up by order of the Court or by Government action.

predictive models which provide early warning signals of potential failure would enable a company to take corrective actions, and reduce its risk.

1.2 OBJECTIVES OF THE STUDY:

Recent research have dealt with the development of multiple discriminant analysis models to predict the failure of companies based on different accounting and financial ratios and other indicators. However, most of these research studies have dealt with large companies. In general, small companies have been neglected somewhat because of the general paucity of financial information available on them.

The primary objective of the current study is to identify those accounting and financial characteristics of small and medium sized companies in the U.K. which are indicative of success or failure. More specifically, the objectives of the study are to answer the following questions:

1. Which specific financial ratios distinguish between failed and nonfailed small and medium sized U.K. companies, five years , four years, three years, two years, one year, prior to failure ?

2. Are the financial ratios which predict failure five years prior to failure the same as those financial ratios which predict failure closer to the time of failure ?

3. Is the predictive ability of failure or nonfailure dependent on the number of years prior to failure for which the data is obtained ?

4. Which discriminant model among the five perform "the best" over time.

1.3 RESEARCH METHODOLOGY:

This study was restricted to a sample of identified failed companies selected from an Exstat Tape available at the University of Bradford and supplied by Extel Statistical Services Limited for the period 1975-1982. The selection of independent variables was limited to those accounting and financial ratios used in previous studies. Multiple discriminant analysis was used to develop a model because of its proven results for problems of this nature. The ratios were selected based on results of previously published failure studies, financial and accounting textbooks.

The data for computing the financial ratios for both failed and nonfailed companies were obtained from the Exstat Tape which is in a computer readable form. The total sample consisted of 30 failed companies and 80 nonfailed companies that had the same industrial classification and total assets not exceeding £10 million. Multiple discriminant analysis was used to identify the financial ratios which best predicted the failed and nonfailed companies in the sample. More detailed discussion of the research methodology will be presented in chapter 4.

1.4 JUSTIFICATION OF THE STUDY:

With small and medium size companies being the backbone of the economy providing the modal number of the jobs in the country, building a model capable of providing early warning signals of impending failure would be of significant value. The greatest value would be derived by interested individuals and companies who have business relationships with potentially failing companies.

If a company could determine far enough in advance, that financial problems which if left unchecked would lead to failure in the near future, it could initiate corrective action before the credibility of the company proves impossible to restore. Once a company loses its credibility within its business environment and customers, no amount of money pumped into the company will restore the lost credibility. Thus the secret of success will be for the company to identify early shifts in its overall performance before credibility is lost. This identification of impending problems could perhaps create sufficient time for the company to attempt a solution to its problems. Birch (1979) found that with each additional year a company stays in business the chances of failure are reduced. In addition, Birch concluded that the greatest risk of failure occurs when a business remains static in comparison to other companies in the same industry. This indicates the need for a model to predict failure as early as possible and to enable the companies and its management to take corrective action.

1.5 PLAN OF THE STUDY:

Chapter two examines small business in the U.K. economy, the role they play, the particular problems they have especially with finance and government initiatives to overcome these problems.

Chapter three presents a discussion of research on company failure relevant to the present study. In addition, some weakenesses of these studies are noted. Table 3.1 summarizes and compares the various financial ratios used within the references cited.

Chapter four contains an indepth discussion of the research methodology for this study. The population of companies is defined, the sample selection is explained and the extraction of the data is discussed, together with a detailed examination of statistical techniques used in this study and an explanation of statistical problems encountered in using discriminant analysis.

Chapter five examines in detail published accounts as a source of financial data and whether this source of data gives sufficient quantity and quality information to assess the financial position of a company.

Chapter six presents the general characteristics of the failed and nonfailed companies, the results of the discriminant analysis, together with the results obtained for the validation sample. The chapter also contains general trends of selected variables that the research determined to be important, as well as the trends in Z-score histories for failed companies in validation sample.

The conclusions and recommendations for further research are presented in chapter seven.

CHAPTER TWO

SMALL BUSINESSES IN THE U.K. ECONOMY

2.1 INTRODUCTION:

Small businesses are very much a subject of current affairs, generating tremendous enthusiasm within the business world. Because of the controversy involved, much has already been written about the subject, however, this chapter contains the relevant issues concerned with the subject as a whole, as I saw them. The next section, therefore, is a descriptive account of what they are and their relevance. The two most important areas of concern for small businesses, as I see the situation, is the involvement of the government in the small business sector and the ways in which its assistance is designed, and the most prevailing problem that of raising finance, these two issues are outlined and reviewed in section 2.3 and 2.4.

2.2 THE NATURE AND ROLE OF SMALL BUSINESSES IN THE U.K. ECONOMY:

This section examines the importance of small businesses in the U.K. economy with special reference to the findings of the Bolton report (1971), the first major enquiry into the small firm sector, and D.J. Storey's book "Entrepreneurship and the New Firm", (1982). The section then goes on to offer a definition of what is considered a small business in the U.K. again with special reference to the Bolton and Wilson report. Finally we look at the different types of small business including alternative forms such as enterprise workshops, worker co-operatives and franchising, and what is known as the 'informal economy'.

2.2.1 <u>THE IMPORTANCE OF A SMALL BUSINESS</u>:

The Bolton report of 1971 was the first major enquiry in to the small firm sector, prior to the appointment of this committee there had never been a comprehensive study, official or otherwise,of the small firm sector in the UK., it states :

> " We had no doubt from the first that the future prosperity of the small firm sector was an important matter, its sheer size and ubiquity are sufficient to ensure that.
> There are at least 1 1/4 million small firms in the U.K., they give employment to some 6 million people or 25% of the employed population, and are responsible for nearly 20% of the gross national product . Still more important than its quantitative contribution is the fact that the small firm plays a vital role in the preservation of a competitive enterprise system.

We believe that the small firm is in fact an essential medium through which dynamic change in the form of new entrants to business , new industries and new challengers to established market leaders can permeate the economy. We therefore believe that in the absence of an active and vital small firm sector the economy would ossify and decay ". (Bolton, 1971)

A study commissioned by the Bolton inquiry, by C.W. Golby and G. Johns, (1971) 'Attitude and motivation', concluded that small business certainly sees itself as being of special benefit to the customer because there was a feeling of emotional involvement and a determination to find a way round difficulties and a pride in performance which, it was felt, larger firms with their rigidity and bureaucratcy could not equal.

"One of the most important contributions of small business to the community is that of providing a wide range of choice and a high standard of personal service to the customer. ....., Many small firms exist to serve minority groups, particularly in the service trades, ... Above all most of us value the personal service which small businesses provide almost as a matter of course and which large businesses have to strive, not always with success, to achieve". (Bolton 1971, page 26)

A further contribution is the evidence that smaller companies have now become the main force behind new employment. In fact over half the new jobs created between 1980 and 1984 were in firms employing less than 100. (Anslow, Your Business 1984). If every small business took on just one more employee, the national dole queues would be halved. Hence the official enthusiasm for the small business sector.
(Banking World 1984)

An article in the Investors Chronicle emphasises the investment contribution:

" At the end of 1983, the three best performers over three years in the U.K. growth unit trust tables produced by money management were all smaller company funds. The basic idea is that a small company is much more capable of growth than a larger company. But its superiority goes further than that. The small company will probably be more efficiently run than the larger group, its managers having more control over the business and usually more incentive to exert themselves. There will be less deadwood and less waste in the smaller company, its management is more likely to be in place because of ability rather than as a result of knowing the right people or self-salesmanship. You only have to look at the mess Britain's large companies got themselves into during the 1981-83 recession to see their short comings." (Investment Chronicle,1984)

Finally D.J. Storey, in his book "Enterpreneurship and the new firm", (1982) lists seven major function which small firms are thought to perform :

1. Smaller firms provide a source of competition (potential or actual) to larger firms in their industry, limiting the latter's ability to raise prices and/or be technically inefficient in the use of production .
2. Small firms have been increasingly acclaimed as major creators of new jobs in developed countries since standardised products, which have traditionally been produced in large enterprises are now increasingly produced by developing countries.
3. Small firms are the seed corn from which the giant corporations of future years will grow.
4. In the developing countries small firms can co_exist with large foreign owned enterprises and by using an appropriate local technology, make a valuable contribution to growth .
5. Smaller firms can provide an harmonious working environment where owner and employer work, shoulder to shoulder, for their mutual benefit. This is likely to be reflected in

fewer industrial disputes and lower absenteeism.

6. The inner city areas of industrial nations contain heavy concentrations of the social problems of unemployment, low incomes and poor housing. It is argued that small firms can make an important contribution to the regeneration of such areas.

7. Small firms are likely to be innovative, being found in industries where technical development is essential for survival .

(Storey 1982)

2.2.2 THE DEFINITION OF A SMALL BUSINESS:

It is not easy to define a small business especially as small business involve a large range of different industries. However, some measures may be used to distinguish small businesses from large ones.

The Bolton committee report 1971 (Bolton committee, 1971, p. 3) defined small firms as, those employing less than 200 people for manufacturing , under £50.000 turnover for retailing and 5 vehicles or less for road transport .

So the Bolton committee used a statistical basis for its definition and the committee used different measures for various industry groups .Quite correctly , they recognize different kinds of business . If we want to measure the size of manufacturing companies , it is quite different from road transport companies as well as businesses in the motor trade sector .

However, the Bolton committee established its definition of small companies on the following three criteria :

Firstly, in economic terms, the small firm has a relatively small share of its market.

Secondly, it is managed by its owners or part owners in a personalized way, and not through the medium of a formalised management structure .

Thirdly, it is also independent in the sense that it does not form part of a larger enterprise.

The Wilson report (Wilson Committee, 1979, report no.3) updated the statistical information in the definition of small companies, by including the effect of inflation on the size of the turnover. However, the small companies in company law have a different definition :

> "A small company is a company in respect of which at least two of the following three conditions are satisfied for any financial year.
>
> A. Its turnover does not exceed £ 2 million.
>
> B. Its balance sheet total of called-up share capital not paid, fixed assets, current assets and prepayments and accrued income must not exceed £ 975,000 .

C. The average number of employees, determined on a weekly basis must not exceed 50.
(Derek A., 1987, p.24.)

The Bolton committee, the Wilson report and company law use some similar factors to define the small companies, which are the size of turnover and the number of employees but different values of the items are used in the three definition. (see table 2.1)

2.2.3 TYPES OF SMALL BUSINESS:

It is quite difficult to keep an accurate check on precisely how many small businesses there are, the smaller they are the harder it is. The statistics probably understate small business activity because not all the self-employed will necessarily show up in the value added tax registrations that are mainly used as the base for assessing the small business population. There are now two million people classified as self-employed and many must be running probably one-man businesses. (Harris 1984).
About half of small businesses are involved in the service sector with retailing outlets the largest single segment.
Table 2.2 show Figures issued by the Department of Trade and Industry's sector for small businesses in 1983.

TABLE 2.1

DEFINITION OF SMALL COMPANIES ACCORDING TO BOLTON AND WILSON REPORT

Industry	Bolton	Wilson
Number of employees		
manufacturing	200 or less	200 or less
construction	25 or less	25 or less
mining/quarrying	25 or less	25 or less
Turnover:		
retailing	£50,000 or less	£185,000 or less
wholesale trades	£200,000 or less	£750,000 or less
motor trade	£100,000 or less	£365,000 or less
miscellaneous services	£50,000 or less	£185,000 or lese
Number of vehicles:		
Road transport	5 vehicles or less	5 vehicles or less
catering	all excluding multiples and brewery managed public houses	

TABLE 2.2

NUMBER OF SMALL BUSINESSES IN 1983

BASED ON INLAND REVENUE SCHEDULE 'D' RETURNS.

Business Sector	Number of small businesses
Agriculture	182,000
Production	138,000
Construction	212,000
Transport	58,000
Wholesale	109,000
Retail	266,000
Finance: property & Professional services	91,000
Catering	121,000
Motor trades	74,000
Other services	155,000
TOTAL	1,406,000

2.2.4 ALTERNATIVE FORMS OF SMALL BUSINESS:

Enterprise Workshops: Enterprise workshops originally formed part of the 'Job Creation Programme' and are run as part of the special temporary employment programme. They are intended to become viable businesses in their own right, and hence to create permanent jobs, within two years of being set up. The small number of workshops currently in operation have had a fairly inauspicious record with only 3 or 4% becoming viable. This is partly because some have been inadequately designed and managed, and partly because they are often grossly under financed in normal business terms.
(Wilson report 1979, page 21.)

Worker Co-operatives: The majority of worker co-ops are small service businesses which involve an average of about 10 members. As the service sector usually requires less capital, less complex market research, and less time to start up, the attractions of the service sector are obvious. The highest single group of co-ops is in the retail, distributive, catering and food processing areas.
(Churchill 1984)

Franchising: Franchising has been rapidly growing in popularity both as a means of expansion for companies lacking the resources to expand by themselves and as a means of entry into business by individuals who want to enjoy the benefits of working for themselves while limiting some of the drawbacks. It is the second generation of "business format" franchise operations, where most of the growth is being recorded. These franchises are usually fast food outlets or services such as rapid printing or cleaning.

The failure rate of franchises who take on a franchise offered by an association member is very low and Patrick Salaun 'franchise manager for Barclays Bank' points out that

"so far we have not experienced any bad debts". (Churchill, 1984)

2.2.5 THE INFORMAL ECONOMY:

Mr Pom Ganguly, government statistician with the Department of Trade and Industry, yearly reports on business birth and death rates. However, the figures used are based on Inland Revenue Schedule 'D' returns. The Economist Intelligence unit estimate 2.3 million small businesses, the additional amount being largely made up of very small companies, not registered for VAT, or dealing in zero-rated goods; such as undertakers or opticians. Although costing the U.K. revenue in taxes, there is another way of viewing the Informal Economy:

"If informal work in the 'cash economy' is increasing while 'formal' employment declines, this could provide new avenues for small business formation and growth. It has further been suggested that this trend is further encouraged by the increasing burden of state

regulations, controls and taxes. Informal economy often represents the first milieu within which individuals test the market, acquire basic business expertise and accumulate funds that can be used for the establishment of 'legitimate' business". (Scase, Goffec, 1982)

2.3 GOVERNMENT INVOLVEMENT IN THE SMALL BUSINESS SECTOR:

The report of the committee of inquiry on small firms appointed on July 23 1969 by the Rt Hon Anthony Crossland, the then president of the Board of Trade, had given among their terms of reference :

> "To consider the role of small firms in the national economy, the facilities available to them and the problems confronting them".

Prior to the appointment of this committee there had never been a comprehensive study , official or otherwise, of the small firm sector in the United Kingdom. This important area had been little researched and poorly documented, and the formation of industrial policy had inevitably proceeded without adequate knowledge of the functions performed by small firms, of their efficiency and of the likely effects upon them of the actions of government. It was a reasonable presumption that the decision to set up the committee was influenced partly by short term considerations. 1969 was a difficult year for business generally and for small firms in particular, and this gave rise to considerable pressure for an investigation of the immediate position of the small firm. The Bolton report 1971 stated the following:

> " It emerged very clearly from the written evidence we received that many small firms believed themselves to be operating in a generally hostile environment as a result of the action of Government. Much of our evidence received before the change of the Government in June 1970 revealed a large measure of straight forward political prejudice against the labour government at that time. It is commonly assumed that the overwhelming majority of small businessmen themselves, despite their numbers, have been extremely ineffective as a pressure group. The main reason for this is that small businessmen are often fiercely independent, very reluctant to join in group activities, and also heavily overworked. The most telling criticism of government in this field is not that its policy towards small business is mis_conceived or hostile, but that it has no policy. Indeed most of the rare initiatives of government designed to help small firms are comparatively recent developments." (Bolton report 1971)

2.3.1 RECOMMENDATIONS OF THE WILSON REPORT (1979):

The Wilson report was commissioned in 1977 to enquire into the role and functioning at home and abroad, of financial institutions in the United Kingdom and their value to the economy ,to review in particular the provision of funds for industry and trade, to consider what changes are required in the existing arrangements for the supervision of these institutions, including the possible extension of the public sector, and to make recommendations. It was published in 1979. The committee appointed had already published a number of volumes of oral and written evidence, two research reports and a progress report on the financing of industry and trades. But this interim report on small firms was the first time they had drawn any conclusions or made any recommendations. The main reason for singling out the small firms for special treatment in this way was the virtual consensus in the submissions they had received that there were problems with the arrangements about financing smaller businesses, whatever the funds and their availability for industry and trade as a whole. There appeared to be a case for closer examination of these claims, both because of their importance in their own right and because of the general lessons which might be expected from a scrutiny of the financial system which was widely believed to be one of their weakest links.

The recommendations are summarised below and it was believed that if accepted, they would bring some measure of benefit to small firms, encouraging more new firms and enabling more existing firms to grow in a faster rate.

1. The department of industry should review the thresholds of all their industrial support schemes with a view to introducing greater flexibility and ensuring that small firms are not excluded.

2. The case for changing the law to allow small companies to raise equity in a redeemable form, and other ways of allowing proprietors of small companies to raise outside capital without risking their overall control, should be given further consideration by the department of trade, the treasury and other departments concerned.

3. The department of trade, the treasury and other departments concerned should consider how best to promote the facilities of Over The Counter (OTC) markets in this country and the case for removing some of the impediments to their development which are alleged to exist at present.

4. Steps should be taken to promote the creation of a new type of institution, the Small Firm Investment Company (SFIC), by removal of the present fiscal and other constraints on the spontaneous development of such a medium. A specific limited relief of personal taxation should be given for the purchase of SFIC shares.

5. An English Development Agency to small firms should be set up with financial powers and objectives similar to those of the Small Business Divisions of the Welsh and Scottish Development Agencies. As an interim step, so the Council for Small Industries in Rural Areas (CoSIRA) should be given the additional financial powers already possessed by its counter parts in Scotland and Wales.

6. A publicly underwritten loan guarantee scheme, with a limited subsidy element and some part of the risk retained by the banks,should be set up on experimental basis as soon as possible.

7. The Export Credits Guarantee Department (ECGD) should review their general responsiveness to the needs of small firms and should consider the appointment of a small

firms representative to the Export Guarantees Advisory Council.

8. The banks should take steps to ensure that their policy in respect of the effect on existing facilities of ECGD guarantees advances is clearly understood at branch level.

9. The National Research Development Corporation should review their practices in relation to the margins of their markets to see whether it is possible to take on more projects put forward by proprietors of the small businesses within their requirement to break even. They should also examine their working relations with other financial institutions in related fields to ensure that viable projects which fail to get their support are passed on to more appropriate places.

10. Those concerned with the provision of advice to small firms, including accountants and the banks as well as the public sector agencies, should take steps to ensure that information about the National Research Development Corporation and Technical Development Capital Ltd is as widely disseminated as possible.

11. Consideration should be given to ways in which the present rather fragmented arrangements for co_operation between small firms and centres of higher education could be put on a more systematic basis, a pilot scheme should be established whereby educational establishments could obtain grants to undertake more prototype development and testing for small firms.

12. The accountancy bodies should take steps to ensure that their members are both equipped and encouraged to take a more active role in providing adequate advice to their smaller business clients.

13. The Confederation of British Industry (CBI) and other representative bodies should consider whether there are any further steps that might usefully be taken to encourage larger firms to release executives to assist smaller businesses with general advice or assistance on particular projects.

14. Those public and private institutions concerned with providing finance to small firms who do not already do so should consider publication of the criteria which they apply when judging applications for assistance and of

guide lines showing the manner in which the required information should be presented.

15. A small statistical unit should be set up within the Department of Industry specifically charged with collecting and co_ordinating statistical information about the small firms.

2.3.2 GOVERNMENT INITIATIVES TO ASSIST SMALL FIRMS 1979-1981:

Storey (1982) outlines briefly the measures taken by a conservative government in Britain to assist the small firm, and encourage more individuals to start their own businesses:

1.Business start-up schemes: outside investors buying shares in new small trading companies obtain tax relief at rates up to 75% on investments of up to £10,000/year (now revised into the business expansion scheme obtaining tax relief at rates of up to 60% on investments of up to £40,000/year).

2.Loan Guarantee Scheme: Government will guarantee 80% of new loans for between 2 and 7 years, on values of up to £75,000 (100,000 after 1 April 1989). The remaining 20% is carried by the financial institutions making the loan.

3.Other financial benefits: corporation tax liability has been reduced . The VAT threshold has been raised.

Trading losses can be offset against tax more generously. Redundancy payments of up to £25,000 are free from tax, if the money is used to start a business.

4.Premises and planning: an extension programme of the building of small factory premises has been undertaken.

Eleven enterprise zones have been created within which planning restriction are much less onerous and where rates relief is given over a ten years period.

5.Information and statistics : The number of forms which government issues have been substantially reduced. On the other hand, the businessman can obtain advice on a variety of topics from small firm information centres. (see the Essex Business Centre)

6.Employment legislation : This has been relaxed for small firms employing less than 20 people, who are not liable for claims for unfair dismissal by workers employed by the firm for less than two year.

That was 1979-81 , In February 1984 the Prime Minister announced that government schemes for small firms are to be simplified by May, so that small firms can see what schemes are on offer from the Department of Trade and Industry , David Tripper, Minister with special responsibility for small firms said, "We must make clear to industry what is on offer in the simplest terms and then make it as straight forward as possible for them to take advantage of it".(British Business 1984)

Certainly the value of the loan Guarantee Scheme has been the centre of controversy, so much that Robson-Rhodes (1983) were commissioned to report on the effectiveness of the scheme.

In general Robson-Rhodes (chartered accountants) commented on the value of this scheme, its place in the range of facilities available to stimulate business, and indicated its contribution to generating new business and jobs. The scheme has clearly made a significant contribution to getting small businesses started and has rekindled interest in appraising and financing small businesses in more risky situations.

2.3.3 THE VIEW AS SEEN BY A FIRM OF PRIVATE MANAGEMENT CONSULTANTS (P.A. MANAGEMENT) 1986:

Extracts taken from a report in the Sunday Times business supplement;

> "The creation of new worthwhile jobs remains the most pressing social, political and economic problem in Britain today. We in P.A. believe we have part of the answer. Economic recovery and growth by themselves cannot provide an answer, and nor can training measures. Neither of these, whilst clearly of benefit themselves can provide the full answer to the size and scale of the problem now being faced.

The scale of run down in traditional industries in some regions is now so great that economic recovery and a stimulus to the economy as a whole will not provide the jobs that are needed in these areas in the number and speed required. For example, Northern Ireland has lost about a half of its manufacturing jobs in the last ten years, whilst the West Midlands has lost a third of its manufacturing employment in just the last five years. These losses will take years to replace under even the most favourable conditions. P.A. has been working in both these regions in the last couple of years in unique schemes to assist local job creation. The main lessons we have learnt are :

* That the most secure and long-lasting job creation comes from the expansion of existing local firms.
* That growth of new business should be incremental in the sense that it should be an extension of existing local business and skills.
* That the correct marketing of local job creation is essential to success.
* That existing public funds and 'pump priming should be much more focused, both in terms of covering smaller 'core' areas and in concentrating on fewer worthwhile initiatives.

In Londonderry several hundred new jobs have been created in the last two years and the effect on the local industrial property market has been significant with private investment stimulated. The ingredients for this success are many and varied but I would point particularly to the coming together of public and private interests to provide a 'one stop' advice and counselling service to fledgling enterprisers and the imaginative marketing and back-up facilities firmly rooted in the community."

2.3.4 THE ESSEX BUSINESS CENTRE:

As an example of recent government policy to assist small business, centres have been formed on a regional basis specifically to provide information and expert help to new and existing small and medium sized companies, one such centre is Essex.

Since its inception at the beginning of 1984 the Business centre (in Chelmsford) has experienced a rapidly increasing demand for its services and the range of activities undertaken has also expanded. The aims of the centre is to provide access to all ranges of services available to business from both the county council and voluntary agencies in Essex, and to draw together these different strands. The centre provides a wide range of expert advice on finance, marketing, exports and general business planning. It also acts as a focal point for businesses seeking help.

2.3.5 ZONES OF FREEDOM:

Whether you are setting a new business or relocating an established one, the Enterprise Zones offer an unrivalled package of incentives. The scheme was started by government in 1981 to stimulate industry and employment in selected inner-city areas. There are at present 25 zones with individual sites varying from about 120 acres to over 1100 acres, locations include : Corby, Hartlepool, Isle of Dogs, Middlesborough, Scunthorpe, Swansea, Clydebank and Belfast. The land is ripe for development and zones offer great potential for service and light industries.
The principal benefits are:

Complete exemption from rates on industrial and commercial property.
Exemption from development land tax.
100% allowances for capital spending on buildings.
Exemption from industrial training levies and from the requirement to supply information to Industrial Training Boards.
Greatly simplified planning controls.
Assisted customs facilities.

Despite criticism that the zones have already encouraged firms in the area to move short distances, there is evidence that extra jobs have been created.

2.4 FINANCE AND SMALL BUSINESS:

2.4.1 SOURCES OF START UP CAPITAL:

" Generally speaking individuals setting up in business for the first time fall into one of three broad categories:

A. Those starting completely from scratch, where the proprietors have no experience in, or connection with, existing enterprises.

B. Ex- employees of existing firms starting up in similar or related areas.

C. Those who take over existing business with the intentions of developing them along different lines.

In almost every case the main initial source of capital will be equity subscribed by the proprietor himself or by his family."(Wilson report 1979)

" wholly independent new firms in Cleveland (North East England) were asked for the sources of finance which founders used to begin their business: 53% of all financial sources were personal savings." (Storey 1982)

2.4.2 SOME TECHNIQUES OF ESTIMATING CAPITAL REQUIREMENT:

In determining financial requirement the prospective entrepreneur faces a necessary but difficult task. Part of the difficulty results from the problem of trying to peer into the future. Although the prospective entrepreneur should personally dig as deeply as possible into future financial needs, he or she should also seek factual information and counsel from various outside sources. It is often quite feasible to visit other businesses, similar to , but not directly competitive with, the proposed business.

As a first step in estimating capital requirement, it is necessary to determine the volume of sales that may be expected. This step is required because the minimum amount of many assets fluctuates directly with business volume. One approach to sales production is to select a desired profit figure and to work back from that to sales; the next step is to compute the amount of assets necessary for that particular sales volume. The prospective entrepreneur may use the double-barrelled approach of applying standard ratios and cross-checking by empirical investigation. Industry standard ratios are compiled for numerous types of business concerns. They are available from Dun and Bradstreet, Bankers, trade associations, and many other organisation. (Broom-Longenecker 1975)

Another method is to construct a forecasted profit and loss account, balance sheet and cash flow. These are the three main mechanisms for keeping an eye on your money.

The balance sheet gives you a still picture of your business's money at a given moment; the profit and loss account tells you how the business has done over a period

(usually a year), and the cash flow forecast tries to predict what you will be spending money on during the next year and when. (Starting Your Own Business -Barclays Bank 1986)
As a final check it may be possible to achieve a break-even point percentage for the proposed type of business. This is the percentage of capacity or normal level that must be reached to avoid losses.

2.4.3 FINANCIAL NEEDS:

The following section is based on
R.B. Hardgreaves "Starting a Business".(1983)
It considers the different types of financial needs and how they can be minimised.

FIXED ASSETS:

The new business may require plant and machinery if it is to manufacture a product and will, whatever its business, need office fittings,furniture and equipment. This can involve large sums of money particularly if bare premises are rented which need screens, carpets, heaters and light fittings. Office equipment will include desks, typewriters, telephones and telex. Motor vehicles including cars may also be needed.

The list of needs is likely to be long and should be carefully reviewed until it only includes the items which must be had to run the business properly. It is probably better to start with too little overhead rather than too much for this reason. For example, office equipment can often be minimal : photocopying equipment is not justified until it would show a cost advantage over using a specialist service bureau.

There are strong arguments for renting property. First, unnecessary finance is not tied up in bricks and mortar. Secondly, greater flexibility can be obtained by short term lets of premises which are likely to be too small in two or three years time. renting of other assets may be economic if they are only needed for short period at a time.

CURRENT ASSETS:

Cash saving on debtors may be difficult as the terms of trade of the industry may dictate the length of credit available; nevertheless, there is no excuse for not planning to collect debtors promptly. Stock is an area where planning can be very valuable as too much is more often held than too little. One of the difficulties can be the wide range of stock items which many businesses need. The secret of minimizing stock levels is good stock control.

Creditors may be an area where there is little scope for savings by increasing credit taken. Indeed the new business may have to pay cash for a while before credit will be given by suppliers. This is one reason for dealing with relatively few suppliers to establish a level of business at which credit and may be discounts will be given as soon as possible. If cash is tight, it may be wiser to choose a supplier which offers credit but is expensive rather than one who does not but is cheaper.

OVERHEADS:

Finally, all overhead areas need a close look. For example, some costs can be linked to income which reduces overheads. A high percentage of sales commission rather than salary to salesmen is one way of doing this. Other areas involving the build up of cost before income also need thought. For example the initial number of staff. Some services can be purchased on a part time basis to start with if the work does not justify a full time salary. Book-keeping is a possible example.

FINANCIAL STRUCTURE:

A basic concept of financing the needs of any business, new or long established is known as 'matching'. There has however been a technical argument to the contrary, but to simplify the matter we will assume that the concept will give the new business person an insight into a workable philosophy on the financial structuring of their company.

The principle is to keep the life of assets and their relevant financing of similar length. For example if a computer is to have a productive life of ,say five years it is appropriate to finance it over a similar period.The financial needs of the company should be taken down into fixed assets, working capital and contingency to help with matching. The matching principle suggests providing for the variable working capital from short term but renewable sources of cash. Plant, office equipment, vehicles and the like are medium investments; while buildings, long lasting plant and some 'hard core' element of working capital are longer investments.

SHORT TERM FINANCE:

The simplest and most common form of short term finance is an overdraft facility. It must not be forgotten, however, that an overdraft is technically repayable on demand and the bank is likely to object if the current account is not in credit at some time in each month. Most businesses, both small and large, use an element of overdraft financing within their total financing. Common security is a legal charge (debenture) on all the assets of the business.

Credit factoring can be a useful form of finance if the business starts to grow quickly, because a higher lending advance against each sales invoice (say 80%) is common.If used properly it need not be expensive and is worth considering seriously when sales are growing fast to a relatively few high quality customers. However, it often does not mix well with an overdraft facility because the banks main security usually includes the debtors.

MEDIUM TERM FINANCE:

The common forms of medium-term finance are a bank medium term loan, hire purchase, and leasing. A medium term loan from a bank has greater continuity than an overdraft. It will be for a definitive period repayable in agreed, say monthly instalments over the period. It will cost more than the overdraft by one or two percent and may involve some restriction such as a limit on total borrowings of the business.

LONG TERM FINANCING:

Long-term loans are usually less well understood than shorter types of finance and the following features are worth noting:

A. Security - will reflect the length therefore greater risk in lending; loans are usually secured on the assets they finance.

B. Interest rates are often fixed.

C. Repayment over seven to twenty years may be available in a variety of ways such as equal periodic instalments.

D. convertible loans - these are sometimes used where security is inadequate or where the ability of the business to service the loan is in doubt. The lender usually has the option for a fixed period to subscribe money for shares in the business at a price or formula fixed at the outset.

Another form of long term finance is preference shares. These are shares in the business which rank ahead of the ordinary shares both for dividends and capital. The capital rights give the shareholders the right on liquidations or sale of the business to receive a fixed repayment of their shares ahead of the ordinary shareholders.

Equity: equity share capital is the most permanent form of capital; they usually carry all the votes which give control over the management of the business.

As a general rule, one's own money should be used for permanent capital though personal guarantees of an overdraft are a convenient way of providing for shorter term needs. As a rule of thumb it should not be difficult to obtain at least as much finance from out side, as which has already been raised personally, and still keep in control of new business.

2.4.4 THE PROBLEM OF RAISING FINANCE:

In 1931 the Macmillan Report was published and this highlighted the great difficulties experienced by smaller companies when attempting to raise longer term finance in relatively small amounts. Macmillan believed this to be mainly the results of a gap in the supply of suitable funds to support the growth of smaller companies. (Macmillan Report 1931). This phenomenon became known as the "Macmillan Gap", which has been described as " the lack of provision for small and medium-sized firms of long-term capital in amounts too small for public issues." It led to the setting up of various institutions specialising in the financing of small firms, notably Charterhouse Industrial Development, Credit for Industry, and Leadenhall Securities. But these institutions could only tackle part of the problem. Accordingly, in 1945, the major clearing banks, with support from the Bank of England, set up the Industrial and Commercial Finance Corporation (ICFC) which at once became and remains by far the most important institutional provider of long-term capital to small and medium enterprise in Britain. (Chadwick 1978).

Mr J.E. Bolton, Chairman of the Committee of Inquiry on small firms (the Bolton Report), commented in May 1976 on what was the major problem of small firms, namely the availability of working capital. This rests fairly and squarely with the clearing banks. The double squeeze of high inflation - causing a need for increased working capital just to stand still - and depreciation in the value of the assets which the small firm can offer as security has caused an ever increasing gap. (Bolton 1976)

As far as bank credit is concerned the small business suffers from certain handicaps as compared with large firms. In the first place they cannot offer the same security and secondly the smallness of their loans involves banks in higher administrative costs. Thirdly, the volume of investment loans to the smaller enterprises is apt to fluctuate because financial institutions have a tendency to start by cutting their money supply to the smaller companies when the money becomes tight because of the extra risk involved.

2.4.5 VENTURE CAPITAL:

The ideas behind venture capital come from the United States, where it has been a source of finance for 20 years. Venture capitalists are prepared to wait for several years before they see a return on their investment - if at all - in the hope that it will be worth millions when it takes off. Recently, the Government's Business Expansion Scheme has allowed individuals to claim tax relief on investments up to £40,000, and this has opened up the gates for a multitude of new funds.

" Most recently a new breed of independent 'pro-active' organisations has emerged. They have identified potential gaps in the market unfulfilled by the banks or the various government schemes. That potential is for close involvement in the management of the company being backed, and in the planning and ownership of the company, over a period of perhaps five to seven years." (Layton, 1984)

" The venture capital industry has grown extremely rapidly during the last four years. There are now nearly 80 specialist organisations providing venture capital to growing private business compared with fewer than 20 at the beginning of 1980." (Lloyd, 1984)

2.4.6 INDUSTRIAL AND COMMERCIAL FINANCE CORPORATION (ICFC):

ICFC is part of 'Investors in Industry' an independent private sector group whose main business is providing long-term and permanent investment capital to companies of all sizes. Investors in industry is owned by nine London and Scottish banks (85%) and the Bank of England (15%).

Since their formation in 1945 they have built up an unrivalled track record in meeting the financing needs of smaller private companies. In the ten years 1967/8 - 1977/8 ICFC lent £16.5 million to 277 firms to start-up (i.e. a business launch which was less than three years old). One-third of those start-ups subsequently failed, with ten percent either having been taken over or ICFC having sold their interest. (Storey 1982)

> "The often heard observation that ICFC drives a hard bargain has a lot of truth in it, but it takes more risks than other investor (a one third failure rate is expected) and has long experience on its side."
> Anslow (1984)

David Marlow, chief executive for ICFC, states that in his view, that what distinguishes ICFC - apart from the sheer volume of its investments, which now runs at over £130 million a year - is the fact that it can take a long-term view. Other funders who can loosely be grouped under the heading "venture capital" are often looking for an "out" within five to seven years. ICFC, supported by the big four clearing banks, can look further ahead and, indeed, is still reasonably happy at being locked into investments it made nearly 40 years ago. (Marlow 1984)

2.4.7 SMALL BUSINESS AND THE BANKS:

Although banks are frequently criticised (not always justifiably) for their lack of response to ideas for new businesses, clearing banks in fact provide more money to small businesses than any other source through their 13000 branches around the country and are often the independent businessman's only point of contact with an external finance system. It is virtually impossible to go into business without personal resources of some kind as, not unreasonably, the banks expect a financial commitment from the potential businessman so that there is a sharing of the risks involved between him and the bank. Senior managers say, and there is really no reason to doubt them, that commitments should be on a ratio of 1:1 of personal resources and bank advances. But it is not difficult to find the branch manager who does not really approve of the more liberal trends in banking and does not consider that the time and effort on the part of the businessman and the laying of his whole livelihood on the line counts as a commitment or acceptance of risk. Anyone who is unfortunate enough to come up against this kind of manager should have no regret about taking his ideas to a higher level, another branch, or eventually another bank. There are plenty of lenders today looking for viable propositions. (Woodcock 1982)

During the past decade there has been a tremendous growth in the provision of medium-term finance for business, as the traditional bank practice of lending for short periods only has been relaxed following two major reports published in the early 1970's on competition and credit control and on small firms. The range of choice for the smaller business is now wide, and is a recognition of the dominant desire of most small businessmen to raise their finance through loans, rather than part with any degree of control by selling a share stake in their companies to an outsider.

"The reason I am convinced that the local bank manager must see himself as the entrepreneur of the 1980's also stems in part from the scale of the problem we face, and in part from the role he has played in 'new frontier' situations in other places and in other times - and make no mistake about it we're in a new frontier situation and we have an urgent need for the resurgence of the pioneer spirit." (Bolton 1978)

Bolton in his article 'The bank manager: entrepreneur of the 1980's' then goes on to recite what J.P. Morgan is reputed to have told his young trainees in Wall Street 'Young man - a banker is someone who lends without adequate security. Any damn fool can make a loan if it's fully secured.' And again Bernard Baruch the American financier friend of Sir Winston Churchill, is quotable as having said 'Money is like manure. If you leave it in a pile it just rots and then stinks. But if you spread it around it's surprising how many things it will help to grow.'

MIDLAND BANK VENTURE LOAN:

Most smaller businesses will probably find themselves using, or being steered towards, the various special schemes set up by the banks in recent years. Medium-term loans from Midland Bank, for example, are usually for amounts of £5000 upwards, repayable over periods of three to seven years. But in order to cater for the smaller independent business Midland has developed its Venture Loan Scheme which provides loans from £5000 to £250000 for up to 10 years. The scheme is designed to meet the medium-term finance needs of sole traders, partnerships, professional practices and incorporated companies. Venture loans are secured and interest is charged at 3% over Midland bank base rate regardless of the amount of the loan. An arrangement fee of 0.5% is payable, subject to a maximum of £500. Because of the time that can pass before a major additional asset generates sufficient cash flow to meet capital repayments, it is possible to arrange for the interest only to be paid during an initial period of up to two years.

LLOYDS BANK ENTERPRISE LOAN:

Lloyds Bank offers general medium term lending facilities to industry and commerce, and the professions too, but in addition provides for the independent business a special scheme called the Small Firms Loan Guarantee Scheme, backed by Government guarantees. These cover 70% of the outstanding loan or 85% for "Inner City Task Force Areas" in parts of: Birmingham, Bristol, Coventry, Doncaster, Hartlepool, Leeds, Leicester, London, Manchester, Preston and Rochdale. Each individual can borrow between £2000 and £100000 with any number of loans up to the maximum limit.The loan is repayable over two to seven years. If the loan is for more than £15000, the bank offer a two years capital repayment holiday in which the interest will be paid only. This type of finance is available to almost every kind of small business with 200 employees or less in manufacturing, retailing, construction and service industries, whether they may be trading already or ready to start. The bank offer a special low interest rate in which the Government levy a 2.5 percent premium on the part of the loan they are guaranteeing . On loans under £15000 this is charged as a single fee at the outset. For larger loans it is paid quarterly in advance reducing as the loan is repaid, that is from year two of the loan the rate goes down by 1/4 percent provided that the borrower keep inform the bank with regular management reports on the progress that he is making.

NATIONAL WESTMINSTER BANK BUSINESS DEVELOPMENT LOAN:

National Westminster Bank's special scheme for the small business is called the Business Development Loan. The bank has made more than 50000 business development loans since it began the scheme in 1971, and more than £400 million is now out on loan. The bank's recent experience has been that between 2000 and 2500 new loans are being granted each month for total sums of around £25 million. The Business Development Loan is similar to the loan scheme available to farmers in that it provides loans ranging from £2000 to £250000 over period of one to twenty years . For loans up to £50000 , repayments are spread over any period up to ten years. Rates on unsecured loans are usually one percent higher than for secured loans, and loans for six to ten years are 0.5 percent higher than those for one to five years.

The arrangement fees for six to ten year loans is 1.5 percent of the amount borrowed and for one to five years it is one percent. The rates quoted are fixed for the duration of the loan, and repayments are taken on a monthly basis, including the interest. The borrower is expected to have a life policy covering the amount of the loan; borrowers can be either businesses or professional practices, including those buying into a practice, as well as farmers. Farm Development Loans are provided for buying farms, livestock, machinery and new buildings, modernisation of old buildings, and other projects likely to improve profitability, such as drainage, fencing, liming and fertilisation.

Where a customer requires a loan of ,say, £100 000, but wants to negotiate a repayment plan which can be tailored to his anticipated cash flow needs. The bank has an alternative fixed rate medium term lending scheme which its managers can offer.

BARCLAYS BANK BUSINESS EXPANSION LOAN:

In addition to the normal range of medium-term finance facilities, Barclays Bank has developed its Business Expansion Loan Scheme, which covers both medium and long-term requirements. Its main features includes a term of two to twenty years at fixed or variable rates of interest, finance for up to 100% of the asset being bought, with the option of a capital repayment 'holiday' of up to two years. Any security taken by the bank is limited to the asset being financed by the loan. Its aim is to provide finance for capital spending for companies which can demonstrate a successful track record and future growth prospects. Such businesses would generally have products for which long-term demand can reasonably be expected and be controlled by experienced management able to show the viability of the new investment.

While Business Expansion Loans are available for terms of between 2 to 20 years the term of one loan would not exceed the life of asset bought and in the case of plant and machinery would not normally be more than 10 years. Barclays has so launched a new loan scheme for holders of self-employed pension plans issued through the bank's subsidiary, Barclays Life Assurance Company. It is planned to extend the loan scheme to holders of pension schemes issued by other life assurance companies, the first of these being the Legal and General Assurance Society. The aim of the scheme is to overcome the fear of being left short of finance which in the past deterred people from investing the maximum possible in pension schemes. The Barclay's plan tries to overcome this by offering pension plan holders the opportunities for loan facilities on acceptable terms.

2.4.8 FINANCE FOR HIGH TECHNOLOGY VENTURES:

There are many frustrated entrepreneurs who complain that financiers cannot grasp the significance of their ideas, particularly of a high technology nature. On the other side, those with funds to invest complain equally about a shortage of worthy projects. There seems to be a serious failure of communication.

In one respect high technology ventures are no different from any other business venture. They all respect risks, and never far from any venture capitalists mind is the harsh statistic that one in three start-ups will fail within the first three years. The difference from other risk ventures is that those based on high technology ideas may have long gestation periods and require far more financial aid during the early years of growth. Despite the fact that bio-technology, microelectronics and computer-related businesses are the sunshine industries or the future, not all financiers are prepared to steel themselves to sit out the years of promise. A good many investors are looking for returns in the short term. Those prepared to be more patient and wait up to ten years for the pay off are in the minority. For high-technology companies at the beginning of their lives equity funding is common. Its merit is that to remove the burden of high interest repayments on loans in early years, when the struggling company can least afford to make them. Many companies which go under during the first few years do so because of the crippling effect of loan payments.

There are about 40 companies in the U.K. which specialise in the provision of venture capital, and an increasing number are interested in high technology sectors. Although several include new technology ventures in their investment portfolios by no means all are well equipped to grapple with the technical dimension of their applicant's propositions. Nor are they all prepared to take on the more active role which distinguishes their American counterparts, especially in terms of equity participation and management guidance.

The following are some examples for high technology ventures taken from "Raising Finance, The Guardian Guide for Small Business" (Woodcock 1982):

Technical Development Capital (TDC):

As a major source of long term finance for small and medium sized British companies, ICFC set up TDC in 1962 to combine the need to translate a promising new idea into a viable commercial product or service with an understanding of the special requirements of funding technical ventures. TDC has since made more than 200 investments in technology based companies, covering electronics, genetic engineering for livestock, scientific instruments, computers and software, plastics technology based projects, namely that development can be a lengthy and costly exercise and that the pay-back period may be brief because of the limited time to exploit a technical advantage before competition catches up. It can therefore, in addition to financial help, also provide qualified assistance from an experienced executive team drawn from high-technology industries. In the area of electronic development , TDC has backed companies like Tape Automation, said to be the sole U.K. manufacturer of high speed automatic tape cassette duplication and winding machinery. This investment helped the company to gear up its sales and marketing operations in the specialised audio tape market. It has also developed a video tape cassette loading unit with which it plans to dramatically undercut its Japanese competitors. TDC seeks to invest in companies with long term growth potential and each application is individually assessed as to product, market and profit projections, with particular emphasis on the personal qualities and background of the managers of the venture. Once a favourable assessment has been made a financial package is designed to meet the needs of the business. Experience has shown that a minority

holding combined with a medium term loan is often the most common scheme but other arrangements are considered depending on the circumstances. Interest on any loan is at commercial rates, fixed for the whole period and charged on the outstanding balance only.
Repayments of the principal start only when the budget projections show that the venture has the ability to repay and are spread over an agreed period.

Finance may be invested in total at the outset or in stages, according to an agreed programme. The progress of each investment and appropriate guidance offered but the day-to-day running of the venture remains the responsibility of the management team. TDC does not appoint members of its staff to the boards of companies it helps to finance, but it may reserve the right to appoint a nominee director who can add to the strength of the business and is acceptable to the other directors.

In financing high risk projects a commensurately high return is anticipated, generally from a dividend based on profits or sales receipts and by realising a capital gain, if and when the entrepreneurs buy TDC's shareholding or they jointly decide to sell the company. TDC is prepared to leave its funds in a company for an indefinite period and inject further funds as appropriate, provided its investment is clearly increasing in value.

CO-OPERATIVE RESEARCH GRANTS SCHEME:

The Science and Engineering Research Council (SERC) has set up a scheme to promote co-operation between manufacturers who wish to develop new products or processes requiring research with an academic content beyond their own research and development resources and academics. It encourages universities and polytechnics to carry out research projects in collaboration with industry, to bring academic expertise to bear on research important to industry and assist in the improvement of commercial products or industrial operations. Grants may be sought in all the physical, biological and engineering sciences for which the SERC is responsible.

The SERC will consider supporting the academic side of the collaboration provided that the company makes a substantial contribution of effort, material and expertise. The SERC contribution may, however, be up to three times that of the company in terms of direct costs. Applications for grants can be made by academic staff in association with a company. Any company is eligible which is directly engaged in the manufacturing or extraction industries, or in the provision of commercial services, and has the intention of exploiting the results of the research.

The SERC is anxious that more small and medium-sized companies should not be deterred from participating because they have limited research and development resources; the council will advise them and may be able to suggest an academic partner.

The company which uses the scheme is eligible for external funding for the part of the costs of research projects which are of direct value to it but which may be beyond its own resources. In return for its contribution to the project the company is assigned any patent or other intellectual property rights arising from the work, subject only to a small royalty to the SERC on successful exploitation. In the first 18 months of the scheme's operations 54 grants to a total value of £1.3 million were approved and the annual budget was increased as a result of this successful response.

BRITISH TECHNOLOGY GROUP (BTG):

The BTG was formed to bring together and build on the facilities offered by the National Research Development Corporation , formed in 1949 since when it has provided support for the exploitation of inventions and finance for innovation by industrial companies, and the National Enterprise Board , which has a shorter history of providing venture capital for new initiatives in advanced technology and funds for developing new industries in the assisted areas of England.

BTG can provide finance for technical innovation in any field of technology, to companies as well as individual entrepreneurs. There are a number of ways in which this finance is provided: joint venture finance, recirculating loans, equity and loan funds, specific funding schemes for innovatory small firms in assisted areas, venture capital for electronics related business as well as funds for more traditional industries. There is also a relationship with Department of Industry Schemes whereby companies which have received grants from Department of Industry schemes can apply to BTG for additional finance. If a firm has received a 25% grant from the Department of Industry or a requirements board, it can then apply to BTG for 50% of the balance; that is 37.5% , making a total of 62.5% from the two sources. The Department of Industry regards BTG finance as private sector finance.

A levy on sales can be arranged to meet particular circumstances, to recover the investment and this is usually in two parts: the first applies until the BTG has recovered its capital with interest at a rate roughly related to the cost of borrowing; this is followed by a second stage, usually at a lower percentage, for a limited period to provide a risk premium or profit element. In calculating levies the group seeks a rate of return which reflects the overall forecast return on the project and the estimated degree of risk; the rate of levy may vary substantially from one project to another depending on the circumstances. The cost of joint venture finance can not be compared with the rate of interest on loan capital because, in the event of failure, joint venture finance does not have to be repaid. There is no minimum or maximum size of investment. The group shares the risks in the project but without taking shares in the company and repayments do not start until the product is being sold.

Funds aimed specifically at the smaller company are provided through Oakwood Loan Finance (a subsidiary of the BTG), and the Small Company Innovation Fund (SCIF). SCIF is like Oakwood, part of the Small Companies Division of BTG and is intended to help small innovative businesses 'including startups' to develop new products or processes and to expand the scope of their activities. while some other forms of BTG finance are linked to the success of a particular product or process the main objective of SCIF is to provide finance for the total business.

BTG has a wide investment role in the English regions, particularly the assisted areas and mainly in the North and South-West, supporting both technical innovators and companies in traditional industries. The aim is to stimulate economic activity in established companies with potential for growth or for improved efficiency by modernisation or rationalisation.

CHAPTER THREE

REVIEW OF LITERATURE

3.1 EARLY UNIVARIATE FAILURE ANALYSIS:

During the late 1800's ratios were developed to compare the current assets of an enterprise to its current liabilities, but it was not until the early of 1900s that the development of financial statements led to comparability of financial ratios within industries. Alexander Wall (1919) examined seven different ratios of 981 firms and published the ratios according to geographical areas and types of business. In effect he popularised the use of ratios with empirical evidence. For a detailed history of early financial statement analysis, the reader is advised to see Horrigan (1965,1968,1978).

Interest in ratios increased widely during the 1920s with a substantial growth of publication in the subject of ratios analysis. Bliss (1923) suggested that for ratio analysis to be complete industry factors such as type and size must be incorporated within any study. Gilman (1925) listed a set of objections to using ratios. He believed that ratios were "artificial" measures which change over time and that they did not portray "fundamental relationships within the business". Littleten (1926) found that the literature had contended that differences exist among industries according to the types of products sold. Furthermore, he found that these differences prevent the direct comparison of companies with other industries .

Prior to the development of quantitative measures of a company's performance, agencies such as Dun and Bradstreet, Inc., supplied information which could be used to determine the credit-worthiness of companies. A number of articles by Foulke (1933 a,b, 1934 a,b) in the Dun and Bradstreet monthly review were particularly important in the development of ratic analysis.

Formal studies to explain why business failed first appeared in the literature in 1930s . A comprehensive analysis of twenty four ratios for twenty nine failed companies representing seventeen different kinds of industries was reported by the University of Illinois Bureau of Business Research (1930). It was found that the following ratios resulted in an uninterrupted indication or symptom of weakness for the majority of companies several years before failure; working capital to total assets , surplus and reserves to total assets , net worth to fixed assets , and fixed assets to total assets .

Fitzpatrick (1932) randomly selected nineteen companies which failed in the 1920s , matching them according to asset size , sales volume, type of industry,

and geographical area with nineteen successful companies from the same time period.
He considered thirteen ratios and examined each set of the companies's ratios three years prior to failure to identify trends. He found that the ratios of failed companies deteriorated as the year of failure approached. The most revealing indicators were net worth to debt and net profit to net worth . His study was too small and selective to be applied generally .

A study was completed by Smith and Winakor (1935) to determine which ratios would indicate that a business would fail . Their data was from the period 1923 - 1931 and they considered twenty one ratios. They concluded that of the current debt paying ability ratios, working capital to total assets was the most dependable and unchanged indicator of failure from those ratios considered.

Most of the research up to this period was in large asset size companies . It was Merwin (1942) who carried out a study on small manufacturing companies those under $ 25,000 in total assets during the period 1926 - 1936 . His study covered 581 continuing and dis continuing small companies in five manufacturing industries . He concluded three ratios were very sensitive predictors of "discontinuance" up to four or five years before the event :

1.Net working capital to total assets

2.Net worth to total debt, and

3.The current ratio .

The ratios of the failing companies were found to be consistently below the average of the surviving companies. He also found that the length of the prediction period varied between industries . His study was the first to introduce the predictive power of ratios for practice , in addition to popularising variation in companies characteristics.

During the 1950s, the utility of ratios for their relationship with return on investment was used for managerial analysis. (see "bibliography on return on investment", NAA Bulletion 1960.) In small business administration much interest in the utility of ratios in their operations also emerged. (eg. Jackendoff,1961,1962; Mckeeven,1960; Sanzo,1960 ;and Schabacker,1960.) Other development concerned the quality of credit under economic conditions; Moore(1957) and the effects on ratios of various accounting procedures, Holdren (1964) observed that the value of inventory turnover ratios varied significantly according to inventory valuation method whether based on the last in first out (LIFO) or first in first out (FIFO).

During this period the introduction of funds statement, which shows the main sources and uses of funds, emerged. Until then it was viewed that current assets were the resources used by company to pay its current liabilities and that by allowing some acceptable margin for shrinkage one could evaluate the debt paying ability of the company both as a going concern, and on a liquidation basis.

A new school of thought was developed, Howard and Upton (1953) argued that the main problem in making a decision about a business's short_term financial position was in taking into account the future ability of business's cash generation to meet all operating and financial obligation by their due date . Following this line of the new school of thought Walter (1957) argued that companies are paying off their existing current liabilities and incurring new ones during the normal operating cycle of the business, normally within the annual period. They also realise current assets and generate new ones by way of new sales.

So the current assets never will meet currently maturing obligations and at the same time the current liabilities are never wholly discharged . This way of comparison will not be a direct indicator of the ability of the company to meet its current obligation as and when they fall due. He viewed the current ratio and its like as static measures of a dynamic flow.

Beaver (1966), following Walter described the company as a reservoir of liquid assets which is supplied by inflows and drained by outflows. He pioneered in the empirical analysis of financial ratios as predictors of failure of business. Beaver defined failure as the condition when any of the following events have occurred : bankruptcy , bond default , overdrawn bank account , or nonpayment of a preferred stock dividend. Seventy nine firms which had failed by the above definition representing 38 different industries were selected from Moody's industrial manual and a list of bankrupt firms provided by Dun and Bradstreet between 1954 and 1964 . Failed firms were classified by industry and asset size . Nonfailed firms were selected for a paired sample and matched within the failed firms by industry and asset size during the same period. Asset size for failed and nonfailed firms ranged from 0,6 to 45 million dollars. Data on the paired firms were tabulated for five years prior to bankruptcy, and thirty ratios were computed for further analysis. The ratios were selected on the basis of three criteria :

A. Popularity in the literature.
B. Performance of the ratios in previous studies, and
C. Adherence to a cash flow concept.

Beaver's study indicated that liquid ratios, those involving the components of working capital, are useful for the evaluation of short_term solvency. Also non_liquid ratios, those components involving profits, long_term debt, and fixed assets are good for assessing long_term solvency. The inclusion of cashflow ratios showed that the three non_liquid ratios, cash flow to total debt, net profit to total debt , net profit to total assets and total liabilities to total assets are the best predictors for both short and long_term solvency one year before failure. When the distribution of ratios was examined, it was found that the nonfailed firms were quite stable while the failed firms exhibited a marked deterioration as failure approached.

Expanding upon this work , Beaver (1968) illustrated a method for empirically evaluating alternative accounting measures as predictors of failure . He found that ratio analysis must be careful not to overlook irrelevant differences among financial statement data that exist and might be obscured when combined in ratio form. To illustrate that suppose the denominator and numerator of any ratio for a failed firm is smaller by the same proportion than those of nonfailed firm, so the ratios of each failed and nonfailed firms will be equal. By using data from his first study (1966) he found that the failed firms tended to have less rather than more inventory. Also contrary to what previous literature asserted , the prediction ability of nonliquid assets measures, for instance long_term solvency was superior in the short run to the liquid assets measures.

All the empirical studies considered so far treated ratios individually . Researchers started to express concern about the univariate approach, that is the assessment of solvency based on single characteristics one at a time. They thought this could lead to faulty interpretation. For instance, a company with poor profitability and/or solvency may be regarded as a potential bankrupt. However, because of its above average liquidity the situation should not be taken too seriously.

In general before a final collapse of any company , some factors go negative , probably low liquidity , decline in profitability , high leverage , imperfect resource utilisation, etc. Meanwhile the financial status of a company is actually a multidimensional characteristic and no single ratio is able to capture these dimensions. For reasons cited above several authors and researchers realised the appropriateness of multiple discriminant analysis approach to assessing the financial health of companies. This is the subject of the next section.

3.2 MULTIVARIATE ANALYSIS OF COMPANY FAILURE:

It was seen in the above section that all research in this area up to 1960 were of a univariate nature and with the realisation by academics that a single ratio could not fully reflect a company's financial profile and with the development of multivariate statistical models for the simultaneous treatment of several variables led to the adoption of a multivariate approach to predict of business failure.

Most of studies have used the technique known as Multiple Discriminant Analysis (MDA). It is a classificatory technique that has a wide range of uses in several fields. It is used primarily to classify and/or make predictions in problems where the dependent variable appears in qualitative forms , e.g. male or female , bankrupt or non_bankrupt. In statistical terms , multiple discriminant analysis is a technique whereby an individual observation is classified into one of two or more groups based on the observations' individual characteristics.

An important advantage of this technique is that it can consider an entire profile of characteristics as well as the interaction between these properties. More details of the theory and calculations of linear discriminant functions will discussed in chapter 4 .

Financial ratios analysis has been employed by many researchers in the field of predicting business failure. As Altman (1968) pioneered this application, his study is considered in detail.

Altman's (1968) initial study on the prediction of corporate bankruptcy utilised the technique of multiple discriminant analysis . This study consisted of sixty six corporations of which half had filed bankruptcy petitions under chapter X of the National Bankruptcy Act during the period 1946 _ 1965 . The mean asset size of these firms was $ 6.4 million with a range of $ 0.7 million to $ 25.9 million.

Failed and non_failed firms were matched as regards asset size and industry . Financial data were collected and twenty two ratios were compiled for evaluation. These ratios fell into five categories of liquidity , profitability , leverage , solvency and activity ratios. The ratios were chosen on the basis of popularity in literature and potential relevancy to the study.
From the original twenty two ratios , five ratios were finally selected using a MDA computer program developed by Cooley and Lohnes (1962).

The final discriminant function was as follows :

Z=.012X1 + .014X2 + .033X3 + .006X4 + .999X5

where

X1 = Working capital / total assets

X2 = Retained earning / total assets

X3 = Earning before interest and taxes / total assets

X4 = Market value equity / book value of total debt

X5 = sales / total assets

Z = overall index

These five ratios were chosen for their independence, predictive accuracy, and statistical significance according to the results of the MDA model.

The resulting model, using data one year before bankruptcy, was found to be extremely accurate in correctly classifying 95% of the initial sample one year, 72% two years, 48% three years, 29% for four years and 36% for five years prior to bankruptcy. Altman says that there is an area of uncertainty between 1.81 and 2.99 which is defined as a grey area or zone of ignorance because of susceptibility to error classification. He concludes that all firms having a Z score of greater than 2.99 clearly fall into the non_bankrupt group , while those firms having a Z score below 1.81 are all bankrupt.

From the predictive accuracy of the model between year one and year five prior to bankruptcy one can realise that the predictive power of the model declines consistently with the exception of years four and five. Altman comments that the most logical reason is that after the second year the discriminant model becomes unreliable in its predictive ability. In addition he states " one would expect on an a prior basis that , as the lead time increase, the relative predictive ability of any model would decrease. This was true in the univariate studies cited earlier, and it is also quite true for the multiple discriminant model" , Altman (1968 p. 604)

Altman, however, thought that the predictive power of this sample should always be high because the variables which entered the final discriminant function were derived from that sample data. He decided that this should be followed by a validation test of the original function, which means testing the original discriminant function with a new sample of companies' accounting data. His second bankrupt sample contained 25 firms in the same asset range as of the initial sample. The prediction accuracy of the validation sample using the original discriminant function was 96% , in fact superior to the result with the initial sample (94%).

Altman examined both his previous study (1968) and the Beaver (1966) study and determined that some suspicion existed regarding the predictive ability of a model even within the same industry, if the accounting methods were not standardised. For this reason , Altman (1971) conducted a second study using data from the railroad industry. The railroads had a uniform accounting system since they are government regulated. Altman admitted that this study did have a weakness in that the length of time a railroad can spend in the bankruptcy status can vary greatly. He attempted to rectify this shortcoming by attaching weights to the variables included in the model to remove any bias due to trend movement. The resulting model found that the railroads were extremely sensitive to changes in the economy. The model showed that the earned surplus to total assets and total debt to total assets ratios were the most powerful indicators of failure. The time period of this study was 1939-1970.

Meyer and Pifer (1970) investigated the prediction of bank failure. They determined that four factors could explain bank failure: local and general economic conditions, the quality of management, and the integrity of the employees. In selecting their sample, each failed bank was matched with a solvent bank using the characteristics of the same economic area, age, and size. The authors summarised the financial information into twenty eight operating ratios and four balance sheet levels. After calculating five forms of each of these thirty two financial measures (i.e. 160 variables), a stepwise regression procedure was used to produce several models. Two main conclusions were reached:

1. Financial measures allow an evaluation of the relative strength of a bank and

2. The recency of data was an important factor in predicting failure.

They found that with a lead time of one or two years, about eighty percent of the firms could be classified correctly with a coefficient of determination of 0.70 . As the lead time exceeded two years, financial variables were not able to discriminate as well between the failing and nonfailing banks.

A study of ratio analysis to predict default of Small Business Administration (SBA) loans for the years 1954-1969 was reported by Edmister (1971, 1972). He selected a sample from firms which had either received loans or loan guarantees from the SBA. He used two samples of firms, one for whom three consecutive statements are available prior to the date when the loan was granted and the other for whom only one annual statement was available. The former sample consists of 42 firms and the later 566 firms, both containing failed and nonfailed firms to repay their loans. He examined 19 ratios and found that for small business the discriminant function fails to separate between failed and nonfailed firms when only one year of financial statements are available. Then he used the first group of samples which have three years data.

Using stepwise multiple discriminant analysis on a set of dummy variables, Edmister found seven variables which predicted failure better than any others, he obtained the following function:

$$Z = 0.951 - 0.423X_1 - 0.293X_2 - 0.482X_3 + 0.277X_4 - 0.452X_5 - 0.352X_6 - 0.924X_7$$

where:

X_1 = 1 if the funds flow/current liabilities ratio is less than 0.05, otherwise $X_1 = 0$.

X_2 = 1 if the equity/sales ratio is less than 0.07, otherwise $X_2 = 0$.

X_3 = 1 if the net working capital/sales ratio divided by its respective Robert Morris Associates (RMA) ratio is less than -0.02, otherwise $X_3 = 0$.

X_4 = 1 if current liabilities/equity divided by the respective SBA ratios has average less than 0.48, otherwise $X_4 = 0$.

X_5 = 1 if the inventory/sales ratio divided by the respective RMA ratios has shown an uptrend and is still less than 0.04, otherwise X_5=0.

X_6 = 1 if the quick ratio/RMA trend is down and its level just prior to the loan is less than 0.34, otherwise $X_6 = 0$.

X_7 = 1 if the borrowers' quick ratio divided by the RMA quick ratio shows an up-trend, otherwise $X_7 = 0$.

The cut_off point was 0.520, and the model was able to predict with 92% accuracy on the original sample, but when he tested on the control sample, its accuracy declined to 57% , which was not so different from by chance. It may have been caused by the small sample size, biased populations or as Gru (1973) suggested, the exclusive use of zero_one dummy variables, which violates the underlying assumption of normal distribution in the multiple discriminant analysis.

Deakin (1972), employing the fourteen ratios of Beaver (1966), devised a decision rule that would be valid over a cross-sectional sample of firms. Thirty two firms which failed between 1964-1970 were selected. Deakin found when using three years of data prior to failure, that the second year prior to failure proved to have the greatest classification ability.

Gru (1973) conducted a study on small business to build a predictive model for assessing the credit worthiness of potential debtors in the U.S, and whether financial ratios together with the application of multivariate discriminant analysis could be used in small business sector. He defined small business as one with total assets less than $ 2,200,000. His primary study consisted of 68 firms representing an equal number which failed and which have not failed, and a secondary sample of 13 failed and 15 nonfailed firms.

The final model contained five ratios correctly and predicted 94% of the primary sample, and 86% of the secondary sample. His model was as follows:

$$Z = 0.07877X_1 + 0.02256X_2 + 0.01643X_3 + 0.07180X_4 - 0.04144X_5$$

where

X_1 = Earning before tax plus depreciation/total debt

X_2 = Working capital / total assets

X_3 = Net sales / total assets

X_4 = Operating profit / total assets

X_5 = Total debt / total assets

Z = Discriminant score

It can be seen that the variables X_2, X_3, X_4 are the same ratios that Altman had used in the analysis of large manufacturing companies in 1968. The major criticism of this study is the period of time of 16 months for collecting the data before the date of failure which is not a significant duration for prediction.

Trieschmann and Pinches (1973) studied insurance company insolvency and constructed a model to identify those companies with a high probability of financial distress. Six variables from an initial set of seventy were included in the multiple discriminant analysis model which correctly classified 49 of the 52 companies included in the study, which means a 94 percent accuracy. The researchers suggested that although their model based on financial data was quite accurate for the time period of the study (1966-1971), the identification of financially failed companies is virtually worthless unless regulatory authorities intervene before it is too late.

Blum (1974) believed that a failing company was likely to harm the community in which it was located in addition to the employees, creditors, and owners associated with the failing company. This study was carried out to construct a theoretical model, based on accounting and market data which can distinguish failing from nonfailing companies. His sample consisted of 115 companies failed during 1954 - 1968 and 115 nonfailed .

The failed and nonfailed companies matched for industry, sales, employees and fiscal year. For both groups data were collected from balance sheets, income statements and stock market prices for a consecutive period of eight years when available, but five years of data prior to failure was found to be optimal. Failure in this study was based on inability of the company to pay debts as they fell due, entrance into a bankruptcy proceeding and explicit agreement with creditors to reduce debts.

The interesting feature of his model is the adoption of a cash_flow framework. The three common denominators underlying the cash_flow framework of his model are: liquidity, profitability and variability.The model was constructed from the following ratios:

A. LIQUIDITY

Short-run liquidity

Flow : 1. The 'quick flow' ratio

position : 2. Net quick assets / inventory

Long-run liquidity

Flow : 3. Cash flow / total liabilities

position : 4. Net worth at fair market value / total liabilities

5. Net worth at book value / total liabilities

B. PROFITABILITY: 6. Rate of return

C. VARIABILITY : 7. Standard deviation of net income over a period

8. Trend breaks for net income

9. Slope for net income

10-12. Standard deviation, trend breaks and slope of the ratio net quick assets to inventory

The failing company model classified failing and nonfailing companies with an accuracy of 94% when failure occurred within one year of the date of prediction, 80% for two years prior to failure, and 70% for three to five years prior to failure. This model shows a long term predictive accuracy but it is rather complicated to use and the information cost is high.

Chesser's research (1974) was to ascertain if the evaluation process of commercial loans could be improved through the utilisation of financial ratios. His primary objective was to develop a model to predict customers'noncompliance with the loan agreement. The period of the study was 1962-1971 with data collected from the loan files of four commercial banks. The study utilised fifteen ratios which he grouped under the categories of liquidity, leverage, activity, and profitability. Discriminant analysis identified a subset of six ratios:

1. Cash and marketable securities to total assets.
2. Net cash to cash and marketable securities.
3. Earnings before interest and taxes to total assets.
4. Total debt to total assets.
5. Fixed assets to net worth, and
6. Working capital to net sales.

The probability model developed from these ratios had a 75% degree of accuracy in predicting loan noncompliance one year prior to its occurrence.

Libby (1975) investigated the ability of loan officers to interpret ratio information for predicting business failure. The officers reviewed five ratios for sixty companies used in the study conducted by Deakin (1972). The ratios were:

Net income to total assets.

Current assets to sales.

Current assets to current liabilities.

Current asset to total assets.

Cash to total assets.

The loan officers had a "prediction achievement" average of 74% , and they ranked current assets to current liabilities and net income to total assets as the most important ratios of those provided. Libby also found that the loan officers who indicated a greater emphasis on the net income to total assets ratio had a higher prediction accuracy.

Altman and Loris (1976) constructed a failure model utilizing a quadratic multiple discriminant analysis on the over the counter broker-dealers. Twenty four ratio and non_financial indicators were used to determine which of these ratios and indicators would show significant differences between active and failed companies. Their final model consisted of the following six variables:

1. Net income after taxes / total assets.
2. Total liabilities plus subordinated loans / owners' equity.
3. Total assets / adjusted net capital.
4. Ending capital less capital additions / beginning

capital.

5. Scaled age.

6. A composite of ten other elements.

Their primary sample contained 40 failed and 113 active companies. The resulting model was 90% accurate on classification of the primary sample and 67% for a hold out sample of 24 companies.

Moyer (1977) re-examined Altman's (1968) original failure model with a different data set which involved companies from the period 1965 - 1975 with a larger asset size, while Altman's data set involved companies from the period 1946 - 1965. He found that Altman's model was sensitive to either the time span or to the asset size and the predictive power of the original model decreased greatly. By using the stepwise multiple discriminant approach Moyer re-estimated the parameters and he observed that somewhat better 'explanatory' power could be obtained from the model if the market value of equity to total debt and sales to total assets are eliminated from the model.

A study of financial ratios for listed public companies in Australia was reported by Bird and McHugh (1977). The authors were concerned with the food, electrical, and accommodation industries during the 1967-1971 period. The total sample size was 118 companies of which fifty companies were a random control group. The authors considered five ratios concerned with liquidity, financial structure, and operating efficiency of a company. The mean, variance, and skewness were calculated for each ratios for each industry in each year. The Shapiro-Wilk's test for normality and rank correlation tests for stability were performed on the ratios. The authors concluded there is some evidence to support the concept that industries differ in their ratios. The study found that the distribution of ratios within an industry were approximately normal in most cases. This study was limited due to:

1. Using only five ratios.
2. The selection of companies was concerned only with those that did not fail.

Most of the studies carried out in this area up to early seventies were by American researchers, however in mid seventies the first British study as far as I know was reported by Taffler, R and Tisshaw, H., (1977) They selected a sample of 46 failing and an equal number of nonfailing companies matched by size and industry.

Failure in this study was defined as entry into receivership, creditors voluntary liquidation, compulsory winding up by order of the Court or reconstruction with Government financial aid. They examined 80 financial ratios using multiple discriminant analysis for the identification of potentially bankrupt manufacturing companies in advance of failure. From those 80 different ratios only four were able to predict with 98% accuracy one year prior to failure. The final discriminant function was in the form:

$$Z = C_0 + C_1R1 + C_2R_2 + C_3R_3 + C_4R_4$$

Where

Z = overall index

C_0= a constant

$C_1 - C_4$ = ratios weights or coefficient

R_1 = profit before tax / current liabilities

R_2 = current assets / total liabilities

R_3 = current liabilities / total assets

R_4 = no_credit interval

The four ratios of Taffler's model measure four different aspects of a company's operation:

1. R_1 : profit before tax / current liabilities

This ratio measures a company's profitability and its ability to cover its current liabilities through its earning power, its contribution to the predictive ability of the model was 53% , and ranked the first.

2. R_2 : current assets / total liabilities

This ratio measures the liquidity of the company its contribution to the model was 13% and it ranked the fourth.

3. R_3 : current liabilities / total assets.

This ratio is one of the indication of company's capital structure. It ranked the second according to its contribution which was 18% .

4. R_4 : No_credit interval, defined as

$$\frac{\text{Quick assets - Current liabilities}}{\text{Total sales - pre-Tax profit}}$$

This ratio measures the short term liquidity of the company and is the time in days for which the company can continue to finance its operations from its resources if its short term finances are cut off. It accounts for 16% of model's power and ranked third.
The authors did not report the actual coefficients or ratios weights and the constant value but the greater R_1, R_2, R_4 and the lower the R_3, the higher the Z-score and then the less the company is in risk.

Taffler concluded that the model was able to predict with a near 100% accuracy of company failures and in some cases up to four to five years prior to the failure event, whereas only 22% of the 46 quoted and none of the 31 unquoted manufacturing bankrupt companies' final audited reports contained auditors' opinions indicating going concern problems. He suggests that the auditors may find the Z-score model an important tool for the prediction of company solvency and for the evaluation of corporate credit worthiness as well as banks, controllers, and creditors.

Altman, Haldeman, and Narayanan (1977) developed the ZETA model for bankruptcy prediction of retailing and manufacturing corporations. The model is commercially available through by Wood, Struthers and Winthrop, and ZETA is their trade mark. The average asset size of their study was one hundred million dollars in total assets for both groups of failed and nonfailed companies. They selected 53 bankrupt firms which failed during 1969-1975 and a matched sample of nonbankrupt firms, they examine 27 variables , the final model contained seven variables. The Lachenbruch, (1967) validation test had an overall prediction accuracy of 92% one year prior to failure. They found that the ZETA model appeared to be quite accurate for up to five years prior to failure with prediction power ranging from 90% to 70% one to five years prior to failure respectively.

Belkaoui (1978) published research using sixteen financial ratios to predict the probability of takeover of Canadian companies. A dichotomous classification test found that nonliquid asset ratios showed superiority in predicting takeovers, with an 80% accuracy in classification. The author stated that the model has to be used cautiously since a limited number of industries and companies were involved.

Bulow and Shoven (1978) presented an economic model to investigate the circumstances under which companies can be forced into bankruptcy. Their model was concerned with the conflicts of interests among those who have claim to the assets and income flow of the company. The three classes of claimants that the authors considered were the bondholders, the bank lenders, and the equity holders. The conclusions of the study were based on the analysis of the economic model and were not tested against any empirical data. The authors concluded that the equity holders were adverse to bankruptcy since they would be the last to receive payment on liquidation of the company. They found that companies with asset portfolios containing a higher percentage of liquid assets would increase their chances of continued existence. Also, the existence of negative net worth was not considered to be a sufficient condition for choosing bankruptcy. Finally, the study found that when tax considerations are included in the model, the company would tend to attempt a merger. The authors concluded that the lack of symmetry in the tax system encourages the continuance of a company instead of liquidation.

Hoeven (1979) published a study to determine when small businesses would default on their loans. The sample of non-Small Business Administration (SBA) , small business commercial bank loans was provided by twelve banks in Denver. An initial set of thirty-eight ratios was constructed. Factor analysis of these ratios identified eight distinct groups, five of which explained 89% of total variance. The dominant ratios indicated a strong significance of liquidity type variables. The five variable discriminant function developed from these results correctly classified only sixty-two percent of the cases. A second (stepwise) discriminant analysis was performed using all thirty-eight ratios. The best results 65% correct classification were obtained for a seven variable model. Only one common variable was chosen in both the stepwise procedure and the factor analysis, this being the net working capital to sales ratio. Additional research found that percent change or trend variables were better predictors of default than static financial ratios.

Ohlson (1980) presented empirical results to predict corporate failure in which the data set was for 1970-1976. The 105 bankrupt companies were derived from the COMPUSTAT files. Nine independent variables were used in the study and the conditional logit model predicted correctly 96% of the companies. Ohlson found that the ratios deteriorate as a company moves from the nonbankrupt to the bankruptcy stage.

In addition, four factors were identified as statistically significant in assessing the probability of bankruptcy within one year: size of company, financial structure, performance measures, and some current liquidity measures.

Whittington (1980) considered the use of accounting ratios in statistical procedures and the basic properties underlying their use. He stated that the basic assumption of ratio analysis is that a proportionate relationship exists between two variables whose ratio is calculated.

In his opinion ratios can be used either for estimation of a functional relationship, usually for purposes of prediction, or for a normative role in which the ratio is compared with a standard. The conclusion of the study was that ratios lend themselves to statistical use due to their ability to reduce variables to similar scales, but the correlation of ratios can lead to biased results if not considered in the analysis.

Casey (1980), replicating Libby's (1975) research under somewhat different conditions, reported the ability of bank loan officers to predict failure of companies based on six financial ratios: net income to total assets, net sales to current assets, current assets to total assets, current assets to current liabilities, cash to total assets, and total liabilities to owners' equity. Forty-six loan officers were given three years of financial data for thirty companies (of which half had failed) and were asked to identify the failed companies. The author makes no attempt to match bankrupt and nonbankrupt companies and stated that the extent to which the predictions were affected were unknown. The study found that 41 of the 46 subjects could predict the nonbankrupt companies over 50% of the time, while none of the loan officers could predict the bankrupt companies over 50% of the time. The author perceived that the loan officers considered total liabilities to owners' equity and current assets to current liabilities as the most important of the six ratios used.

The characteristics that would aid in the identification of failure in the banking industry were examined in a paper by Rose and Scott (1980). Their study also attempted to determine if recent changes in industry practices, being toward more aggressive profit seeking, were associated with failures of the commercial banks. Since the authors found that existing research had not yet identified any pre-failure characteristics for the largest U.S. bank failures, they used the eleven largest commercial bank failures in the 1970s. A control group of nonfailed banks was selected with the only requirement that total deposits exceeded seventy-five million dollars. Their model focused on the determinants of return on equity; leverage ratios, asset turnover, and net after tax profit margin. These factors were then expressed in terms of total loans to total assets, municipal securities to total assets, interest on deposits to total time and savings deposits, interest and fees on loans to total loans, equity capital to total assets, and interest-sensitive liabilities to earning assets. The authors found that the statistical outlier technique contained within program multiple discriminant (MULDIS) developed by Eisenbeis and Avery did not provide evidence of a relationship between the banks' failure and their financial profiles. In addition, changes in banking practices toward more profit-seeking and greater risk-taking were not associated with failure. The failure of major banks seems to be due to endogenous factors of the individual banks and their management.

A significant contribution to this field was made by Ismael G. Dambolena and Sarkis J. Khoadry, (1980) when they incorporated measures of stability in their model and succeeded in improving the predictive power of the model. Although Altman in his study of 1977 called ZETA model had introduced the stability measure of earnings, Dambolena and Khoudry claimed that Altman's model was far from adequate because not all the ratios had been tested for stability over time.

They considered a sample of 34 failed companies during 1968-1975 and an equal number of nonfailed companies. The failed and nonfailed companies was matched by industrial classification as appeared in Dun and Bradstreet's million dollar directory. Data for both sets of failed and nonfailed companies were collected for the eight years prior to failure. They examined 19 ratios which cover four dimensions of company's operations: Profitability, activity, liquidity, indebtedness, and they defined the following variables measuring the stability of the ratios over time ;

1. The standard deviation of ratios over a three year and a four year period.
2. The standard error of estimate around a four year linear trend.
3. The coefficient of variation over a four year periods.

They found the standard deviation of the ratios give the best results, thus two discriminant functions were evaluated, first by using ratios alone and second by using both ratios and their standard deviations. The classification performance of the discriminant function was as follows:

	Percent Correct Classification		
	Years Prior to Failure		
	1	3	5
Ratios Alone	94.4	79.7	70.3
Ratios & Standard Deviations	95.7	89.1	82.6

They concluded that their model performs better with the inclusion of the stability measures for the years one three five prior to failure as it can be seen clearly from the result above.

The use of nonfinancial variables in small businesses by loan officers was evaluated in a paper by Cowen and Page (1982). The authors examined eight nonfinancial variables which they grouped into three classification: demographic characteristics of the owner, characteristics of the company, and the characteristics of the loan. The data used in their multiple discriminant analysis was drawn from the client files of the office of Minority Business Enterprise of Cleveland, Ohio. A sample of 60 companies was selected and consisted of 26 successful loans and 34 unsuccessful loans. The authors examined the variables for correlation and found that the various groups of variables had low correlation. The Lachenbruch holdout method of classification was used for validation of the resulting model. The model consisting of three variables owners' age, owners' net worth, and the size of the loan, correctly classified 73% of the cases. The authors concluded that the model should be used with caution due to the local nature of their sample.

The use of the Altman (1968) bankruptcy model as an active tool to aid in the financial turnround of a company was discussed by Altman and La Fleur (1981). The authors showed that the decisions which helped to save the financially troubled GTI Corporation were specifically motivated by understanding the financial ratios in the bankruptcy model. Using the model as a guide, the company's management was able to avoid the impending bankruptcy and create a sound financial base. The authors believed active use of certain predictive models as tools in the decision process offers management more opportunities to improve business strategies.

Konstans and Martin (1982) presented a financial model which would be simple and useful to businessmen. The authors stated that although mathematical models are very helpful to the decision maker, these models introduce additional complexities to the users. They also believed ratio analysis of financial data is a powerful tool which has not received enough attention. Ratio analysis has the merits that:

1. Financial ratios are easy to compute.
2. The ratios are expressed in a common dimensionality, and,
3. The necessary data are easily obtained from the financial statements.

The authors' model structured around profitability and financial stability, contained eighteen ratios. The ratios were classified as either primary or secondary ratios, representing the problems and the symptoms of problems, respectively. The authors also grouped the ratios according to variables they measured: margin, turnover, balance, liquidity, and solvency. They concluded that perhaps ratio analysis has been neglected due to the large number of commonly employed ratios, and that the large number of ratios may overwhelm the businessman in their analysis. Ratio analysis should result in identifying the underlying causes of a problem and not merely lead to an evaluation of a problem's symptoms.

Research concerning general trends and macroeconomic conditions that affect business failures was published by Altman (1983). He constructed a first difference distributed-lag regression model to evaluate the aggregate economic influences in the United States for the period 1951-1978. The dependent variable was the change in the business failure rate as reported by Dun and Bradstreet.

Four independent variables used in the model were:

1. Percentage change in real GNP.
2. Percentage change in the money supply.
3. Percentage change in the Standard and Poor's Index, and,
4. Percentage change in new business formation.

Altman found that the model's overall results were quite encouraging considering the problem of aggregation of the microeconomic events that led to failure. The model was also used to predict the changes in the business failure rate in the future, and the prediction was for a record number of filings for bankruptcy in 1980 and 1981 which did occur.

Following the same approach of the stability of financial ratios used by Dambolena and Khoury (1980), Betts and Belhoul (1987) carried out a study on U.K. companies to build a more sophisticated model to identify companies at risk of failure. The period of their study covered the years 1974 to 1978 for the failed companies, and because of missing data the number of failed companies used were 39 in the first year before failure, 36 in the second and 31 in the third year. The companies for the going concern group were 93 selected from an

Exstat tape, they do not attempt to match the failed and nonfailed companies by size, industry, or financial year. They evaluated four classes of variables:

1. Financial ratios:

   29 financial ratios were selected on the basis of their popularity in the literature and their ability to discriminate between failed and nonfailed companies in previous studies.

2. Measures of stability:
   a. Financial ratios stability measures;
      They compute the standard deviation of each of the 29 ratios over three years period.
   b. Balance sheet decomposition measure;
      This measures the changes in the assets and liabilities structure over the previous year.

3. Measures of trend;

   They select the total assets, total sales, total employees, and inventory to compute the trend over three years period for these variables as well as the changes in the above variables over the previous year.

4. Measures of size:

The three measures of size they select were total assets, total sales, and total employees.

The authors construct two discriminant functions for each of one, two, three years before failure, the first function contained only the financial ratios, and the second with all variables (financial ratios plus the four stability measures described above). Neither the trend measures nor the balance sheet decomposition measures appear in any of the discriminant models which were obtained by using the stepwise procedure based on Wilks' lambda, the reasons for that they state :

" In the case of the balance sheet decomposition measure, it can be argued that the financial stability measures are likely to carry most of its potential information content and therefore make it redundant once they are included in the models. However, regarding the trend measures, it is more difficult to relate their information content to that of financial ratios and stability measures. It might be that the short term rate of growth of a company is not as important as a well balanced and stable structure in determining its chances of survival."

Their best discriminant function was chosen on the basis of the classification results from the analysis sample as well as a validation sample, however they do not report the actual coefficients or ratios weights of the variables that entered their best function which finally was tested for multivariate normality and equality of dispersion matrices. They conclude that the test for the multivariate normality was rejected for both failed and going concern groups whereas the test for equality of dispersion matrices was not strongly rejected.

The final conclusion they reach was:
"*The inclusion of the financial stability concept in the framework of the discriminant model for identifying bankruptcies improved the ability of the model to distinguish between failed and nonfailed firms, but it could be argued that a standard deviation based on three observations does not have any statistical meaning. However, it could be suggested that these measures should not necessarily be regarded as estimates of the stability of financial ratios, but rather as a description of their behaviour over the last three years.*
The variables selected are related to financial dimensions that were found to be relevant in most of the previous research, namely profitability, financial leverage, and liquidity. The selected financial stability measures account for the same kinds of financial dimensions, with the addition of credit management. ***It therefore seems that the financial stability concept does not reduce the role played by financial ratio analysis in forecasting company failure, but is merely complementary***

to it. Consequently, it appears likely that this kind of concept could prove useful in other areas of financial and company performance research." (Betts and Belhoul, 1987, P. 332)

3.3 SUMMARY:

Although the research studies cited in this chapter were concerned with the development of models to predict "success" or "failure" of companies, all studies did not use the same types of financial variables. This difference in the selection of financial variables could be attributed to the different time periods investigated and to the various industries for which the data were collected. Numerous studies reduced a large set of financial variables to a much smaller set of significant variables through the employment of statistical procedures such as regression analysis and multiple discriminant analysis.

The predictive power of these analyses seems to be dependent upon the choice of analytical procedures utilised as well as the selection of specific ratios and other indicators. Several financial ratios were found to be good predictors in more than one study; however, no particular ratio appears to loom predominantly. Table 3.1 presents a summary of some selected references along with categories of financial ratios used by the authors. Table 3.2 detail the specific ratios.

TABLE 3.1

FINANCIAL RATIOS USED IN SELECTED FAILURE STUDIES (1)

	Return on Investment (Profitability)	Financial Leverage (Gearing)	Capital Turnover & Activity	Liquidity
EARLY UNIVARIATE FAILURE ANALYSIS				
University of Illinois (1930)	1 2 3	8 9	11 14	15 19 21
FitzPatrick (1932)	3	7 9	10 12 14	15 16
Smith & Winakor (1935)	2 3	8 9	11	15 19 21
Merwin (1942)		7		15 21
Beaver (1966)	1 2 3 5	6	10 11 13 14	15 16 18 20 21
Beaver (1968)	2	6	11	15 16 18 20 21
MULTIVARIATE FAILURE ANALYSIS				
Altman (1968)	4	6 7	11	15 16 21
Altman (1971)	4	6		

cont'd

TABLE 3.1 (continued)

	Return on Investment (Profitability)	Financial Leverage (Gearing)	Capital Turnover & Activity	Liquidity
Edmister (1972)		7 9	10 11 12 13 14	15 16 21
Deakin (1972)	2	6	13	15 16 18 20 21
Gru (1973)				
Blum (1974)		7		
Chesser (1974)	4	6 7 9	11	15 17 21
Libby (1975)	2	6	13	15 16 18 20 21
Moyer (1977)	4		11	21
Belkaoui (1978)	3		13	15 16 20 21
Altman, Haldeman,& Narayanan (1977)	4 5		11 12	15 21

cont'd

TABLE 3.1 (continued)

	Return on Investment (Profitability)	Financial Leverage (Gearing)	Capital Turnover & Activity	Liquidity
Hoeven (1979)	1 2 3 4 5	7 8	10 11 13 14	15 16 17 18 19 21
Ohlson (1980)	2	6		15 21
Dombolena & Khoury (1980)	1 2 3	6 7 9	10 13 14	15 16
Casey (1980)	2	7		15
Taffler (1980)	4	7		16
Altman & La Fleur (1981)	4		11	21
Konstans & Martin (1982)	1	7	10 11 12 13	15 16 17 19
Taffler & Sudarsanam (1982)	4	7	14	20
Betts & Belhoul (1987)	4			

(1) The specific financial ratios representing the numbers under each category appears in table 3.2 and were used in at least three of the references cited.
In most studies other variables were also incorporated in the analysis. In addition, some authors used the reciprocal of a particular ratio (e.g., net wort/sales and sales/net worth). It should be noted also that terminology which define the components of a ratio has not been used consistently and as a result, computations of a particular ratio have not been standardised (i.e., there are no agreed on standards in computing financial ratios).

TABLE 3.2

SPECIFIC FINANCIAL RATIOS USED IN SELECTED FAILURE STUDIES PRESENTED IN TABLE 3.1

RATIOS	RETURN ON INVESTMENT OR PROFITABILITY RATIOS
1	Net Income / Sale
2	Net Income / Total Assets
3	Net Income / Net Worth
4	Earnings Before Interest And Tax / Total Assets
5	Net Income / Total Liabilities
	FINANCIAL LEVERAGE (GEARING) RATIOS
6	Total Liabilities / Total Assets
7	New Worth / Total Liabilities
8	Net Worth / Total Assets
9	Fixed Assets / Net Worth
	CAPITAL TURNOVER AND ACTIVITY RATIOS
10	Sales / Net Wort
11	Sales / Total Assets
12	Sales / Fixed Assets
13	Working Capital / Sales
14	Inventory / Sales
	LIQUIDITY RATIOS
15	Current Assets / Current Liabilities
16	Quick Assets / Current Liabilities
17	Cash / Total Assets
18	Cash / Current Liabilities
19	Inventory / Current Assets
20	Quick Assets / Total Assets
21	Working Capital / Total Assets
22	Working Capital / Current Liabilities

CHAPTER FOUR

RESEARCH METHODOLOGY

4.1 INTRODUCTION:

The objective of this study is to attempt to construct a financial model using accounting ratios derived from published financial statements. These statements are readily available from a number of sources. The model is to be used to help identify small and medium sized companies in the U.K in danger of financial failure up to five years before its occurrence. A classification problem arises, when classification is based on a single financial ratio at a time. This was described in the first section of chapter three.

However due to the multivariate nature of finance, the predicting power of ratios is cumulative. No single ratio predicts nearly as well as a small group of ratios. The development of multivariate statistical models led to the adoption of a multivariate approach to this problem.

Although various statistical techniques are available under this approach, the more recent studies have used the technique known as Multiple Discriminant Analysis as described in the second section of chapter three. This technique was first developed by U.S archaeologists working in Arizona Desert, Chandrasekaran (1983). They were digging up skulls and wanted to know which of the two Red Indian tribes they belonged to. They began by examining skulls where they knew the owner's tribe to see what characteristics best discriminated between the two tribes. All Sioux may have thick skulls but that does not help if the Iroquois do too. So they looked for characteristics where the difference between Sioux and Iroquois was greatest. No single characteristic is enough by itself, Sioux may have generally pronounced cheekbones and Iroquois flat cheekbones, but if there are a few flat-cheeked Sioux something else must be used as well. Individual characteristics are combined to produce a picture of the two Red Indian tribes. Each characteristic is allocated a value and the total of these values is known as a Z score. This might be arranged so that a positive Z score represented a Sioux and a negative Z score meant an Iroquois.

4.2 STATISTICAL METHODOLOGY:

Multiple discriminant analysis is a statistical technique which classifies a categorical dependent variable into one of two or more groups depending upon characteristics of several independent variables. The two groups in this study correspond to the failed companies and the nonfailed companies while the characteristics are the financial ratios.

Klecka (1975, p.435) stated that "the mathematical objective of discriminant analysis is to weight and linearly combine the discriminating variables in some fashion so that the groups are forced to be as statistically distinct as possible".

Eisenbeis and Avery (1972) stated that:

> "Discriminant analysis encompasses both predictive and inferential multivariate statistical techniques. It deals with a specific class of statistical problems focusing on the analysis of group population and/or data sets. In general, the underlying assumptions of discriminant analysis are that (1) the groups being investigated are discrete and identifiable, (2) each observation in each group can be described by a set of measurements on m characteristics or variables, and (3) these m variables are assumed to have a multivariate normal distribution".

The objectives of discriminant analysis are well suited to accomplishing the objectives of this study, these being:

1. To determine if statistically significant differences exist between the average score profiles of the two a priori defined groups (i.e. failed and nonfailed companies).
2. To establish procedures for classifying the statistical units (i.e. small_medium companies) into groups on the basis of their scores on several variables (i.e. financial ratios).
3. To determine which of these independent variables account most for the differences in the average score profiles of the two groups.

These objectives introduce the concepts of a priori defined groups and average score profiles. These concepts are explained graphically in figure 4.1 for the two variables, two group discriminant problem. While this figure illustrates only two measurement (X_1 and X_2) for each failed and nonfailed company, twenty two measurement were utilised initially in the statistical analysis of the present study.

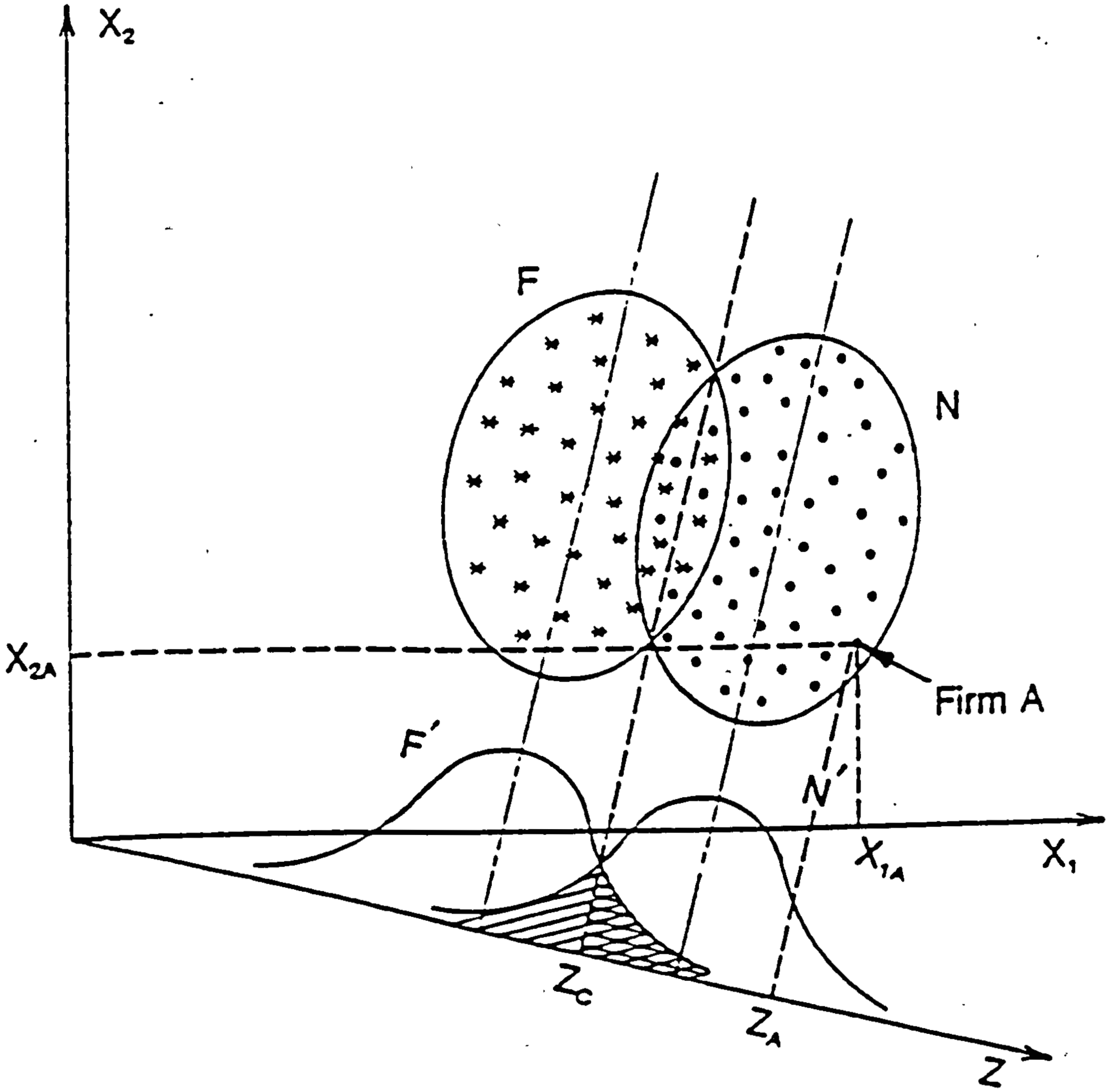
Figure 4.1 portrays a scatter diagram of the two measurements x_1 and x_2. These could be for some companies of the two groups. The ellipses F and N could depict the two a priori defined groups of companies which fail (F) and did not fail (N). Particular companies which failed and did not fail are represented with an * (asterisk) and a . (dot) respectively. Although a company can only be a member of one of the two groups, some overlap of the groups can exist when discrimination is not perfect. This is shown in the figure as the intersection of the ellipses F and N which contains both failed and nonfailed companies.

The two ellipses F and N graphically surround some proportion of the sample of companies in the study, say 95% or more of each group. The straight line drawn through the two points where the ellipses intersect, when projected to the Z axis, determines the cutting score Z_c (also termed the critical Z score).

The discriminant scores, represented by the Z axis are obtained as a linear combination of the two measurements. The score for each company is used to identify its predicted group membership in the following way: Companies with a score smaller than Z_c would be classified as failed while companies with a score larger than the cutting score would be classified as nonfailed. For example, in figure 4.1 company A would be assigned to the nonfailed group, based upon the values of the measurement X_{1A} and X_{2A} for company A and its resulting discriminate score Z_A.

FIGURE 4.1

Two-Group Discriminant Analysis



Source: Robert B. Welker "Discriminant Analysis as an Aid to Employee Selection," *The Accounting Review*, XLIX (July, 1974), p. 515.

F' and N' represent the distributions of the discriminant scores for companies in groups F and N. The shaded area, corresponding to the overlap of the distributions F' and N', is smaller than that which could be obtained for any other line drawn through ellipses F and N. The separation of the groups F and N is maximized by the minimisation of this overlap between the distributions F' and N'. Altman (1968) referred to this overlap as the zone of ignorance, which represents the range of discriminant scores for which misclassifications can occur.

Thus, discriminant analysis determines the linear combination of two or more independent variables that best separates the a priori defined groups. This discrimination is accomplished by the statistical decision rule of maximizing the <u>between-group variance</u> relative to the <u>within-group variance</u> , as expressed in ratio form. Discriminant analysis can be useful in two ways:

(1) determining group differences, and

(2) classifying companies into their apparent group memberships.

4.2.1 MODEL DERIVATION:

Fisher (1936) developed a method for the solution of the two group case known as linear discriminant analysis. The two group case can be bankrupt or non-bankrupt companies, male or female, and so on. The separation between the groups is expressed in terms of the difference between the value of the discriminant equation for two groups.

Discriminant equation is expressed as follows:

$$Z = U_1X_1 + U_2X_2 + \dots + U_pX_p$$

where U_i = ith coefficient

X_i = ith independent variable.

The value of the coefficients are chosen so as to maximize the separation between the two groups. In order to determine the coefficients, samples in both groups are chosen for calculation. The value of the coefficients, U, are obtained by the following formula:

$$U = W^{-1}d$$

where W is the sum of co- variance matrix of X_s in both groups and d is the difference of the mean value of X_s between both groups.

The equations' statistical significance is required to be tested. For the details of theory and calculation, see Appendix (A).

The discriminant score for a company, obtained by summing the constant term and the products of the value of each independent variable (financial ratio) and the corresponding discriminant coefficient, is used to assign each observation to the group it most closely resembles. The discriminant coefficients are mathematically determined by maximizing the between-group variance relative to the within-group variance. In principle, this corresponds to minimizing the overlap of the distributions (see figure 4.1).

So each member of the two groups have a discriminant score that forms the basis of the assignments of companies to each group. A company classified as belonging to the failed group if $Z_i < Z_c$ or to nonfailed group if $Z_i > Z_c$. The cut-off point Z_c is chosen based on the population probabilities of the membership of the two groups which have the smallest number of misclassifications.

4.3 VARIABLE SELECTION METHODS:

In many situations discriminant analysis, like multiple regression analysis, is used as an exploratory tool. In order to arrive at a good model, a variety of potentially useful variables are included in the data set. It is not known in advance which of these variables are important for group separation and which are more or less extraneous. One of the desired end-products of the analysis are the identification of the "good" predictor variables. The most three commonly used algorithms for variables selection available on $SPSS^{x}$ are :

1. The forward entry.
2. The backward elimination, and
3. The stepwise selection based on Wilks' lambda.

4.3.1 <u>THE FORWARD SELECTION VARIABLES</u>:

In the forward selection method variables are added to the discriminant function one at a time until there is no increase in the discrimination between the two data groups. At each step a variable enters the discriminant function, all other variables already in the new function will be tested for their contribution to the discriminant function's power. It should be stated that variables entering the function in any previous steps could be removed from the discriminant function if they no longer make any contribution to the function's discrimination power.

4.3.2 <u>THE BACKWARD ELIMINATION METHOD</u>:

While the forward selection method starts with no independent variables in the equation and sequentially enters them, backward elimination starts with all variables in the equation and sequentially removes them.

Instead of entry criteria, removal criteria are specified.

Two removal criteria are available in SPSS^x. The first is the minimum F value (FOUT) that a variable must have in order to remain in the equation. Variables with F value less than this F to remove are eligible for removal. The second criterion available is the maximum probability of F to remove (POUT) a variable can have.

4.3.3 STEPWISE SELECTION OF VARIABLES BASED ON WILKS' LAMBDA:

Since stepwise variable selection combine the features of forward selection and backward elimination, this method will be discussed in details.

Wilks' lambda Λ is the ratio of the within groups sum of squares of cross products (W) to the total sum of squares of cross products (T) for p variables. Therefore Wilks' lambda for (1,2,.....,p) is :

$$\Lambda\,(1,2,\ldots\ldots,p) = \frac{|W(1,2,\ldots\ldots,p)|}{|T(1,2,\ldots\ldots,p)|} \tag{1}$$

If a variable is added then a partial statistic can be derived as follows:

$$\Lambda\,(p+1) = \frac{\Lambda\,(1,2,3,\ldots\ldots,p,p+1)}{\Lambda\,(1,2,3,\ldots\ldots\ldots,p)} \tag{2}$$

which measures the increment in lambda's value. The corresponding F statistic:

$$F = \frac{n - g - m}{g - \Lambda} \; \frac{1 - \Lambda(p+1)}{\Lambda(p+1)} \qquad (3)$$

can be used to test the significance of the change from Λ to Λ (p+1) provided that the added variable is arbitrary and not the one that maximises F. (Rao, 1970)

This statistic is used to enter and remove variables in the stepwise procedure. The first step is to evaluate for each variable the univariate F ratio used in the analysis of variance (ANOVA) technique. The variable with the highest value is the first one entered into the discriminant function. The next step is to evaluate the F statistic (3) for all the variables not in the discriminant function. The F statistic is called F to enter. Again a variable with largest F to enter is the next to enter the discriminant function if its F value is greater than a specified threshold "F in" . The default value of this statistic in SPSS^{x} is 1.0.

After the first variable has entered the discriminant function , all the remaining variables are re-examined by computing for each variable the F statistic (3), which is called F to remove. The variable with lowest F to remove is deleted if its F value is smaller than a second threshold value, "F out" which is not necessarily the same as for "F in", although the default value is 1.0 in the SPSS^{X}. Variable selection terminates when no more variables meet entry or removal criteria, and the best subset of variables so far selected is the one which accounts for most of the difference between the two groups.

In the current study, determination of the discriminant function was accomplished using an initial set of twenty two financial ratios and stepwise selection of variables based on Wilks' lambda to identify those variables which were statistically significant in distinguishing between failed and nonfailed companies. The stepwise method was chosen rather than the all inclusive method since the all inclusive method creates the discriminant function from the entire set of independent variables, not taking into the account the discriminant power of each independent variable. Eisenbeis and Avery (1972) contented that "significant" amounts of computer time are needed once the number of variables exceeds fifteen .

The advantage of stepwise discriminant analysis can be supported by additional remarks by Klecka (1975) :

"In many instances the full set of independent variables contains excess information about the

group differences, or perhaps some of the variability may not be over useful in discriminating among the groups. By sequentially selecting the "next best" discriminator at each step, a reduced set of variables will be found which is almost as good as, and sometimes better than, the full set" .

The Wilks' lambda and the F statistic as the criteria to select those variables which best discriminate between failed and nonfailed companies are available at the University of Bradford's Computer Centre within the $SPSS^{x}$. The Wilks' lambda statistic takes into consideration both the differences between groups and the homogeneity within groups. The variable which have the smallest lambda would be the one selected to be included during each step of the procedure. The F statistic is used for the determination of the variable that has the largest differences between the groups and then allows this variable to enter the model. Klecka (1975) noted that in a stepwise discriminant procedure either statistic will generate the same results.

4.4 <u>MODEL VALIDATION</u>:

Classification of the original sample using the parameters of the model is generally expected to measure the predictive power of the model and is expressed as the proportion of correct classification to total sample size. Many researchers thought that this method of assessment might be biased and lead to over optimistic estimation of how well the model might perform in the general population. Lachenbruch (1974) has suggested alternative methods of estimating classification errors.

The two methods that are employed often and mentioned in the literature are:

1. The holdout method, and
2. The "Lachenbruch" or U method.

For the first method, samples are split with one set used to estimate the discriminant function and then employed to classify the other (holdout) sample. The sample proportion of misclassified observations for both the groups are then estimated. The estimated proportion by this method are consistent and unbiased but unless the samples are large this method cannot be used.

For the second method one observation is held out at a time and classified by means of estimates evaluated using the remaining $N_1 + N_2 - 1$ observations. This will be repeated until all observations are classified. This method is applicable for both large and small samples and gets around the sample size limitation which is associated with the "holdout" method. Eisenbeis and Avery (1972) used this method on problems associated with unequal dispersions and more than two groups. These two methods although less biased than the original sample method, only deal with descriptive accuracy. Assessing the actual performance of the model outside the original time period would be more appropriate than the method described above. In this study parameters evaluated from the original sample were tested on a new sample drawn outside the original period.

4.5 ASSUMPTIONS OF DISCRIMINANT ANALYSIS:

Linear discriminant analysis is based on assumptions of multivariate normality of variables in each group and the equal dispersion matrices of groups.

4.5.1 DISTRIBUTION OF THE DATA:

The standard discriminant analysis procedure assumes that variables used to characterise the members of the groups being investigated are multinormally distributed. Despite the contention that the linear discriminant functions could produce misleading results because of non-normality, In his study of 1972 Deakin concludes that the larger the sample the more approximate to normal distribution. Whereas Lachenbruch (1973) found that the performance of linear discriminant functions tended to deteriorate when the distribution of variables was not multinormal. Deakin (1976) found that prior transformation of ratios to approximate normality is ineffective. So it seems sensible to test for multinormality and if this hypothesis is rejected, to attempt to transform the variables. Although the separate univariate normality of each variable is not a sufficient condition to ensure the multivariate normality of the data set, it was thought that multivariate normality would be more likely if this is the case. (Taffler, 1982).

In order to test the normality of the variables a goodness of fit test was performed. The most appropriate tests in this situation are the chi-square test and the Kolmorgorov-Smirnov test.

4.5.1.1 CHI-SQUARE TEST:

The observations are firstly divided into a number of classes say k. Each class size is determined by the number of observations which requires a minimum of five observations.

The test is to evaluate if the differences between the observed and expected frequencies are significant to reject the hypothesised distribution as a good fit. The test statistic used is:

$$W = \sum_{i=1}^{k} \left(\frac{O_i - E_i}{E_i} \right)^2$$

where: O_i is the number of observations in the i'th class, and E_i is the expected number of observations in the i'th class under the null hypothesis. K is the number of classes.

W has a chi-square distribution with k - s - 1 degrees of freedom, if the difference between O_i and E_i is normally distributed , the degrees of freedom will be k - 3 , because s is the number of parameters of the hypothesised distribution, which means s equal two for the normal distribution. However, the chi-square test is sensitive to extreme values and to the number of classes selected, it was not used in this research and the Kolmorgorov-Smirnov test for goodness of fit was preferred and used in the analysis.

4.5.1.2 THE KOLMORGOROV-SMIRNOV TEST:

This test was first presented by two Russian mathematicians whose names are attached to it. The test statistic depends on the absolute value of the maximum deviation between an assumed cumulative distribution of X, F(X) and a corresponding function of X, $S_n(X)$.
The interesting feature of the test is its independence of F(X). The test is as follows:

Let $x_1', x_2', \ldots\ldots\ldots\ldots x_n'$ denote a random sample from a population with assumed cumulative distribution function F(X) and let $x_1, x_2, \ldots\ldots\ldots\ldots x_n$ denote the ordered sample. A sample distribution function is constructed is given by the formula:

$$S_n(x) = \begin{cases} 0 & , x < x_1 \\ \dfrac{k}{n} & , x_k \leq x < x_{k+1} \\ 1 & , x \geq x_n \end{cases}$$

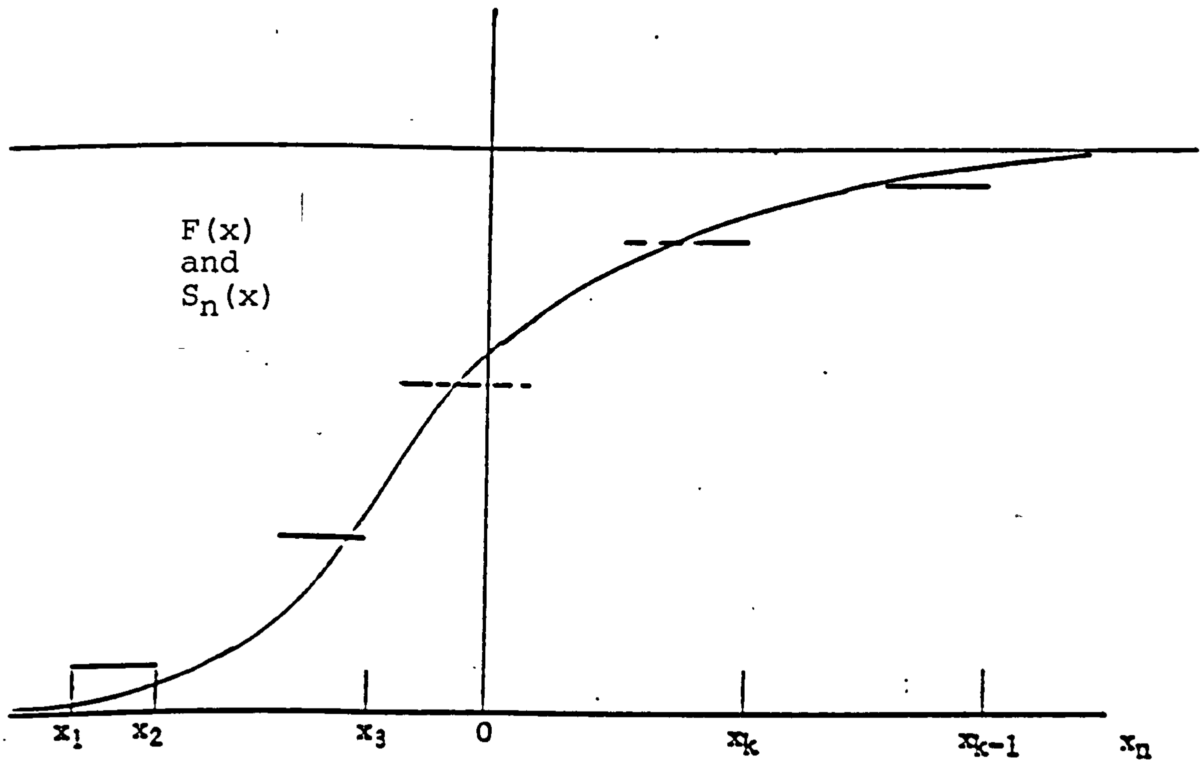
S_n (x) is clearly a step function. A graph of $S_n(x)$ together with a graph of a typical F(X) is given in figure 4.2. For any particular F(x) it is possible to compute $|F(x) - S_n(x)|$ for each element in the ordered sample. It is also possible to compute :

$$D_{max} = \max_x |F(x) - S_n(x)|$$

which is the maximum vertical distance between the graph of F(x) and the corresponding value of $S_n(x)$ for all the elements in the sample. It can be shown that D_{max} is independent on F(x) and can therefore be used to construct a non-parametric test for F(x). However, because $S_n(x)$ differ from sample to sample, that means obviously D_{max} is a random variable. Its distribution can be worked out numerically for any particular values of n by using combinatorial methods.

FIGURE 4.2

A sample and theoretical distribution of x



Critical values of this statistic for different values of n are presented in Appendix (B) reproduced from Hoel (1962).

Let D_n^{α} be a critical value of D_n such that

$$P(D_n \leqslant D_n^{\alpha}) = 1 - \alpha$$

where α is a chosen level of significance. Then it follow

$$1 - \alpha = P(\max_x |F(x) - S_n(x)| \leqslant D_n^{\alpha})$$

$$= P(|F(x) - S_n(x)| \leqslant D_n^{\alpha} \text{ for all } x)$$

$$= P(S_n(x) - D_n^{\alpha} \leqslant F(x) \leqslant S_n(x) + D_n^{\alpha} \text{ for all } x)$$

This last equality shows that the two step functions, $S_n(x) + D_n^{\alpha}$ and $S_n(x) - D_n^{\alpha}$, yield a confidence band with confidence coefficient $1 - \alpha$ for the unknown distribution function F(x). To use this as a test, the null hypothesis, that x has a distribution F(x) is rejected if F(x) does not lie within the limits as defined in the last equality presented above.

4.5.2 TESTS FOR MULTIVARIATE NORMALITY OF THE DATA:

The optimal results of any multiple discriminant model depends on the assumptions that the groups are multivariate normal and the equality of the variance covariance matrices. Several tests for multivariate normality have been developed. A discussion about their application can be found in Andrews et al (1973), Malkowich and Afifi (1973), but most of them are difficult to implement. Mardia (1970) developed a test for multivariate skewness and kurtosis, which is readily available on computer programs (Mardia and Zemroch, 1975). He defines the measures:

$$b_1,p = \frac{1}{n^2} \sum_{i=1}^{n} \sum_{j=1}^{n} \{(x_i - \bar{x})S^{-1}(x_j - \bar{x})\}^3$$

and

$$b_2,p = \frac{1}{n} \sum_{i=1}^{n} \{(x_i - \bar{x})S^{-1}(x_i - \bar{x})\}^2$$

of a set of n independent p variate observations $x_1, x_2, x_3, \ldots\ldots x_n$, b_1,p is a measure of multivariate skewness and b_2,p is a measure of multivariate kurtosis. $\bar{x}$ denotes the sample mean vector and S the sample variance covariance matrix. He then derives:

$$A = \frac{n}{6} b_1,p$$

and

$$B = [(b_{2,p} - \{p(p+2)\}] / \{ 8p(p+2)/n\}^{1/2}$$

where n is the number of observations. These two statistics follow respectively a X^2 distribution with $p(p+1)(p+2)/6$ degrees of freedom and a standard normal distribution, N(0,1) and can be tested accordingly. The null hypotheses are that : $b_{1,p} = 0$ and $b_{2,p} = p(p+2)$. If the hypothesis that $b_{1,p} = 0$ is rejected, it means that the sample is skewed. While if the hypothesis that $b_{2,p} = p(p+2)$ is rejected, the conclusion will be that the sample does not have the same kurtosis as the multivariate normal sample.

4.5.3 TESTS FOR EQUALITY OF THE VARIANCE COVARIANCE MATRICES:

Suppose there are g groups, and each group contains n observations on p variables. Suppose also that the variance covariance matrix of:

group 1 = Σ_1
group 2 = Σ_2
group 3 = Σ_3 , ... etc.

A criterion suggested by Box (1949) and based on the work of Bartlett (1937) for testing the equality of groups variance covariance matrices is that:

$$H_o = \Sigma_1 = \Sigma_2 = \Sigma_3 = \ldots\ldots \Sigma_g$$

In general the population variance covariance matrices are not available, so sample estimates of the k dispersion matrices are made.

Box defines the criterion as:

$$M = n \log |S| - \sum_{i=1}^{2} (n_i \log |S_i|)$$

where S is the pooled variance covariance matrix of the g groups, S_i is the variance covariance matrix of group i , n is the total number of observations and n_i, the number of observations in the ith group.

In order to test the significance of M, two statistics have to be computed:

$$A_1 = \left(\sum_{i=1}^{g} \frac{1}{n_i} \frac{1}{n} \right) \frac{2p^2 + 3p - 1}{6 (g - 1) (p + 1)}$$

$$A_2 = \left(\sum_{i=1}^{g} \frac{1}{n_i^2} \frac{1}{n^2} \right) \frac{(p - 1) (p + 1)}{6 (g - 1)}$$

If $A_2 - A_1^2$ is > 0 then

$$F = \frac{M}{b}$$

follows a F distribution with f_1 and f_2 degrees of freedom where

$$f_1 = 0.5\ (g - 1)\ p\ (p + 1)$$

$$f_2 = (f_1 + 2) / (A_2 - A_1^2)$$

and

$$b = f_1 / (1 - A_1 - f_1 / f_2)$$

If $A_2 - A_1$ is < 0, the following is used:

$$f_1 = 0.5\ (g - 1)\ p\ (p + 1)$$

$$f_2 = (f_1 + 2) / (A_1^2 - A_2)$$

$$b = f_2 / (1 - A_1 + 2 / f_2)$$

and

$$F = f_2\ M / f_1\ (b - M)$$

follows an F distribution with f_1 and f_2 degrees of freedom.

If the results from the test lead to reject the equality of the variance covariance matrices of the two groups, a quadratic rule is implied, but before reaching this conclusion one should review what other researchers said when they faced the same problem and how best they proceed. This will be the subject for the next section.

4.5.4 PROBLEMS OF DEVIATION FROM MULTIVARIATE NORMALITY AND NON EQUALITY OF THE VARIANCE COVARIANCE MATRICES:

Pinches (1980) identified various factors which may directly influence the reported classification results investigated by users of discriminant analysis. He grouped these factors as those under the control of the researcher and those not under control of the researcher. The first group can directly influence the group means and / or dispersion matrices, while the second require classification decisions by the researcher. Two problem areas of multivariate nonnormality and unequal dispersion matrices are discussed below. For additional references regarding statistical and methodological problems associated with the use of discriminant analysis, see Ashikaga and Chang (1981), Clarke, Lachenbruch, and Broffitt (1979), Conover and Iman (1980), Eisenbeis (1977), Frank, Massy, and Morrison (1965) , Gilbert (1969), Joy and Tollefson (1975), Lachenbruch and Goldstein (1979), Lachenbruch, Sneeringer, and Revo (1973), Marks and Dunn (1974), Wahl and Kronmal (1977).

4.5.4.1 MULTIVARIATE NORMALITY:

If the test of multinormality for variables in the failed and nonfailed group which enter the discriminant function does not hold, that means the performance of the discriminant model will not be optimal. However most of the researchers assume that the standard discriminant procedures yield reasonable approximations and proceed as if this assumption held. Eisenbeis (1977) believed that deviations from the normality assumption appear to be the rule rather than the exception. This has been recently confirmed by two researcher. Belhoul (1983) carried out the tests described in section 4.5.2 and 4.5.3 for multinormality and unequal dispersion matrices, on a large sample of UK companies in an attempt to develop multiple discriminant models to identify high performing companies. He concluded that multinormality and unequal dispersion matrices were rejected.

Betts (1984) arrived at the same conclusion, when he implemented the same tests during the development of a multiple discriminant model to identify companies at risk of financial failure. Therefore in the current study, these findings have been accepted and the research has proceeded as if these assumptions were rejected.

Bias may enter into the tests of significance and the classification accuracy due to nonnormality. Gilbert

(1968) determined that there was only a small loss in the predictive accuracy using the linear function when multivariate nonnormality exists. Lachenbruch (1973) determined that the linear function was sensitive to nonmultivariate normality. However the problem was reduced when the distribution of the variables are bounded. Lachenbruch, Sneeringer, and Revo (1973) examined the robustness of both linear and quadratic procedures using nonmultivariate normal distributions. Their conclusions were that standard linear procedures may be quite sensitive to nonmultivariate normality. They also noted that the general classification error rates were not affected as much as the individual group error rates. Their suggestion was that data should be transformed if possible to approach normality. This research proceeded as have most researchers, based on the conviction that the techniques used generate reasonable approximations as if the normality assumption held.

4.5.4.2 UNEQUAL DISPERSION MATRICES:

A second critical assumption of linear discriminant analysis is the equality of group dispersion matrices. Relaxation of this assumption affects the significance test for the difference in the means of group, assessment of the relative importance of variables in the model, as well as appropriate form of the classifications rules.

According to Pinches (1978), the larger the sample size, the higher is the possibility that there exist significant differences between the groups being analysed. The larger sample sizes are also likely to generate unequal dispersion matrices and require the quadratic rather than linear procedures. Pinches (1978) also found that the chances of misclassification will decrease as the size of the sample increases.

Unequal dispersion implies a quadratic rule is appropriate (Eisenbeis and Avery, 1972). Altman, when he tested his original model of 1968 on a new set of data drawn in 1976 to see whether it had retained its validity and relevance over the past decade, also tested for group dispersion similarity in the original two group sample. His test revealed that the group dispersion were not identical. So, quadratic discriminant analysis was performed and the comparison between the linear discriminant analysis and quadratic discriminant analysis classification accuracy on the original samples and the validation test results was made.

The differences in accuracy of the two models were observed to be insignificant. Altman commented that the five explanatory variables separated the two groups to such an extent that the statistical structure made little difference. He added, however, in studies where overlap is substantial quadratic discriminant analysis is likely to improve the classification accuracy.

Marks and Dunn (1974) investigate the same problem and concluded that large samples are necessary in quadratic discriminant analysis to avoid spurious discrimination through over-fitting and a resulting biased function, the risk of which increases with the number of variables.

Eisenbeis (1977) studied the case when the dispersion matrices were unequal and the linear model was employed. He concluded:

> **"Significant differences can occur which are directly related to the differences in the dispersion, the number of variables and the separation among the groups. Agreement between the two procedures declines as the differences between the dispersions and the number of variables increase. The further apart the groups are for given dispersions, the less important are the differences between the linear and quadratic results". (1977, p.879).**

Further, Lachenbruch, etc. (1975), concluded from their simulation study of the effect of departure from normality in the two group discriminant case that to fit a quadratic model in the case of unequal covariance matrices, depends on the type of non-normality. It may well make matters worse rather than better to use a linear approach. Finally none of the related empirical studies upto date of which the author is aware have reported the superior predictive ability of a quadratic discriminant function on other data than from which the function was derived.

So for the reasons cited above the linear discriminant model approach which is simple to use and interpret, will be used in this study.

4.6 SAMPLE DESIGN:

4.6.1 THE SOURCE OF THE DATA:

Limited liability companies are required by law to supply Companies House with their accounts and balance sheets together with many other information. This is the part of the price to pay because they have limited liability. This published accountancy data is available for any limited company and it is also available from Companies House.

A far better source of the data is the Exstat tape provided by Extel Company Limited, which contain all detailed balance sheet and profit and loss account on over three thousand British companies, other European, Australian and Japanese quoted and unquoted concerns.
Data on other characteristics of the companies are also provided such as industrial classification, number of employees, country of registration, number of years for

which data is available (year being defined as an accounting period of any duration), etc. So the Exstat Tape as the source of data was used in this research.

4.6.2 <u>CRITERIA FOR THE INCLUSION IN THE ANALYSIS</u>:

The companies included in this study were selected according the following criteria:

1. A company was defined in its broadest sense as a complete legal entity involved in any commercial or industrial activities was considered as a company.
In other words for the company to be included in the analysis it should not be a subsidiary company.

2. Accounting practice and company laws differ from country to country which make the comparision of the data almost impossible, so for the sake of the comparability the companies should be only British companies.

3. No restriction was made regarding the type of ownership. Many researchers carry out their studies on public companies, for instance, Mulondo (1981) and Taffler (1976), the reasons for that were the availability and uniformity of the data. Public companies are required by law to supply Companies House and to make their accounts and balance sheets with many other information available to the public, so these requirements made these for public companies uniform and readily available than the private companies. In the current study as the Exstat tape is the source of the

data , the presentation of the data is uniform and these problems are overcome.

4. The companies had at least five years of complete data.

4.6.3 SAMPLE SELECTION:

The failed companies selected from the Exstat tape were identified as having entered into receivership; or gone into voluntary liquidation (although voluntary liquidation may not be for solvency reasons, in this study they were observed to be for their inability to continue to trade); or been compulsorily wound up by order of the Court or by Government action.

Failed companies , denoted as group 1 , comprised all companies which failed during January 1975 to December 1982 and having total assets not exceeding £10m.
Data for one to five years prior to failure were extracted from the Exstat tape where the year prior to failure is defined as the latest period. Similarly, data two years prior to failure consist of data drawn from the accounting period preceding the latest period and so on.

In the case of nonfailed companies the decision was made to select only those companies of the same asset size and the same industrial classification. The excluded companies beyond this size was due to the total asset range and the industrial classification of companies in group 1 (failed companies) . So from a total population comprising of 810 nonfailed companies , every tenth observation was selected to get a sample size of 80 nonfailed companies (denoted as group 2).

Any random sample of nonfailed companies could contain some companies that still nonfailed but in reality have a failed company financial profile.
Taffler (1976) preferred to select apparently "healthy companies" rather than nonfailed on the grounds that the sample of nonfailed companies could include companies with financial characteristics no different from those in the failed set. He argued that by adopting his approach clear discrimination between the two groups could be achieved and any overlap will be almost insignificant. Taffler's approach may improve the classification efficiency by reducing the type 2 errors, (predicting a nonfailed company as failed company) but the discriminant function resulting from this method can not be used for extrapolation to classify the total population of nonfailed companies, in addition to the problem which arises in defining the criteria to identify " healthy companies". So for these reasons I preferred a random sample of nonfailed companies rather than to choose the "healthy companies".

4.6.4 SELECTION OF FINANCIAL RATIOS:

Since a wide range of financial ratios is available for selection, the important points to be considered in selecting ratios for any particular study are:

A. How far the ratios selected are appropriate for the particular use and how far can they help an analyst to discover the economic reality behind the figure.

B. Whether the ratios chosen are theoretically sound

Therefore, the initial step in selecting the financial ratios to be considered for inclusion in the statistical analysis was to consult previously published failure studies, financial textbooks, and accounting textbooks. Four criteria were used in the final selection of the ratios. These were: (1) data availability permitted calculation of the financial ratios, (2) their ability to predict failure in previous studies, (3) their popularity in the literature, and (4) the development of a comprehensive set of ratios representing traditional categories of ratio analysis, such as profitability, gearing, capital turnover, and liquidity.

The final list of twenty two financial ratios, all of which had been tested in the studies described in chapter three, appears in appendix (c). Table 3.1 shows the studies from which the choice was made. The transformations chosen to give the best approximation to univariate normality described in section (4.5.1.2), appears in appendix (D), Meanwhile, definition of the components of these financial ratios is presented in appendix (E).

4.6.5 EXTRACTION OF THE DATA:

Having decided the source of data together with the criteria for inclusion in the analysis and the statistical methodology to be used in this study, it remained to select the two groups of companies and the required accountancy data to construct the company failure models up to five years before the event of failure.

The data on the Exstat Tape are located in three Sections, these are section B, C and D. However Section B comprises thirty nine items (B1 - B39) of information usually called as "Company Data". The kind of data in this section is company issuer code (B1), company name (B8), country of registration (B9), date of creation on Extat file (B11), industrial classification (B13), Subsidiary company marker (B22), etc.

Section C has items from C1 to C30 containing accounts data, such as exports (C14), domestic employees' remuneration (C16), charitable donations (C20), political contribution (C21) etc. Items from C31 to C82 contain profit and loss account data, and items from C83 to C121 contains the balance sheet assets data, while the balance sheet liabilities data are located in items C122 to C164.

Section D contains the Security Data, but there is no access to this data at the present time according to the Document Number: EXSTAT-2 dated January 1987 and in the same time these Security data are not relevant to this study. In order to extract the data from the Exstat Tape, one should identify the label refer to that item as it is given in the Exstat User Manual 1983, and by following the instructions given in the Document EXSTAT-2, then a program can be written to extract the required data. The first step is to create an input file. Line one of the input file must contain the word DATA. The lines following this contains the names of the data items that user requires and this may be entered consecutively on each line separated either by spaces or commas or one item per line. The maximum length of a line is eighty characters. After data items required have been specified, then the program must be terminated by the word "END". The next line of the input file must contain the word "SELECT", followed by criterion and must be terminated by "END" again. If companies are selected on a single criterion the request would take the form:

<u>Data Item</u> <u>Relation</u> <u>Condition</u>

where:

Data item is the name of the field to be tested

Relation is: EQ equals

NE not equal

LT less than

LE less than or equal ie. not greater than

GT greater than

GE greater than or equal ie. not less than

Condition is the value against which the data item is to be tested. These conditions may be strung together using "ANDS" and "ORS" and grouped using brackets to clarify the meaning. To illustrate that lets consider the extraction of the failed companies according the conditions cited in the preceding section.

ILLUSTRATIVE PROGRAM TO EXTRACT THE FAILED COMPANIES GROUP

```
DATA

B1 , B8 , B9 , B11 , B13 , B22 , B30 , B32 , B35 , C115

END

SELECT

( B9 EQ EX OR B9 EQ EY OR B9 EQ EV OR B9 EQ EW ) AND

B22 EQ N AND

( B32 GE 19750101 AND B32 LE 19821231 ) AND

( B35 EQ R OR B35 EQ C OR B35 EQ V) AND

B30 GE 5

END
```

The data items are:

B1 = company issuer code

B8 = company name

B9 = country of registration

B11 = date of creation on Exstat file

B13 = industrial classification

B22 = subsidiary company marker

B30 = number of periods for which data available

B32 = end date of last period for which data held

B35 = company marker B (dead company)

C115 = Total assets.

As this research is on U.K. based companies, so B9 has to be equal "EX" , "EY" , "EV" , and "EW".
where

EX = the code given to English registered companies

EY = the code given to Scotish registered companies

EV = the code given to Channel Island

EW = the code given to Isle of Man

B22 should be equal "N", that means the companies to be selected are not subsidiary companies. As B32 is the end date of last period for which data held, the conditions under this item was made to select only those companies failed between the first of January 1975 and the 31st of December 1982, that is the time period for the failed companies in this study. In addition, the failed companies item "B35" was selected equal (R , C , V).

where:

R = receivers appointed

C = compulsory liquidation

V = voluntary liquidation

Finally the selected failed companies should have at least five consecutive years of accountancy data available for analysis, and that is the condition B30 to be greater than or equal to five.

The following statement will run the program to obtain the required data:

```
ZEXST, I="INPUT 1" , P="OUTPUT 1"
```

Where "INPUT 1" is the name of input data file and "OUTPUT1"
is the name of the file that the extracted data is to be written in the format described in the Exstat User Manual (1983) Section three.

In the same way all the accounting data required to compute the financial ratios can be extracted for both failed and nonfailed companies in order to construct the discriminant models.

CHAPTER FIVE

PUBLISHED ACCOUNTS AS A RELIABLE SOURCE OF INFORMATION

5.1 INTRODUCTION:

In the preceding chapter it was decided that published financial information through the companiess' annual reports will be used as a source of data. Therefore one should ask whether these published financial reports together with the accounting ratios derived from these financial reports give the right information in sufficient quantity and quality in order to assess the financial performance of the companies.

The purpose of this chapter is to clarify that, and to provide a review of some of the more important topics which arise in connection with published annual reports, making reference where appropriate to the relevant literature. Since this subject has a large coverage, the chapter cannot claim to provide a detailed review of all the controversy surrounding the subject of the data derived from published financial reports as a reliable source of information about a company's financial position.

The approach adopted is to look first at the development of annual reporting in the U.K., to discover the improvement in quantity and quality of the reported data, in particular the disclosure requirement of the latest Companies Acts, and the contribution of the Accounting Standards Committee. The following examines the objectives, the users and their needs, and the controversy surrounding this subject. Then, the seven desired characteristics of financial reporting that make the financial information useful, will be reviewed. Finally, the limitation of published accounts have been discussed, hoping that the justification of using published financial accounts and their reliability as a source of information will emerge.

5.2 THE DEVELOPMENT OF THE ANNUAL REPORTING IN THE U.K.

Corporate disclosure through the annual reports was first introduced by the Companies Act 1844. Such statements were originally designed to assist in the protection of shareholders and creditors from fraud and mismanagement; Edey and Partipakdi (1954). Audits were made compulsory for all companies by 1900. By 1908 companies were required to publish accounts other than to shareholders. Disclosure of financial information in the published accounts of British Limited Companies has been influenced by a series of Companies Acts which have laid down certain minimum disclosure requirements. The Acts were passed at approximately twenty year intervals and each Act has called for the disclosure of more information than its preceding one; Jones (1974).

Since 1942 the Institute of Chartered Accountants in England and Wales (ICAEW) has regularly issued official recommendations on increased disclosure and auditing standards (ICAEW, 1949). The quantity and quality of the reported data have improved considerably over a long period of time with the Companies Act 1948, which gave positive guide-lines on how accounts should be prepared. But up to this time the public were not allowed to have access to these accounts. It was the Companies Act 1967 that made the accounts of limited companies available to the public. Companies Act 1976 and 1980 added little to these disclosure requirement, but in 1981 a further Companies Act substantially scrutinized accounting requirements that bring these into line with the provision of the EEC Fourth Directive; John Blake (1987). Finally, the Companies Act 1985 codifies the Acts from 1948 to 1981 into one single status, proving to be an important milestone in the development of the quality of annual reports, and to be primarily a legal basis in the present system of annual reporting by companies.

Regarding the influence of standards-setter and regulations created by professional bodies on the development and improvement of annual reporting. For many years The Institute of Chartered Accountants in England

and Wales (ICAEW) issued a series of recommendations on Accounting Principles, starting in 1942. These were generally summaries of existing practice, and they were in no way mandatory on the members of the ICAEW. By the 1960s it was becoming clear that the practical results of this approach were not acceptable, because different companies in similar circumstances were following different accounting policies, leading to different and incompatible results, Carsberg (1974). Accountants and their professional bodies were being publicly criticized. To counter this deficiency the ICAEW set up the Accounting Standards Steering Committee (ASSC) in 1970. The ASC, as it is now called, includes representatives from the following additional bodies:

The Association of Certified Accountants
The Institute of Chartered Accountants in Scotland
The Institute of Chartered Accountants in Ireland
The Institute of Cost and Management Accountants
The Institute of Public Finance and Accountancy

The joint committee of the six member bodies is acting collectively as the Consultative Committee of Accounting Bodies (CCAB). The accountancy profession hopes to bring about a greater uniformity of practice, especially between companies with similar accounting problems. One of the main aims of accounting standards is to make financial statements reasonably comparable with one another. The ASC is responsible for preparing draft standards, and the CCAB for approving them, unanimity being required. Enforcement is a matter between the individual bodies and their members. The Corporate Report of the Scope and Aims Working Party of the Accounting Standards Steering Committee (now the Accounting Standards Committee, ASC) in 1975 will no doubt prove to be another milestone for improvement of corporate disclosure.

In 1983 The ASC approved the proposals of a working party set up to review the standard-setting process. These proposals spelt out the preparation and consultation process in much greater detail than had existed before. A new type of consultative document was created, a Statement of Intent (SOI), and also a new type of final pronouncement, a Statement of Recommended Practice (SORP). These statements will be deal with specific matters affecting particular industries or types of companies. Whereas Statements of Standard Accounting Practice (SSAPs) will deal only with matters of major and general importance.

In 1987 another committee was set up, known as the Dearing Committee with the following terms of reference:

a) To review the development of the standard setting process in Great Britain and Ireland and in other major industrial countries.
b) To outline the basic purpose of accounting standards and their future bearing in mind the attitude of

both government and the public towards regulation of the corporate sector and in the light of major changes in the financial markets and in the approach by preparers of accounts to financial reporting.

c) In the light of the above to make recommendations on:

(1) The most appropriate form which accounting standards should take.

(2) The position of standards in relation to company law.

(3) Procedures for ensuring compliance with standards.

(4) The identification of topics for consideration.

(5) The need for, and nature of, public consultation about proposed standards.

(6) The funding of the cost of standard setting.

(7) The composition and powers of any body responsible for standard setting.

The Dearing Committee reported in November 1988 and proposed fundamental changes. The report proposed that the Accounting Standards Committee should be abolished and replaced by a two-tier structure. The top tier, the Financial Reporting Council, would determine broad policy and direction. This would consist of about twenty nominated members chosen from as wide a variety of relevant backgrounds as possible. The second tier would be an Accounting Standards Board. This would consist of nine members appointed effectively by the Financial Reporting Council. The Board would issue standards in its own right ,not through the individual CCAB members, and in order to avoid compromise solutions, a majority of two thirds would be sufficient for a standard to be approved. This proposal would increase the speed with which new standards could be introduced or existing standards amended.

The report explicitly recommended that the movement towards the development of a general conceptual framework should be encouraged. The committee also clearly hoped that its suggested requirement of a two-thirds majority rather than unanimity will encourage the development of precise and explicit standards requirements rather than compromises found in recent years so often.

The final important area tackled by the Dearing Committee Report, and perhaps the most important of all, is the question of compliance with SSAPs. It was recommended that a Review Panel be established to examine any identified material departures from accounting standards which in its view, involve an issue of principle or which might result in the accounts in question not giving a true and fair view. The Panel would only be concerned with the accounts of large companies. Its constitution would be determined by the same committee as that responsible for determining membership of the Accounting Standards Board. It is proposed that each departure from a standard would be examined by a tribunal whose membership would differ, but drawn from a central pool of experts by the chairman of the Review Panel. Where a company fails to amend its accounts along with the suggestion made by the Review Panel it is suggested that, under a new statutory power under civil law, the directors be required by the court to circulate additional/revised information to all those entitled to receive the accounts so as to ensure compliance with the requirements of the Companies Act or with the true and fair requirement.

It seems that, there is a general agreement that something needs to be done to make SSAPs both stronger in their pronouncements and requirements, and effectively observed and followed.

Since the setting of ASC in early 1970, there have been a number of SSAPs, each SSAPs has dealt with a problem area or topic. It is noticeable that the rate of appearance of SSAPs has slowed down sharply in recent years, sea table 5.1. It took a full three years between the Issue of SSAP 23 Accounting for Acquisitions and Mergers in May 1985 and the SSAP 24 Accounting for Pension Costs in May 1988.

TABLE 5.1 *

TOPICS DEALT WITH BY ASC

Associates

ED 1	Accounting for the Results of Associated Companies	June 1970
SSAP 1	Accounting for Associated Companies	Jan. 1971 (amended Aug. 1974 revised April 1982)
ED 25	Accounting for the Results of Associated Companies	Oct. 1979

Accounting policies

ED 2	Disclosure of Accounting Policies	June 1971
SSAP 2	Disclosure of Accounting Policies	Nov. 1971

Mergers, acquisitions and goodwill

ED 3	Accounting for Acquisitions and Mergers	Feb. 1971
ED 30	Accounting for Goodwill	Oct. 1982
ED 31	Accounting for Acquisitions and Mergers	Oct. 1982
SSAP 22	Accounting for Goodwill	Dec. 1984
SSAP 23	Accounting for Acquisitions and Mergers	Apr. 1985
ED 44	Accounting for Goodwill - additional disclosures	Sept. 1988

cont'd

TABLE 5.1 (Continued)

Earnings per share

Ed 4	Earnings per Share	Mar. 1971
SSAP 3	Earnings per Share	Feb. 1972

Extraordinary items

ED 5	Extraordinary Items and Prior Year Adjustments	Aug. 1971
ED 7	Accounting for Extraordinary Items	July 1972
SSAP 6	Extraordinary Items and Prior Year Adjustments	Apr. 1974 (revised Aug.1986)
ED 16	Supplement to "Extraordinary Items and Prior Year Adjustments"	Sep. 1975
ED 36	Extraordinary Items and Prior Year Adjustments	Jan. 1985

Stocks and work in progress

ED 6	Stocks and Work in progress	May 1972
SSAP 9	Stocks and Work in progress	May 1975 (revised Nov. 1988)
ED 40	Stocks and Long Term Contracts	Nov. 1986

Changing prices

ED 8	Accounting for Changes in the Purchasing Power of Money	Jan. 1973
SSAP 7	Accounting for Changes in the Purchasing Power of Money	May 1974

cont'd

TABLE 5.1 (Continued)

ED 18	Current Cost Accounting	Nov. 1976
ED 24	Current Cost Accounting	Apr. 1979
SSAP 16	Current Cost Accounting	Mar. 1980
ED 35	Accounting for the Effects of Changing Prices	July 1984
Government grants		
ED 9	The Accounting Treatment of Grants under the Industry Act 1972	Mar. 1973
SSAP 4	Accounting Treatment of Government Grants	Apr. 1974
ED 43	The Accounting Treatment of Government Grants	June 1988
VAT		
ED 10	Accounting for VAT	May 1973
SSAP 5	Accounting for Value Added Tax	Apr. 1974
Deferred tax		
ED 11	Accounting for Deferred Tax	May 1973
SSAP 11	Accounting for Deferred Tax	Aug. 1975 (withdrawn Oct. 1978)
ED 19	Accounting for Deferred Taxation	May 1977
SSAP 15	Accounting for Deferred Tax	Oct. 1978 (revised May 1985)
ED 33	Accounting for Deferred Tax	June 1983

cont'd

TABLE 5.1 (Countinued)

Imputation tax

ED 12	The Treatment of Taxation under the Imputation System in the Accounts of Companies	May 1973
SSAP 8	Treatment of Taxation under the Imputation System	Aug. 1974

Funds statements

ED 13	Statement of Source and Applications of Funds	Apr. 1974
SSAP 10	Statement of Source and Applications of Funds	July 1975

Research and Development (R & D)

ED 14	Accounting for R&D	Jan. 1975
ED 17	Accounting for R&D - Revised	Apr. 1976
SSAP 13	Accounting for R&D	Dec. 1977
ED 41	Accounting for R&D	Jan. 1987

Depreciation (and Investment properties)

ED 15	Accounting for Depreciation	Jan. 1975
SSAP 12	Accounting for Depreciation	Dec. 1977 (amended Nov. 1981 revised Jan. 1987)
ED 26	Accounting for Investment Properties	Sept. 1980
SSAP 19	Accounting for Investment Properties	Nov. 1981
ED 37	Accounting for Depreciation	May 1985

cont'd

TABLE 5.1 (Countinued)

Group accounts		
ED 20	Group Accounts	July 1977
SSAP 14	Group Accounts	Sept. 1978
Foreign currency		
ED 21	Accounting for Foreign Currency Transactions	Sept. 1977
ED 27	Accounting for Foreign Currency Transactions	Oct. 1980
SSAP 20	Foreign Currency Translation	Apr. 1983
Post balance sheet events		
ED 22	Accounting for Post Balance Sheet Events	Feb. 1978
SSAP 17	Accounting for Post Balance Sheet Events	Aug. 1980
Contingencies		
ED 23	Accounting for Contingencies	Nov. 1978
SSAP 18	Accounting for Contingencies	Aug. 1980
Petroleum revenue tax		
ED 28	Accounting for Petroleum Revenue Tax	Mar. 1981
Leases		
ED 29	Accounting for Leases and Hire Purchase Contracts	Oct. 1981
SSAP 21	Accounting for Leases and Hire Purchase Contracts	Aug. 1984

cont'd

TABLE 5.1 (Countinued)

Pensions

ED 32	Disclosure of Pension Information in Company Accounts	May 1983
ED 34	Pension Scheme Accounts	Apr. 1984
SORP 1	Pension Scheme Accounts	May 1986
ED 39	Accounting for Pension Costs	May 1986
SSAP 24	Accounting for Pension Costs	May 1988

Charities

ED 38	Accounting by Charities	Nov. 1985
SORP 2	Accounting by Charities	May 1988

Off balance sheet finance

ED 42	Accounting for Special Purpose Transactions	May 1988

Segmental disclosure

ED 45	Segmental Reporting	Nov. 1988

Notes:

1. The topics are shown in order of the first Exposure Draft (ED) on each subject. The date of issue of each document follows its title.

2. As well as producing EDs and SSAPs, ASC has published Statements of Recommended Practice (SORPs) and is franking SORPs for various industry groups. It has also produced several discussion papers, guidelines, statements of intent,etc.

* **Source**: Financial Reporting 1988 - 1989; A survey of UK Published Accounts; ICAEW 1989.

It seems to suggest that the ASC believes that most of the essential area have been covered by the standards programme concentrated on dealing with the current problem of the moment and that revision and refinement are now its major tasks.

However, the five aims originally set out as a- standards programme to ASC have been all at least partially achieved, Hanson, (1989). The hopes of the accountancy profession were to bring about greater uniformity, yet they still remain hopes two decades after setting up the ASC in early 1970. The main reasons for that in my opinion are the lack of an effective enforcement mechanism. A second reason is that the approach of dealing with problem areas individually has the disadvantage of inconsistency. For example the different methods of valuation in use at the present time and the inconsistency between certain SSAPs, like the one between SSAP 12 on depreciation and SSAP 19 which advocates non depreciation of investment properties. This approach is like the treatment of the symptoms rather than the disease which can lead to the problems reappearance in a different form. The more effective way of treatment is to design standards in depth to deal with problems as single problems to avoid the conflict and inconsistency.

Despite of shortcomings discussed above, there is a general agreement that the overall quality and quantity of published accounts has been improved remarkably in the past two decades, among many who share this view is Hanson, (1989).

In conclusion, it is the opinion of the author that as a result of the latest Companies Acts, in particular the 1985 Companies Act and the important contribution made by the ASC, the published accounts now contain valuable information for assessing companies' financial positions in greater detail, which is unlikely to be available from any other source.

5.3 THE OBJECTIVES OF FINANCIAL REPORTING:

The early objectives of published accounts were to assist in the protection of shareholders and creditors from fraud and mismanagement. Accounting information is useful to the extent that it facilitates decision-making. The question which arise almost always in literature is: what kinds of information should a company disclose about its operations ? Writers have been proposing modifications to the accounting methods for many years which seems to suggest that there was no agreed and clear objective on published accounts even between the professional accounting bodies in the U.S and U.K. For instance, in 1936 when the American Accounting Association said: " **The purpose of the statements is the expression, in financial terms, of the utilization of the economic resources of the enterprise and resultant**

changes in the position of the interests of creditors and investors. Accounting is thus not essentially a process of valuation but the allocation of historical costs and revenues to the current and succeeding periods." The Institute of Chartered Accountants in England and Wales (ICAEW) responded to the above expression as follows: **".... the purpose for which the annual accounts are normally prepared is not to enable individual shareholders to take investment decisions." " ... the results shown by accounts prepared on the basis of historical cost are not a measure of increase or decrease in wealth." And " A balance sheet is mainly an historical document which does not purport to show the realizable value of assets ... and so is not a statement of the net worth of the undertaking."** Carsberg et al, (1974).

Increasingly from the early sixties there has been some change, in which American accountants have come to believe that part of the answer to what kinds of information should a company disclose, lies with the user of the financial statements. In other words, what is the purpose for which each particular type of user requires the information ?

Therefore, published annual reports have become the most debated topic in the field of accountancy and finance. As a result of the controversy surrounding this subject and in particular, the preparation and presentation of the final accounts, two groups have been emerged. The first group believe that accounts should be prepared independent of the users, that is, no regard should be paid to satisfy any user or any special group of users; (Spouse and Moonitz, 1962). Whereas, the second group disagree with this approach on the grounds of company ownership and management. They argue that the business belongs to the shareholders, and management are hired to run the business. therefore, the management is responsible to report to shareholders only through the annual financial reports, in order to facilitate the owners assess to their business. However, Chamber (1966) came out against this school of thought, when he stressed that the purposes of published accounts are that they should be laid out in a fashion understandable by the recipients and divulge sufficient information in order to reach the conclusions on a specific company. The user orientated approach has become clear and well recognised.

A significant increasing level of interest in the specification of objectives of published accounts has been published from early sixties. Perhaps the most significant one, is Moonitz's "Basic Postulates of Accounting" (1961), as it was the first research study undertaken under the sponsorship of the American Accounting Principles Board for an attempt to provide a theoretical basis for accounting; Hawkins (1971). Moonitz defined the objective of company reporting as the provision of data to be used as a basis for choosing between available economic alternatives and for checking and evaluating the results, when he state:

> **" Quantitative data are helpful in making rational economic decision, i.e., in making choices among alternatives so that actions are correctly related to consequences".**

The same view was shared by the Committee to Prepare a Statement of Basic Accounting Theory (American Accounting Association, 1966), and by Yuji Ijiri & Robert Jaedicke, (1966). However, **Moonitz** while recognizing the potential of a user approach warn that:

> **".... any one who stresses 'usefulness' as a criterion, in accounting or elsewhere, must answer the two pointed questions - useful to whom ? and for what purpose ? And herein lies the danger. We could easy be trapped into defining accounting and formulating its postulates, principles, and rules in terms of some special interest, such as the business community, or the regulatory agencies, or investors, or tax collectors".**

It is clear that he accepts the full implication of this line of thought, that different information might reasonably be provided for different people and for different purposes. He thought it might be dangerous to formulate accounting principles for special interest groups, Carsberg, (1974). Moonitz points out the one important factor in the problem of reporting equally to all groups' interests. That factor is the need of accounting information which will be of help in making economic decisions.

This school of thought or Moontiz's theory was actually supported by the Association of the Institute of Corporate and Public Accountants (AICPA, 1973), when they stated that the purpose of the financial statements was to provide information " **... useful to investors, creditors, for predicting, comparing and evaluating potential cash flows in terms of amount, timing and related uncertainty..."**
Regarding for whom the accounts should be prepared, they conclude that all financial statements should be directed to those **who have limited access to companies inside information.**

However, **Pankoff and Virgil (1970)** gave this subject another increase by extending the concept of financial statement to include the predictive factor, when they state:

> **" while financial accounting reports may have an historical perspective, the value of those reports can not be measured solely by the**

accuracy with which they reflect the past. It seems safe to say that most users, investors and creditors, for example, are not interested at all in the past per se, but only to the extent that the past can be used to reveal the future. In other words, firms' past records are useful to the extent that they help users make decisions about an uncertain future."

But there were some others who did not agree in associating the purpose and value of accounting information directly with decision making, among them, Bevis (1965) who relegates decision making to secondary status when he states that:

"....The fact that prospective investors may use the information contained in the report to assist them in making projections in connection with investment decisions does not belie the report's essential nature and purpose as an historical accounting of what has taken place."

Most of the opinions summarized and discussed in this section so far are from American writers, researchers and accounting organizations. However, the objectives of published accounts were not very much discussed in the U.K. The serious stage in this subject was taken up from early seventies, when in 1970 the Institute of Chartered Accountants in England and Wales

(ICAEW) commissioned the Accounting Standard Steering Committee (ASSC), as it then was, to "**..narrowing the areas of difference and variety in accounting practice by published authoritative statements on best accounting practice...**". In 1974 the (ASSC) appointed a sub-committee to prepare a wide-ranging discussion paper. Its terms of reference were:

> **The purpose of this study is to re-examine the scope and aims of published financial reports in the light of modern needs and conditions. It will be concerned with public accountability of economic entities of all kinds, but especially business enterprises.**
> **It will seek to establish a set of working concepts as a basis for financial reporting. Its aims will be to identify the persons or groups for whom published financial reports should be prepared, and the information appropriate to their interests. It will consider the most suitable means of measuring and reporting the economic position, performance and prospects of undertakings for the purposes and persons identified above.**

The report of this committee was published in 1975 under the title **The Corporate Report**. It summarised the objectives of published accounts as:

"The fundamental objective of corporate reports is to communicate economic measurements of and information about the resources and performance of the reporting entity useful to those having reasonable rights to such information."

Published accounts have been an area of exceptional innovation in the U.K. during the 1980s, however being so deep and varied subject, a lot has been written about this topic which has precipitated some controversy. The more recent work on this subject are by McMonnies, 1988 and The Solomons Report (Solomons, 1989) in the U.K., and of the International Accounting Standards Committee (IASC, 1989) and the conceptual framework projects of the Financial Accounting Standards Board (FASB) in the USA. Although there is no full agreement on the objectives of published accounts, all these sources are generally agreed that:

a) Published accounts are expected to serve users and that the equity investors and lenders are among others the most important class of users.

b) The balance sheet and profit and loss account, together with a statement of cash flows are the fundamental financial statements.

c) The concern of the users is with economic evaluation and decision making.

So, it is the author's opinion that the objectives of published accounts are to provide information to any one who has no access to inside information of the company in order to help him reach the decisions about the company for whatever purpose.

5.4 USERS OF COMPANY ACCOUNTS:

In order to understand the information available in published annual reports, it would seem useful to find out who are the users. The users are here taken as those who have reasonable right to information concerning the reporting company. Several different user groups have been cited in the literature of published corporate reports. However, The Corporate Report identifies seven separate user groups, namely, the equity investor group, the loan creditor group, the employee group, the analyst/adviser group, the business contact group, the government and finally the public.

1. THE EQUITY INVESTOR GROUP:

Essentially this group consists of shareholders. The aim of this group is to consider whether or not to invest in a company, that simply means to buy shares or probably to buy more shares, and alternatively, whether or not to sell shares. Usually equity investors look for one or two things; the first is the income which is a money return to them within the payment of dividend, and secondly the capital gain which is a money return by selling shares at more than their purchase price.

The point is that investors need information about future profits. As published accounting information is almost always about the past, the need to make the past results useful for estimating the future is an important influence on some of the detailed disclosure requirements, such as share prices and dividend policy .. etc. The general trend is to make reported accounting statement as suitable as possible for the investor to make his own estimations.

2. <u>THE LOAN CREDITOR GROUP</u>:

This group comprises long, medium or short-term lenders of money. The important question for a loan creditor to consider is wether he will get his money back or not? So a short-term loan creditor will be interested in the amount of cash a company has got or will get very soon. For protection purposes, he will also be interested in the net realisable value of all the assets, and the priority of the various claims other than his own on the available resources. On the other hand long-term lenders will clearly need a relatively longer-term view of the company's future cash position. That means, they can not restrict their interest to cash. They need to assess, as the Corporate Report correctly says, the " economic stability and vulnerability of the borrower".

Their needs are to estimate the overall strength and position of the company in the future.

3. <u>THE EMPLOYEE GROUP</u>:

Employees need financial information about the company for two main reasons; first for the wage negotiations and second, for the assessment of their job security at present and future. So they will need information in a clear and simple non-technical way, as well as nonfinancial information, for instance, they want to know about management attitudes to staff involved in making decisions about the conditions of service in general.

4. <u>THE ANALYST/ADVISER GROUP</u>:

This group consists of experts that advise other groups. Stockbrokers and investment analysts will advise shareholders. Trade union advisers will advise employees. Government statisticians will advise the government, and so on. The needs of this group are clearly the needs of the special group they are advise. But because they are advisers and probably experts, with no doubt one can say that they will need more detail and more sophisticated information to be presented to them.

5. THE BUSINESS CONTACT GROUP:

This group consists of all that have dealings with business, but are not included in any other group. It can be divided into three subgroups as follows:

a) Suppliers and trade creditors need similar information to that required by short-term loan creditors, but at the same time they will also need to have a longer-term idea of the future of the business. Therefore they need to estimate the future of their customers, as they are primarily concerned with the sufficiency of cash to pay the immediate debts, the continuing existence of the company and security of their claims.

b) Customers will wish to assess the reliability of the companies both in the short term sense and in the long term sense, such as, whether they get the goods on time and in good condition and an effective guarantee, that the service is available after sale.

c) Competitors need to find out as much as possible about the financial, technical and marketing structure of the companies . But here it is important to mention that the companies will not be keen for disclose this information for it and to become generally available within the industry. At the same time it is well recognized that companies have a reasonable right to keep the causes of their success secret. Further if the competitors want to consider a merger or a straight take-over bid, which is a common case in recent years, for these purposes they need the above information as well as and in addition to the information required by the equity investor group.

6. <u>THE GOVERNMENT</u>:

Government need financial information for purpose of taxation. This could be the most clear use by government, but it is not necessarily the most important one. Government also needs information for making decisions which affect particular companies or industries. They need information as a base for their economic decisions, which will be varied and very detailed.

7. <u>THE PUBLIC</u>:

This group consists of individuals and pressure groups who may need information for their personal use. Moreover as companies are part of the society at large and they react and interact with society, they will be concern about such things as employment, health and safety, and contribution to charities. It should be noted that much of this information is non-financial information, and some can not be even measured, so whether it is accounting information or not is hard to judge, but, with no doubt it is useful information.

From the discussion above it is clear that different users with varied purposes, may require different information about the same items and also different users will require and be able to understand different degrees of complexity. Therefore the question is whether general financial statements will meet the needs of diverse user groups, despite that some sort of common needs can be noticed.

The following quotation might be useful here:

> **" All these groups have a legitimate interest in the activities of a corporation, although clearly some groups are more affected by these activities than others. While the corporation is not legally obligated to report directly to all these groups, it certainly can be argued that a moral obligation to do so exists. Any such reporting obligation would most likely be met within the framework of accounting system. (Stone, 1967)**

5.5 THE CHARACTERISTICS OF COMPANY ANNUAL REPORTS:

Certain characteristics or qualities of financial reporting make financial information useful. Providing information that has each of these qualities is an objective of financial accounting. These qualitative objectives are at least partially achieved at present, although improvement is probably desirable with each one of them. Full achievement of the qualitative objectives are caused by conflicts between objectives, as well as by lack of complete understanding of them.

Therefore, it is useful not only to consider the purposes for which the information is required, but also to consider the characteristics of useful information. These characteristics were considered by Accounting Standard Steering Committee (ASSC) through The Corporate Report (1975). It suggests seven desirable characteristics that corporate reports should have and hold, if they are to meet the objectives of published accounts. These are:

1. Relevance
2. Understandability
3. Reliability
4. Objectivity
5. Completeness
6. Timeliness, and
7. Comparability.

1. Relevance:

Corporate reports should seek to satisfy as far as possible, the user's needs (Accounting Objectives Study Group 1973, American Accounting Association 1966, Carsberg et al 1974). The objective of relevance helps in selecting methods of measuring and reporting in financial accounting that are most likely to aid users in making the sorts of economic decisions for which they use financial accounting data. To make a judgement about relevance of information, attention is focused in the common needs of users and not on specific needs of particular users. An important task is to determine those common needs and the required information that is relevant to them. The concept of relevance has been advocated as important to financial reporting for some time; Lee T.A. (1971); Staublus G.J. (1970), and has been defined as follows:

"Relevance is the primary standard and requires that the information must bear upon or be usefully associated with actions. It is designed to facilitate, or results desired to be produced. Known or assumed information needs of potential users are of paramount importance in applying this standard" American Accounting Association, (1966). Relevance is the key for information, "if information is not relevant to some needs, it is indeed, worse than useless" American Accounting Association (1966). So relevance is the primary qualitative objective because information that does not bear on a decision is useless, regardless of the extent to which it satisfies the other objectives.

2. Understandability:

All material information must be given in the clearest possible manner. Where appropriate the main features should be presented in a simplified form for use by less sophisticated readers (Staubus 1971, Accounting Objectives Study Group 1973, Carsbery et al 1974).

Understandability is important because accounting information must be readable if it is to be useful. Users of financial statements can understand the information only if the data presented and their methods of presentation are meaningful to them. As different users will obviously have different levels of ability as regards understanding accounting information. Understandability also requires that the users have some understanding of the complex economic activities of companies, the financial accounting process, and the technical terminology used in financial statements. Understandability does not necessarily mean simplicity. It means to take into the account the abilities and knowledge of the users concerned. Therefore problems do not arise when an accountant has to report on complex activities, but to the nonexpert user.

3. Reliability:

It should be credible. The credibility of information contained in corporate reports is enhanced if it is independently verified (ASSC 1975). Verifiable financial accounting information provides results that would be substantially duplicated by independent measurers using the same measurement methods. It is not suggested, that a high degree of accuracy is necessary, only that which is possible given the constraint of time and expenses (Accounting Objectives Study Group 1973).

4. Objectivity:

The information presented should be fair and neutral. It must be based on verifiable evidence (whenever possible). It should not be biased towards the interest of any particular user group (Spacek 1969, Carsberg et al 1974, Barback 1976). Measurement can not be completely free from subjective opinions and judgement. Nevertheless, the usefulness of information is enhanced if it is verifiable, which means, if the attribute or attributes selected for measurement and as well as the measurement methods used provide results which can be confirmed by independent measurers.

Neutral financial information is directed to the common needs of users and is independent of presumptions about particular needs and desires of specific users of the information. Measurements that are not based on presumptions about particular needs of specific users enhance the relevance of the information to common needs of users. Therefore preparers of financial information should not try to increase the helpfulness of the information to a few users to the detriment of others.

5. Completeness:

It must disclose all material matters to provide users, as far as possible, with an overall picture of the economic activities of the reporting company (ASSC, 1975).

6. Timeliness:

The annual report should be published reasonably soon after the end of the accounting period to which it relates. It should not be so out of date as to be useless for decision making (Grady, 1965). Therefore approximate information if it is to be made available in time to assist with some decision is likely to be more useful than precise and accurate information presented after the decision has been already made.

7. Comparability:

The results should be presented in such a way that they are comparable with those of other accounting periods and other reporting entities. It is also necessary for the accounting concepts and policies to be applied with some degree of consistency in methodology, particularly for the comparison of the company against itself and for inter-company comparison lee, 1975, Accounting Objectives study Group, 1973.

These are all the important conditions of good communication, but many are difficult to meet simultaneously in practice. However, the corporate reports should make a balance of these seven desirable characteristics. For example, relevance may have to be sacrificed to some extent to obtain a sufficient level of objectivity while a balance is needed for completeness and understandability. Also judgment is needed to settle conflicts between completeness and timeliness (ALIA, 1976).

The follow up of one objective or one set of objectives may conflict with the following up of others. For example, it is not always possible to have financial statements that are highly relevant on the one hand, and also timely on the other hand. At the same time it is not always possible to have financial accounting information that are both as verifiable and as relevant as desired.
Conflicts between qualitative objectives might be resolved by arranging the objectives in order of relative importance and determining a desirable compromise. However, except for the primary of relevance, neither the accountants nor users now agree as to their relative importance. In addition, determining a desirable compromise requires judgement.
The following quotation is a useful summary:

" The qualitative characteristics of financial statements, like objectives; should be based largely upon the needs of the user of the statements. Information is useless unless it is relevant and material to a user's decision. Information should be as free as possible from any biases of the preparer. In making decisions, users should not only understand the information, presented, but also should be able to assess its reliability and compare it with information about alternative opportunities and previous experience. In all cases, information is more useful if it stresses economic substance rather than technical form". Accounting Objective Study Group, (1973).

5.6 LIMITATIONS OF PUBLISHED ACCOUNTS:

Achievement of the qualitative objectives of financial accounting enhance the reliability of financial statements. Reliability of information is important to users because decisions based on the information may affect their results. However reliability does not imply full precise information in the published accounts, because financial accounting involves approximation and judgement.

The responsibility for the reliability of a company's published accounts rests with its management. These responsibilities are discharged by applying generally accepted principles that are appropriate to the company's circumstances, by maintaining effective accounts systems and internal control, and by reporting adequate financial statements.

There is an inherent limitation in final accounts, in so far that they are designed to meet the information requirements of different users or group of users (as discussed in section 5.4) and hence the result is a compromise. For example, trade creditors are initially concerned with adequate cash to pay immediate debts, the continuing existence of the company, and finally the security on their claims, therefore the accounting data provided in annual financial statements for them is insufficient on the grounds of frequency and timeliness. They argue that the information is available only once a year, and is several months out of date. More reliance is placed on their own estimates. On the other hand the banks are risk lenders, in that their primary function is the security of the loan rather than the earnings of the business. Robson Rhodes (1982) indicates that the high failure rate of companies financed under the Government Loan Guarantee Scheme was partially attributable to the lack of caution in bank lending. The banks at that time were entitled to recover 80% from the Government in the event of loan default.

The following are some criticisms regarding the reliability of published accounts:

5.6.1 METHODS OF DEPRECIATION AND VALUATION OF INVENTORIES:

In accordance with standard practice, annual published accounts are prepared under certain accounting conventions. However, within these accounting conventions, there is still considerable scope for arbitrary and personal judgment. In practice, companies provide for depreciation of fixed assets at a much higher rate than their actual rate. Usually, the fixed assets are used long after the cost is fully depreciated. The methods and rates are based on a mixture of convenience, together with estimates of the useful working life of the assets as well as the resale value of the assets. The method of depreciation selected will give different values to assets over the years and different charges to the profit and loss account, even though the same useful working life is used.

The two most commonly used methods of depreciation are the straight line method and the declining balance method. The straight line depreciation method allocates the cost of a fixed asset less any resale value equally to operations over the estimated useful working life of the asset. The depreciation (D) is computed by the formula:

$$D = \frac{1}{k} (c - s)$$

Where : k = estimated number of years of useful working life

c = cost of asset

s = estimated resale price (scrap value)

The declining balance sheet method on the other hand charges a greater proportion of an asset's total depreciation to operations during the early years of its estimated useful working life than during latter years. In other words, a constant proportion is used each year but it is applied to the portion of the cost not previously depreciated. The following formula is used to compute the annual depreciation:

$$d = 1 - \sqrt[k]{\frac{s}{c}}$$

(the symbols are the same as in above)

The obvious difference between these two depreciation methods can be demonstrated by the following example:

Assume that an asset is bought for £160,000 with an estimated useful working life of five years by the end of which its resale value is expected to be £5,000. The table below demonstrates the differences in employing the two depreciation methods:

	Straight Line method	Declining balance method
Asset value at beginning of year 1	£160,000	£160,000
Depreciation for year 1	- 31,000	- 80,000
Asset value at beginning of year 2	129,000	80,000
Depreciation for year 2	- 31,000	- 40,000
Asset value at beginning of year 3	98,000	40,000
Depreciation for year 3	- 31,000	- 20,000
Asset value at beginning of year 4	67,000	20,000
depreciation for year 4	- 31,000	- 10,000
Asset value at beginning of year 5	36,000	10,000
depreciation for year 5	- 31,000	- 5,000
resale value	5,000	5,000

Each of these two methods has its legitimate economic reasons for when and why it should be applied. For example, if an asset's operating costs are constant over its entire life, the straight line depreciation method is the more appropriate because it allocates the cost of asset equally to operations for each accounting period. While, on the other hand the declining balance depreciation method is likely to be more suitable when a particular asset requires a greater maintenance in its latter years of operation.

As it is clear from the table above, the depreciation method will have a great effect on the resulting profit of the company particularly when the depreciating assets are expensive. Therefore this loophole can be used by management to reach a desired profit under certain circumstances. For instance, the declining balance depreciation method can be used to hold down earnings and conserve funds by reducing shareholders' pressure to increase dividend distribution, and also to provide an argument against pay increases. In other situations, the straight line depreciation method can be utilised to smooth earnings, and in times of depressed profits it helps to switch from the declining balance depreciation method to the straight line method to boost profits with the hope that this will maintain the market price of the company's shares. The choice of useful working life for a depreciated asset can also be used in a similar way to further the achievement of management's financial objectives.

The valuation of inventories is another area which brings a lot of criticism to published accounts regarding the different methods that have been employed in practice. The effect of using the well known two methods of valuation of the inventories, namely, First in first out (FIFO), and last in first out (LIFO) will be demonstrated below with the impact of inflation on published accounts.

5.6.2 INFLATION:

A second major criticism is that financial statements prepared on the historical cost basis do not reflect the effects of inflation. Inflation has an impact in two main ways. First, the profit figure in each year is overstated and second, the value of comparing the trend of performance over consecutive years is impaired. An example will be useful to illustrate that :

Suppose that company A, began business on December 31, 19x1, and its balance sheet at that time was as following:

Balance Sheet For Company (A) At 31 - 12 - 19x1

ASSETS		LIABILITIES AND NET WORTH	
	£		£
Cash	80,000	Equity	480,000
Inventory	200,000		
Net fixed assets	200,000		
	480,000		480,000

The fixed assets are depreciable over 10 years by using the straight line depreciation method. Inventory is reported on a first in first out (FIFO) basis. Sales occurred at the end of the first year of operation, and inflation for that year was 10 percent, assuming that it occurred at the beginning of 19x2.

The income statement for the first year of operations reported on an historical cost basis was as follows:

Income Statement On Historical Cost Basis For Company (A)

At 31 - 12 - 19x2

Sales		£ 280,000
Cost of goods sold		
Beginning inventory	£200,000	
Purchases	220,000	
Ending inventory	(220,000)	
	----------	200,000
Depreciation (200,000/10)		20,000
selling and administrative expenses		30,000

Net profit		30,000
		==========

It is noticeable that the company's ending inventory is higher than its beginning inventory by the percentage increase in prices, namely 10 percent. However the balance sheet of the company at December 31, 19x2, would be:

Balance Sheet On Historical Cost Basis For Company (A)

At 31 - 12 - 19x2

ASSETS	£	LIABILITIES AND NET WORTH	£
Cash	110,000	Equity	480,000
Inventory	220,000	Retained earnings	30,000
	510,000		510,000

If two of the more widely used profitability ratios, computed from the results above, They will be:

Net profit margin = net profit after tax / sales

(30,000/280,000)*100 = 10.71%

Return on assets = net profit after tax / total assets

(30,000/510,000)*100 = 5.88%

In both cases, the profitability of the company is overstated, because of using (FIFO) method, inventories that are sold are assumed to have been purchased at the prices prevailing when the oldest items in the inventory were purchased. With inflation, these prices will be considerably below their replacement costs. So the inventory sold are valued at £200,000 for accounting purposes, whereas their replacement cost at the time they were sold was £220,000. The costing of inventory in this manner tends to understate costs and to overstate profits. A remedy is to use the last in first out (LIFO) method. With this method, the inventory most recently purchased is employed in the cost of goods sold. As a result, the value affixed to the inventory will be nearer the replacement cost.

In addition to inventory valuation on the FIFO basis overstating profits, depreciation charges are based on the original cost of the fixed assets, less accumulated depreciation. Again with inflation, the original cost is less than the current replacement cost of these assets. If these assets increase in value by 10 percent, their replacement value is £220,000, and depreciation would be 22,000 instead of the 20,000 used for accounting depreciation purposes.

Reproducing the income statement of company A on a replacement cost basis, it would look like this for 19x2:

Income Statement On a Replacement Cost Basis For Company (A)

At 31-12-19x2

Sales		£ 280,000
Cost of goods sold (replacement cost)	£220,000	
Depreciation (220,000/10)	22,000	
selling and administrative expenses	30,000	
		272,000
Net profit		8,000

Then, the profitability ratios will be as follows:

Net profit margin (8,000/280,000)*100 = 2.86%

Return on assets (8,000/510,000)*100 = 1.57%

So the results of the two profitability ratios are substantially lower than those originally obtained by using the accounting data based on an historical cost.

Assume in 19x3 no inflation occurs, the income statement of the company will be as follows on an historical cost basis:

Income Statement On Historical Cost Basis For Company (A)

At 31 - 12 - 19x3

Sales		£ 280,000
Cost of goods sold		
Beginning inventory	£220,000	
Purchases	220,000	
Ending inventory	(220,000)	
		220,000
Depreciation (200,000/10)		20,000
selling and administrative expenses		30,000
Net profit		10,000

Therefore the profit of the company drops substantially from £30,000 reported in the 19x2 year to £10,000 in 19x3 year despite using historical costs to compute the profit figure.

This deterioration of the profit performance is primarily due to inflation, and not to the management. Looking at the income statement on a replacement cost basis for 19x3, it will be :

Income Statement On a Replacement Cost Basis For Company (A) At 31 - 12 - 19x3

Sales		£ 280,000
Cost of goods sold	£220,000	
Depreciation (220,000/10)	22,000	
selling and administrative expenses	30,000	
		272,000
Net profit		8,000

This profit figure is exactly the same as that for 19x2, on a replacement cost basis.

In order to compute the two profitability ratios on a replacement cost basis, it is necessarily to reproduce the 19x2 balance sheet on a replacement costs. This balance sheet becomes:

Balance Sheet On a Replacement Cost Basis For Company (A)
At 31 - 12 - 19x2

ASSETS		LIABILITIES AND NET WORTH	
	£		£
Cash	110,000	Equity	480,000
Inventory	220,000	Retained earnings	8,000
Net fixed assets	198,000	Holding-period gain	40,000
	---------		-------
	528,000		528,000
	========		=======

The gross fixed assets are adjusted for inflation by 10 percent to £220,000. When the subtraction of the first year's depreciation of £22,000, takes place the net fixed assets becomes £198,000. The holding period gain of £40,000 is comprised of the inventory profit of £20,000 which arises from the FIFO method, together with the increase in value of the fixed assets of £20,000. Both of these gains are due to inflation during 19x2. With £528,000 as the asset value, the profitability ratios for 19x3 using replacement cost data are:

Net profit margin (8,000/280,000)*100 = 2.86%

Return on assets (8,000/528,000)*100 = 1.51%

While the net profit margin is the same as in 19x2, the return on assets is lower. This is due to the denominator, beginning total assets, being larger than that for the preceding year.

5.6.3 <u>THE PROBABILITY OF BIAS ON CERTAIN ITEMS</u>:

The 'static' nature of annual financial statements opens up the question of bias. For example inventory and debtors at the end of the year may not be representative of their respective levels during the year. There are also opportunities for window dressing e.g. inventory can be reduced prior to the balance sheet by reducing purchases. This would improve cashflow and liquidity. Debtors could be reduced by discouraging credit sales or by encouraging debtors to settle quicker with larger discounts. Liquidity ratios could be improved by short term borrowing just prior to the balance sheet data.

The limitations cited above are some of the weaknesses of published accounts as regards their reliability to people who have no other source of information. However, a number of researchers and writers in this field have put forward some suggestions to improve their reliability. Notes accompanying the accounts are necessary if the users have to have more accurate knowledge about the company's financial position (Myre (1946), Stamp and Marley (1970), Mulondo (1981)). These notes would include information such as the various accounting methods used for depreciation and valuation of inventories etc .

The debate and controversy over the years on the subject of depreciation and the effect of revaluation of assets on the depreciation charge no doubt led the ASC to issue a completely revised version of SSAP 12 in January 1987, known officially as SSAP 12 (revised). It states the following in paragraphs 25, 26 and 27:

"25. The following should be disclosed in the financial statements for each major class of depreciable asset:

(a) The depreciation methods used;
(b) The useful economic lives or the depreciation rates used;
(c) Total depreciation charged for the period; and
(d) The gross amount of depreciable assets and the related accumulated depreciation.

26. Where there has been a change in the depreciation method used, the effect, if material, should be disclosed in the year of change. The reason for the change should also be disclosed.

27. Where assets have been revalued, the effect of the revaluation on the depreciation charge should, if material, be disclosed in the year of revaluation."

It is worth mention that these requirements are in line with the requirements of Companies Act 1985 Schedule (4). Regarding the criticisms in connection with the methods of valuation of inventories discussed above, again the ASC came under pressure to issue a revised SSAP 9 in September 1988. This time it was not in line with same requirement of the 1985 Companies Act. The SSAP 9 states that:

"The amount at which stocks are stated in periodic financial statements should be the total of the lower of cost and net realisable value of the separate items of stock or of groups of similar items".

The Companies Act 1985 Schedule 4 paragraph 27 allows the use of LIFO, as well as FIFO, weighted average, and any other method similar to any of these three. There is therefore large scope for companies to chose methods or to switch from one method to others when they need to control their approximate desired paper profit.

Despite the limitations cited above, the similarities followed by practices in preparing financial statements are more greater than the differences. Published accounts are valuable sources of accounting data and have led to a large number of financial analysis studies which have made major contributions to the field of financial analysis.

CHAPTER SIX

RESULTS AND INTERPRETATION OF THE RESEARCH

6.1 INTRODUCTION

This chapter presents the findings obtained from this study. The chapter is divided into five sections:

1. General characteristics of the failed and nonfailed companies.
2. Results of the analysis and models derived as well as the results of the validation tests.
3. General trends of selected financial ratios that the research determined could distinguish between failed and nonfailed small-medium size companies.
4. The performance of the "best" discriminant model (DFY2) on the failed company set comprising the validation sample, and finally;
5. An analysis of the performance of DFY2 on some nonfailed companies in validation sample.

6.2 GENERAL CHARACTERISTICS OF THE SAMPLE COMPANIES:

This study consisted of thirty failed companies and eighty nonfailed companies selected from the Exstat Tape provided by Extel Company Limited. A list of companies represented in this sample, together with the date of last report, the number of years for which accounting data is available, and total assets, appear in appendix (F) for failed companies and in appendix (G) for nonfailed companies.

The mean, minimum, and maximum total assets of the failed companies at the year of failure and for the nonfailed companies at the year analysed are presented in table 6.1.

TABLE 6.1

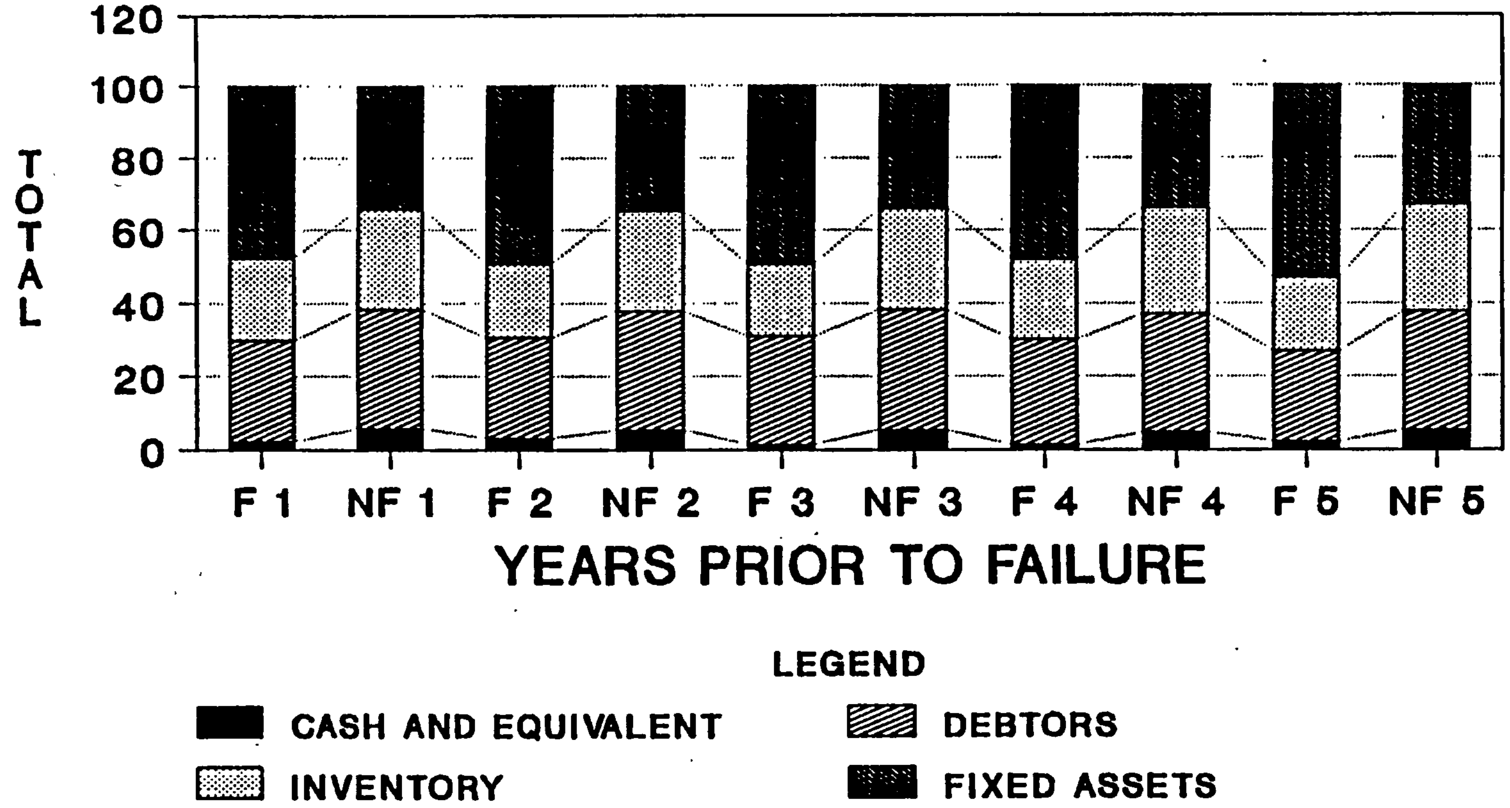
MEANS, MINIMUM, AND MAXIMUM
TOTAL ASSETS FOR THE SAMPLE

	failed companies (£)	nonfailed companies (£)
Mean Total Assets	4901953.70	5680150.00
Minimum Total Assets	912000.00	473000.00
Maximum Total Assets	9997000.00	9995360.00

However one way of analysing the financial statement is to study the relationships within a set of financial statements at a point in time and with trends in these relationships over time. The development of the common-size statement came from the problems in comparing the financial statements of companies that were different in size. For example, suppose that company (A) had liabilities of £ 50000.00 and company (B) had £30000.00 long-term liabilities. Regarding the possible size differences between the two companies (in total assets), it would be misleading to say always that company (A) is more highly geared than company (B). So one way of controlling the differences in size is to make the components of the balance sheet as a percentage of total assets, and the emergent statement is called a common-size statement. By doing so many references can be reached from the new statement, such as the utilisation of assets and methods used to finance their assets. In the same way the comparison could be made between the two groups comprising the sample, that is failed companies and nonfailed companies, in order to have a clear view about the components of the balance sheet as a percentage of total assets (liabilities and equity or shareholder's fund) and the changes in these components over the five years prior to failure.

Figure 6.1 presents the changes in the composition of assets for failed (F) and nonfailed (NF) companies for one through five years prior to failure . The percentage in this figure are tabulated in Table 6.2.

FIGURE 6.1
CHANGES IN THE PROPORTION OF ASSETS RELATIVE TO TOTAL ASSETS FOR F & NF CO'S



F = FAILED NF = NONFAILED

TABLE 6.2

CHANGES IN THE PROPORTION OF ASSETS RELATIVE TO TOTAL ASSETS FOR FAILED AND NONFAILED COMPANIES

Failed Companies

	Years Prior To Failure				
	1	2	3	4	5
	%	%	%	%	%
Cash & Equivalent	2.45	3.30	1.70	1.70	2.59
Debtors	27.36	27.53	29.57	28.66	24.45
Stock & Work in Progress	22.55	20.17	19.70	21.94	20.10
Fixed Assets	47.63	48.99	49.03	47.70	52.86

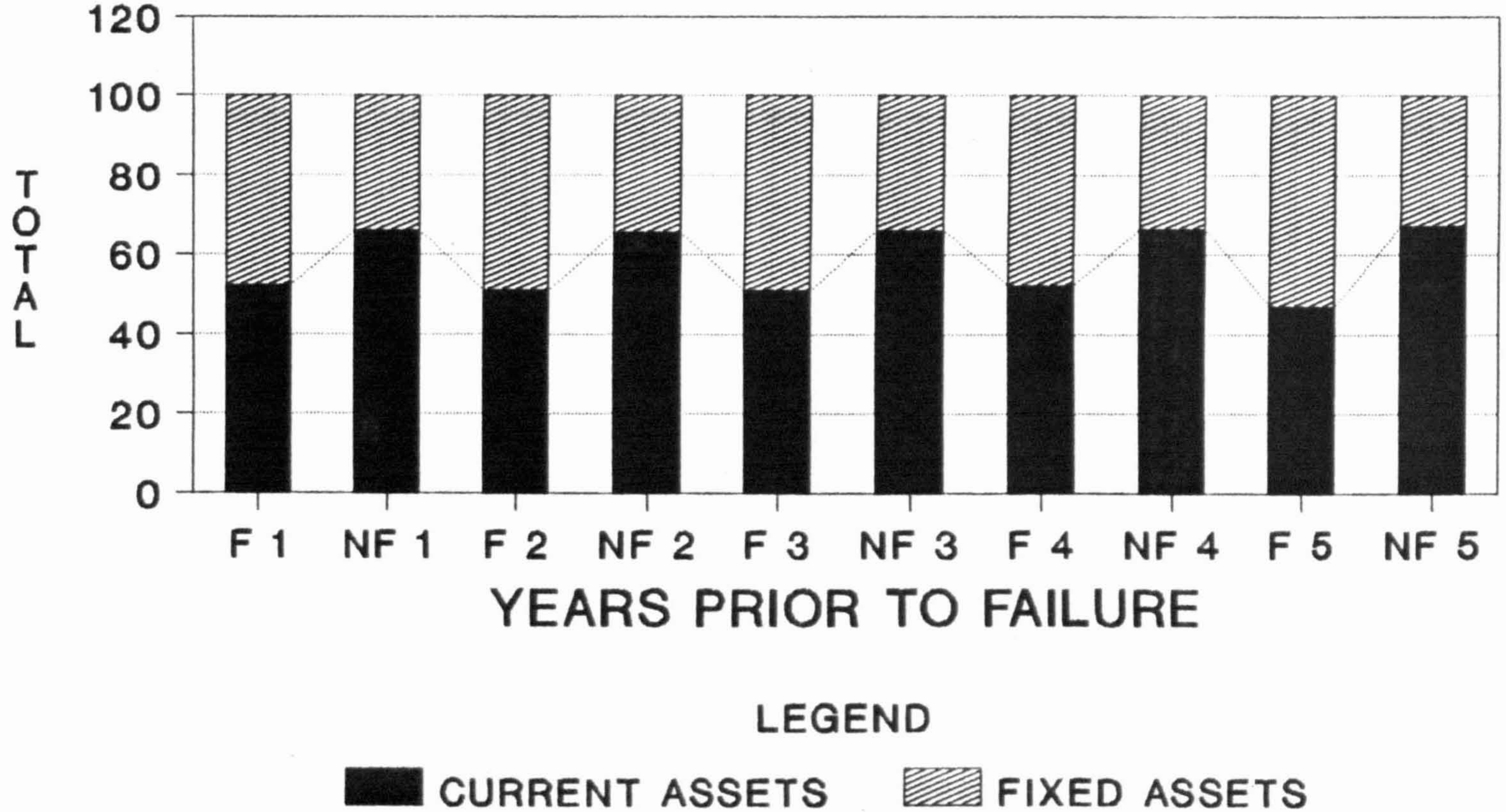
Nonfailed companies

	Years Prior To Failure				
	1	2	3	4	5
	%	%	%	%	%
Cash & Equivalent	5.95	5.43	5.5	4.91	5.5
Debtors	32.30	32.40	32.84	32.40	32.50
Stock & Work In Progress	27.54	27.45	27.59	28.83	29.03
Fixed Assets	34.21	34.72	34.07	33.85	32.96

The data seem to indicate that the nonfailed companies on the average maintained a higher percentage of their total assets as cash, debtors, and stock and work in progress, while the failed companies had a higher percentage of fixed assets (plant and equipment) than did the nonfailed companies. This higher percentage of fixed assets for the failed companies could indicate that the companies had nonproductive or inefficient assets. The lower percentage of debtors and stock for the failed companies could indicate on the other hand insufficient stock was carried. These general conclusions suggest possible problems with the failed companies and may be confirmed when those ratios that are important are determined.

Figure 6.2 is a graphical presentation of the percent distribution of current and fixed assets relative to total assets for failed and nonfailed companies one through five years before failure. Table 6.3 tabulates the percentages in this figure. The data reinforce the conclusion that assets of failed companies were not utilised efficiently since they maintained a higher percentage of fixed assets than the nonfailed companies. The lack of current assets can cause a company to have insufficient cash or credit to pay current liabilities. This is also suggested by noting that the nonfailed companies had a higher percentage of current assets, and at the same time a higher percentage of quick assets (see Table 6.4) which were more readily converted

FIGURE 6.2
DISTRIBUTION OF CURRENT & FIXED ASSETS RELATIVE TO TOTAL ASSETS PERCENT FOR F&N



F = FAILED COMPANIES
NF = NONFAILED COMPANIES

TABLE 6.3

PERCENT DISTRIBUTION OF CURRENT AND FIXED ASSETS RELATIVE TO TOTAL ASSETS FOR FAILED AND NONFAILED COMPANIES

	Years Prior To Failure				
Failed Companies					
	1	2	3	4	5
	%	%	%	%	%
Current Assets	52.37	51.01	50.97	52.30	47.14
Fixed Assets	47.63	48.99	49.03	47.70	52.86
Nonfailed companies					
	1	2	3	4	5
	%	%	%	%	%
Current Assets	65.79	65.28	65.93	66.15	67.03
Fixed Assets	34.21	34.72	34.07	33.85	32.96

TABLE 6.4

PERCENT DISTRIBUTION OF INVENTORY, QUICK ASSETS AND FIXED ASSETS RELATIVE TO TOTAL ASSETS FOR FAILED AND NONFAILED COMPANIES

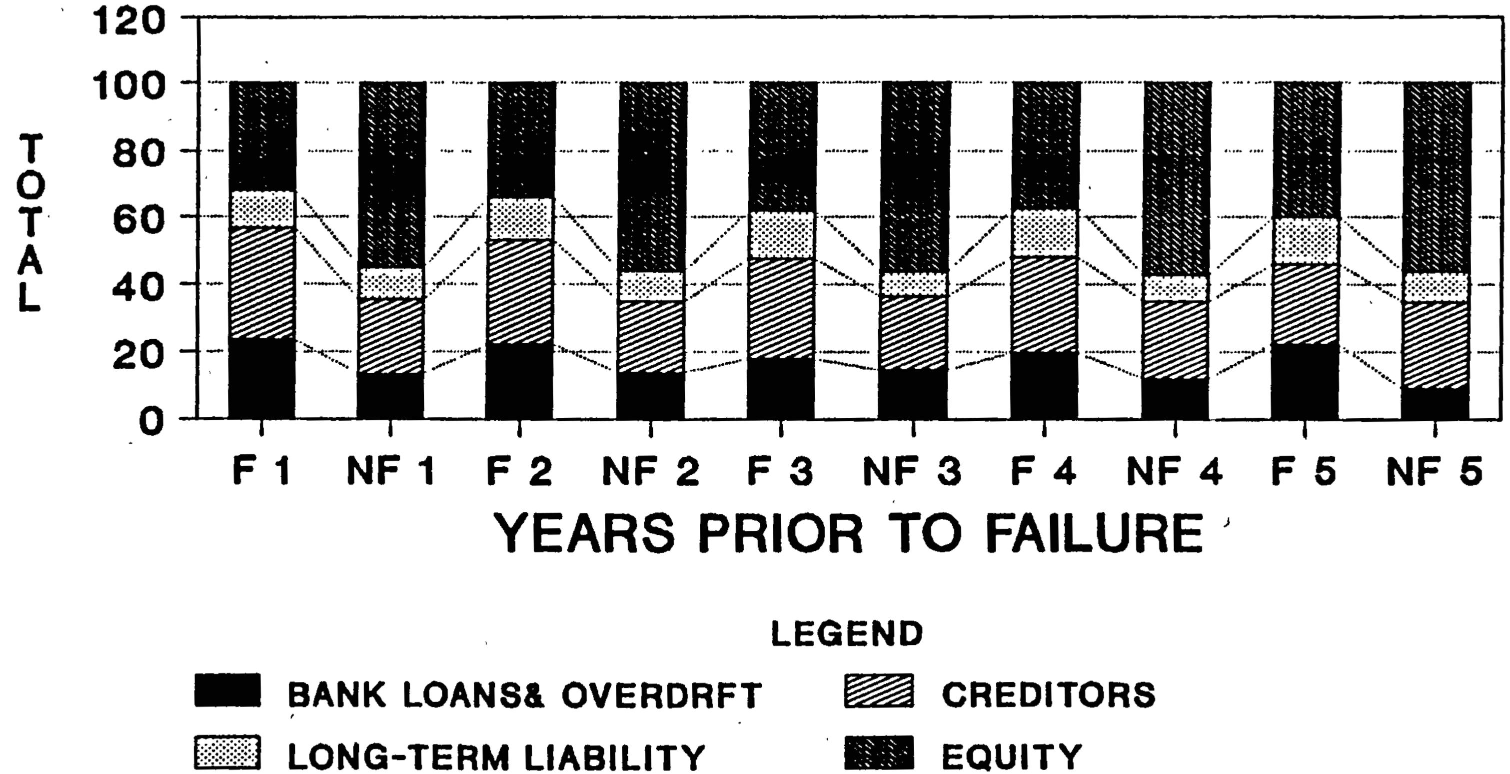
	Years Prior To Failure				
Failed Companies					
	1	2	3	4	5
	%	%	%	%	%
Inventory	22.55	20.17	19.70	21.94	20.10
Quick Assets	29.82	30.84	31.27	30.36	27.04
Fixed Assets	47.63	48.99	49.03	47.70	52.86
Nonfailed companies					
	1	2	3	4	5
	%	%	%	%	%
Inventory	27.54	27.45	27.59	28.83	29.03
Quick Assets	38.25	37.83	38.34	37.31	38.00
Fixed Assets	34.21	34.72	34.07	33.85	32.96

into cash to meet adverse changes in business conditions. Despite that the nonfailed companies had almost double the cash and equivalent than the failed companies. This liquidity allows a company to respond to changing conditions and improves its ability to survive during times of economic downturn.

Figure 6.3 presents the changes in the proportions of liabilities and equity (shareholder's fund) relative to total assets for the sample of companies up to five years before failure. The percentage in this figure are tabulated in Table 6.5 .

The data represent methods companies used to finance their asset acquisitions . A healthy company will have an easier time using the equity markets for long-term financing. This conclusion is supported by the higher percentage of equity for the nonfailed companies compared to the failed companies. The failed companies used the current and long-term liabilities as their major sources of financing. When a company has to rely on financing assets through short (current) or long-term liabilities, its interest expenses will be greater. If a company encounters financial difficulties, the ability to rollover short-term debt may become a major problem which could hasten the demise of the company, and this is really what is happening to the companies in U.K. .

FIGURE 6.3
CHANGES IN THE PROPORTION OF LIABILITY & EQUITY RELATIVE TO TOTAL ASSETS FOR F&NF



F = FAILED COMPANIES
NF= NONFAILED COMPANIES

TABLE 6.5

CHANGES IN PROPORTIONS OF LIABILITIES & EQUITY RELATIVE TO TOTAL ASSETS FOR FAILED AND NONFAILED COMPANIES

Failed Companies

	Years Prior To Failure				
	1	2	3	4	5
	%	%	%	%	%
Bank Loans And Overdrafts	23.67	22.21	17.98	19.78	22.56
Creditors	33.08	30.89	29.68	28.26	23.38
Long-term Liabilities	11.19	12.78	14.13	14.66	13.98
Equity	32.07	34.12	38.20	37.30	40.12

Nonfailed companies

	Years Prior To Failure				
	1	2	3	4	5
	%	%	%	%	%
Bank Loans And Overdrafts	13.56	13.89	14.69	12.14	9.01
Creditors	21.86	21.15	21.77	22.85	25.88
Long-term Liabilities	9.68	9.04	7.34	7.82	8.91
Equity	54.90	55.93	56.20	57.19	56.20

During 1990 because of the higher interest rate most of the small companies are in financial difficulties and quite a large number failed.

6.3 RESULTS OF THE DISCRIMINANT MODELS:

As presented in chapter four the variables selection method to be used in multiple discriminant analysis will be the stepwise procedure selection of the SPSS^{x} (1985). This procedure based on Wilks' Lmbda maximises the F-ratio for the test of differences between group centroids and does not increase the overall rate of misclassification (Mclachlan, 1980).

The analysis proceeded in three stages:

The first stage is concerned with evaluating five discriminant models for each of the five years prior to failure.
The second stage is to assess the performance of each of the five models over time. In other words to test the performance of the five models on data not used in their construction, that means for each of the five discriminant functions a further four discriminant runs will be made to assess the performance of each model. For example the resulting linear discriminant function from the first year prior to failure will be tested on data years two, three, four, and five prior to failure.

Similarly the linear discriminant function which emerges from using data two years prior to failure will be tested on data year one, three, four, and five prior to failure, and so on for the discriminant models years three, four, and five . In total 20 discriminant runs will be made in addition to the five discriminant runs for each of the five years prior to failure.

The third stage concerned the validation technique, it was however, considered that at this stage, that the model is basically explanatory as it is tested on the groups from which it was originally derived. Only when new companies are classified applying the model would it then become predictive in nature.

It was, therefore decided to test each of the five models precisely over the time on a new sample drawn from the Exstat Tape which comprised 10 failed and 56 nonfailed companies selected on the same basis of the original sample according the total assets and industrial classification.
The required data for the validation sample was extracted from the Exstat Tape up to five years prior to failure.

6.3.1 EVALUATING THE DISCRIMINANT MODELS:

Regarding the first stage , five discriminant functions for years one, two, three, four, and five before failure have been determined. As mentioned earlier in section 5.3 , the method used for all five discriminant functions was Wilks' forward selection, and it is available on the $SPSS^x$ (1985). The results of applying the discriminant function for years one to five prior to failure, together with their performance in classifying the companies whose accounting data was used in constructing them are presented in Table 6.6 .

It can be seen from this Table that the best performing model is the one year prior to failure model which classifies 93.3% of the failed companies correctly, whereas model the two years prior to failure classifies only 83.3% of the failed companies correctly. The three years prior to failure model classifies 76.7% of the failed companies correctly and the four years prior to failure model classifies 86.7% of failed companies correctly. Finally the five years prior to failure model classifies 84.0% of failed companies correctly.

It is clear that the Wilks' Lambda for the one year prior to failure model is the lower among all the models and because of the method chosen to select a subset of variables from all possible discriminant variables that minimised this statistic and maximises its equivalent F-ratio for the test of the differences between group centroids this model was consider to be the best one at this stage at least.

TABLE 6.6

RESULTS OF DISCRIMINANT MODELS

Years Prior to Failure	Variables Entered the Discriminant Function	Percentage of Correct Classification: Nonfailed	Failed	Total	Wilks' Lambda	F-Value	Degrees of Freedom
1	R2PR R3PR R4PR R5PR R7GE R12TR R21LQ	95.0	93.3	94.55	0.3733	24.461	7,102
2	R3PR R6GE R10TR R11TR R14TR R20LQ R21LQ	88.8	83.3	87.27	0.4761	16.032	7,102
3	R2PR R3PR R6GE R10TR R16LQ R20LQ	77.5	76.7	77.27	0.6551	8.951	6,102
4	R2PR R4PR R5PR R6GE R10TR R11TR R16LQ R20LQ	88.5	86.7	87.96	0.5518	10.049	8,99
5	R6GE R7GE R9GE R10TR R13TR R16LQ R17LQ R18LQ R19LQ R20LQ	79.5	84.0	80.58	0.5812	6.6280	10,92

$F_{6,60} = 4.37$, for $\alpha = 0.001$ $F_{6,120} = 4.04$ for $\alpha = 0.001$

$F_{7,60} = 4.09$, for $\alpha = 0.001$ $F_{7,120} = 3.77$ for $\alpha = 0.001$

$F_{8,60} = 3.87$, for $\alpha = 0.001$ $F_{8,120} = 3.55$ for $\alpha = 0.001$

$F_{10,60} = 3.54$, for $\alpha = 0.001$ $F_{10,120} = 3.24$ for $\alpha = 0.001$

The threshold value of F7,102 at the 99.9% level of significance is between 3.77 and 4.09, while the computed value of f7,102 has a value of 24.461 for the one year prior to failure model and 16.032 for the two year prior to failure model. This means that there is a very significant separation between the group centroid of the failed and nonfailed small-medium sized companies.

However, it is not sufficient that the discriminant function to be chosen should work or had the higher classification accuracy in one year only prior to failure, but the best discriminant model would have to work over time, in other words it was decided to test the performance of each of the model one, two, three years before failure on data not used in its construction as it was stated on stage two in the beginning of this section.

The reason for not examining the performance of models four and five years prior to failure was mainly because the numbers of financial ratios entering these two models made them difficult to use in practice, particularly model five years prior to failure, which contained ten variables, whereas model four years prior to failure had eight variables. On the other hand three variables R2PR, R4PR, and R5PR, appearing in the model four years before failure are already included in model one year before failure. The variables R6GE, R10TR, R11TR, and R20LQ, are included model two years before failure and the only remaining variable R16LQ in model four years before failure appears as well in model three years before failure, so it was decided that nothing further could be gained from carrying out the assessment and performance of this model.

Turning to model five years prior to failure it can be seen from Table 6.6 that variables R6GE, R10TR, and R20LQ are included in model two years before failure and variable R7GE appears in model one year before failure, while variable R16LQ is included in model three years before failure, the main reason for not pursuing its performance any further was because of the huge number of variables (10) in this model, which definitely will not be easy to use in practice.

6.3.2 TESTING THE PERFORMANCE OF DISCRIMINANT MODELS OVER TIME:

In order to choose the best discriminant model from the resulting model obtained from stage one, it is necessary to examine the performance of each of the first three discriminant models from years one, two, and three prior to failure over the time.

The results of this examination are given in Table 6.7. It can be seen from this results that, as the lead time increases, the relative predictive ability of any model would decrease and this is expected on an a priori basis.

However as Altman (1968) stated that " the bankruptcy prediction model is an accurate forecaster of failure up to two years prior to bankruptcy and that the accuracy diminishes substantially decreases as the lead time increases." This is also true based on results in Table 6.7 column three for DFY1 and DFY2.

Any way to choose the best discriminant model the question is should one take the correct classification of the failed companies only or the total percentage of the correct classification for the entire sample (failed and nonfailed small medium size companies).

However, if only the correct classification of the failed companies have to be taken as a criterion to choose the best model, and up to two years before failure, which is quite enough time for action to be taken before the event of failure, it is clear that discriminant function two is the best one, which correctly classifies 93.3% of failed companies in the first year before failure and 83.3% in the second year. It also correctly classifies 88.18%, 87.27% of the sample of companies in year one and two respectively prior to failure.

TABLE 6.7

RESULTS OF TESTING THE PERFORMANCE OF DISCRIMINANT MODELS (1,2,3) YEARS PRIOR TO FAILURE OVER TIME

DISCRIMINANT FUNCTION *	YEAR PRIOR TO FAILURE	PERCENTAGE OF CORRECT CLASSIFICATION			NUMBER OF THE COMPANIES	
		F	NF	TOTAL	F	NF
DFY1	1	93.3	95.0	94.55	30	80
	2	73.3	92.5	87.27	30	80
	3	26.7	84.8	68.81	30	79
	4	33.3	82.1	68.52	30	78
	5	28.0	84.6	70.87	25	78
DFY2	1	93.3	86.3	88.18	30	80
	2	83.3	88.8	87.27	30	80
	3	53.3	88.6	78.90	30	79
	4	50.0	79.5	71.30	30	78
	5	68.0	82.1	78.64	25	78
DFY3	1	80.0	75.0	76.36	30	80
	2	73.3	76.3	75.45	30	80
	3	76.7	77.5	77.27	30	80
	4	76.7	87.2	84.26	30	78
	5	80.0	87.2	85.44	25	78

* DFY1, DFY2, DFY3 represent the discriminant function one, two, and three years prior to failure respectively from stage one.

The discriminant function one, correctly classified 93.3%, 73.3% of failed companies in the first and second year respectively before failure, but its total percent of correct classification for the first year is superior to DFY2 (94.55%), and in the second year had the same result (87.27%) .

It was thought however to test all the three discriminant models on a new sample of failed and nonfailed small medium sized companies in order to reach a precise decision of choosing the best discriminant model, and that will be the subject of the next section.

6.3.3 TESTING THE DISCRIMINANT MODELS ON THE VALIDATION SAMPLE.

Classification of the original sample using the parameters of the model is generally expected to measure the predictive ability of the model and is expressed as the proportion of correct classifications over the total sample size. Many researchers, however, considered that this method of assessing the groups from which the model was originally generated may be biased and lead to overly optimistic estimation of how well the model would perform the whole population of companies.

It was, however considered that at this stage, that any model is basically explanatory as it is tested on the groups from which it was originally derived. Only when new companies are classified by applying the model would the model then become predictive in nature. It was therefore, decided to test the three models rigourously on a new sample drawn from the Exstat Tape which comprised ten failed and fifty-six nonfailed small-medium sized companies, selected on the same bases of selection as the analysis sample.

A list of these failed companies, together with the date of failure, date of last report, type of failure and the elapsed time between the last report and the date of failure are given in table 6.8.

The data required to test the three discriminant models on the validation sample was extracted from the Exstat Tape up to five years before failure. The results of this test are given in Table 6.9. It is obvious that the accuracy of the model two years prior to failure is better than any of the two others. This model correctly classified 80% of the failed companies in year one and two prior to failure, 66.7%, 55,6%, 44.4% in years 3, 4, 5 before failure respectively, however if the results given in Table 6.7 should be also taken in to account when considering the selection of the best discriminant model among the three models, this model was nearly the best even at that stage , because of the instability of the performance of DFY3 over time. The same problem arose with this model in the validation test (see Table 6.7 and 6.9).

Moreover the correct classification of model DFY2 on the validation sample for years 3, 4, and 5 prior to failure is superior for the same years when it tested over time on the original sample, with the exception of the fifth year prior to failure.

Since this study is concerned with developing a model to help predict failure of small-medium sized companies as soon as possible in order to take the corrective action before the event of failure, the discriminant model two years prior to failure was considered the "best" overall discriminant model.

Indeed, this model was capable to classify correctly 67 percent of failed companies in validation sample three year before failure. That means it gives a two year lead time in which necessary action could have made to try to prevent the failure of companies.

TABLE 6.8

A LIST OF FAILED COMPANIES USED TO VALIDATE THE DISCRIMINANT MODELS

	COMPANY NAME	DATE OF FAILURE	DATE OF LAST REPORT	MONTHS ELAPSED BETWEEN FAILURE & LAST
1	Ellenroad Mill	RA: 29.01.84	31.03.83	10
2	Metamec Jentique	RA: 30.06.84	30.06.83	12
3	Spencer George	RA: 04.05.84	31.12.83	4
4	W Ribbons Holding	VL: 23.05.86	30.06.83	35
5	Allen (W.G.) & Sons (Tipton)	RA: 30.06.85	31.03.84	15
6	Cocksedge (Holdings)	RA: 28.02.85	31.03.84	11
7	Herman Smith	RA: 30.06.85	30.06.84	12
8	Lifcare International	RA: 29.06.86	31.12.84	18
9	Nova (Jersey) Knit	RA: 03.01.87	31.03.84	33
10	Castle (G.B.)	RA: 29.05.86	26.7.85	10

RA = Receiver Appointed VL = Voluntary Liquidation

TABLE 6.9

% OF CLASSIFICATION RESULTS BASED ON VALIDATION SAMPLE

YEAR PRIOR TO FAIL	DFY1			DFY2			DFY3 (1)		
	F	NF	TOTAL	F	NF	TOTAL	F	NF	TOTAL
1	70	100	95.4	80	94.6	92.4	70	75	74.2
2	60	92.9	87.9	80	83.9	83.3	50	75	71.2
3	44.4	80	75	66.6	74.5	73.4	44.4	64.3	61.5
4	33.3	83.9	76.9	55.6	76.4	73.4	55.6	64.3	63.1
5	33.3	80.4	73.9	44.4	69.6	66.2	55.6	62.5	61.54

(1) F denote failed companies and NF nonfailed companies.

The best discriminant function chosen was:

$$Z = 0.526 + 4.997\ R_3PR - 7.751\ R_6GE + 0.142\ R_{10}TR$$
$$+0.810\ R_{11}TR + 1.96\ R_{14}TR + 3.725\ R_{20}LQ$$
$$+2.083R_{21}LQ$$

where

R_3PR = Net Income / Net Worth

R_6GE = Total Liabilities / Total Assets

$R_{10}TR$ = Sales / Net Worth

$R_{11}TR$ = Sales / Total Assets

$R_{14}TR$ = Stock / Sales

$R_{20}LQ$ = Quick Assets / Total Assets

$R_{21}LQ$ = Working Capital / Total Assets

These financial ratios represent the profitability dimension (R_2PR), the financial leverage (Gearing) dimension (R_6GE), the capital turnover and activity dimension ($R_{10}TR$, $R_{11}TR$, $R_{14}TR$), and finally the liquidity dimension ($R_{20}LQ$, $R_{21}LQ$). The centroid of the groups is failed Z= -1.70
and nonfailed Z= 0.64 , the range -1.7 to 0.64 is called the "grey zone" . A cut-off score of Z=0 was selected by adjusting the value of the constant. When using the model proper interpretation of the Z-score is very important. A score below zero does not mean that a company will fail , but merely implies that it exhibits characteristics similar to those of past failures. Companies in the grey area together with those of a score below zero required closer analysis, including an examination of the trend of

z-scores in previous accounting periods. A steady decline in the z-score would certainly indicate a high probability of failure.

It is interesting to have a measure of the individual importance of every variable in the "best" discriminant model. However, one useful technique in getting the final variable profile for measuring the contribution of each variable in the discriminant function is by ordering the standardised coefficients . This method is available on $SPSS^x$ and it is similar to multiple regression analysis. The standardised coefficients associated with each discriminant variable is a measure of its contribution to the discriminatory power of the function. Table 6.10 presents the contributions of each variable in the "best" discriminant function. It can be seen from this table that The gearing ratio R6GE and the profitability ratio R3PR, appear to be equally important contributors to the total discriminating ability of the model. They ranked the first and second respectively. The third and forth ratios are the capital turnover and activity ratio R10TR and R11TR, while the liquidity ratios R20LQ and R21LQ ranked the fifth and sixth. The remaining capital turnover and activity ratio R14TR ranked the seventh.

Another method of measuring the individual importance of each variable is to compute the mean of every variable in both sets of failed and nonfailed

companies and then perform an F-test which is the relevant one here for a significant difference between the means. This test relates the difference between the mean values of the ratios in each group to the variability of values of the ratios within each group. The results of this test are presented in table 6.11.
It can be seen from this table that there is a highly significant difference between the means of the R3PR, R6GE, R10TR, R20LQ and R21LQ, whereas there is no significant difference between the means of variable R11TR and R14TR is significant only at the 10% level.

However, table 6.10 shows these two variables ranked the forth and seven most important contributors to discrimination between the two groups respectively. This is an indication of the importance of the multivariate approach to this kind of problem. In other words using the traditional univariate analysis, R11TR would not have been identified as an important variable when searching for companies in danger of failure.

More detailed discussion on the significance and the importance of financial ratios which entered the best discriminant function DFY2 together with those in DFY1 are presented in section 6.4 along with a plot of their five year trends for both failed and nonfailed companies.

TABLE 6.10

THE CONTRIBUTION OF EACH FINANCIAL RATIOS IN THE "BEST" DISCRIMINANT FUNCTION

FINANCIAL RATIOS	FINANCIAL DIMENSION	STANDARDISED COEFFICIENTS	RANKING
R3PR	Profitability	1.280	2
R6GE	Financial leverage	-1.284	1
R10TR	Capital turnover & Activity	0.765	3
R11TR	Capital turnover & Activity	0.501	4
R14TR	Capital turnover & Activity	0.375	7
R20LQ	Liquidity	0.482	5
R21LQ	Liquidity	0.423	6

TABLE 6.11

THE DIFFERENCES IN MEANS OF FINANCIAL RATIOS WHICH

ENTERED THE BEST DISCRIMINANT FUNCTION

FINANCIAL RATIOS	MEAN VALUE OF FINANCIAL RATIOS FOR		F STATISTIC	SIGNIFICANT
	FAILED COMPANIES	NONFAILED COMPANIES		
R3PR	-16.991	9.661	23.91	0.0000
R6GE	64.012	42.898	38.01	0.0000
R10TR	591.852	358.147	5.801	0.0177
R11TR	155.241	159.773	0.617	0.9802
R14TR	26.925	19.641	2.994	0.0864
R20LQ	30.860	37.921	6.048	0.0155
R21LQ	9.329	28.471	21.79	0.0000

6.4 GENERAL TRENDS OF FINANCIAL RATIOS ENTERING MODELS ONE AND TWO YEARS PRIOR TO FAILURE.

It was thought not only to present the trends of variables that entered the best discriminant model but also the trends of the variables in discriminant model one year prior to failure. The reason for this was that the model was the best in stage one of the analysis. Hopefully this will help to understand the reason why its classification accuracy declined in predicting the failed companies overtime and as well as in the validation sample, despite its overall performance on the sample being better than the discriminant model two year prior to failure. These two models used in total, twelve unique variables from the original set of twenty two entering the discriminant function one and two years prior to failure. This section graphically presents five years trends for each of these along with discussion of their significance. Tables 6.12 and 6.13 contain the numerical value of these variables for each year prior to failure.

The magnitude, too high or too low, of some ratios are indicative of various types of problems. However, caution should be exercised as ranges for many ratios vary between and within industries. Also, trends presented here are based on averages, and might obscure large variations.

The plot of net income to total assets (R2PR) appears in Figure 6.4. This ratio is a measure of profitability and may be regarded as a measure of long-term viability of the company, that is of its viability both to generate the funds required to support its continuation and expansion and its attractiveness to potential lenders and providers of new capital. Examination of Figure 6.4 shows clearly that the failed companies had a sharp decrease in this ratio between the third and second years before failure and between the second and first year which indicate their inability to continue in business, while for the nonfailed companies this ratio was more stable during the same time period.

The plot of net income to net worth (R3PR) appears in Figure 6.5. This ratio is a fundamental test of true profitability. It measures the return applicable to shareholders after the deduction of interest payments to creditors. The graph indicates that the failed companies had a large decrease in this ratio especially from third years to first year prior to failure, which means they were suffering from big losses on one hand, and decreasing equity on the other hand (see Table 6.5), while the nonfailed companies had increasing values of this ratio through the fifth year to first year.

TABLE 6.12

MEANS OF SELECTED FINANCIAL RATIOS FOR FAILED COMPANIES

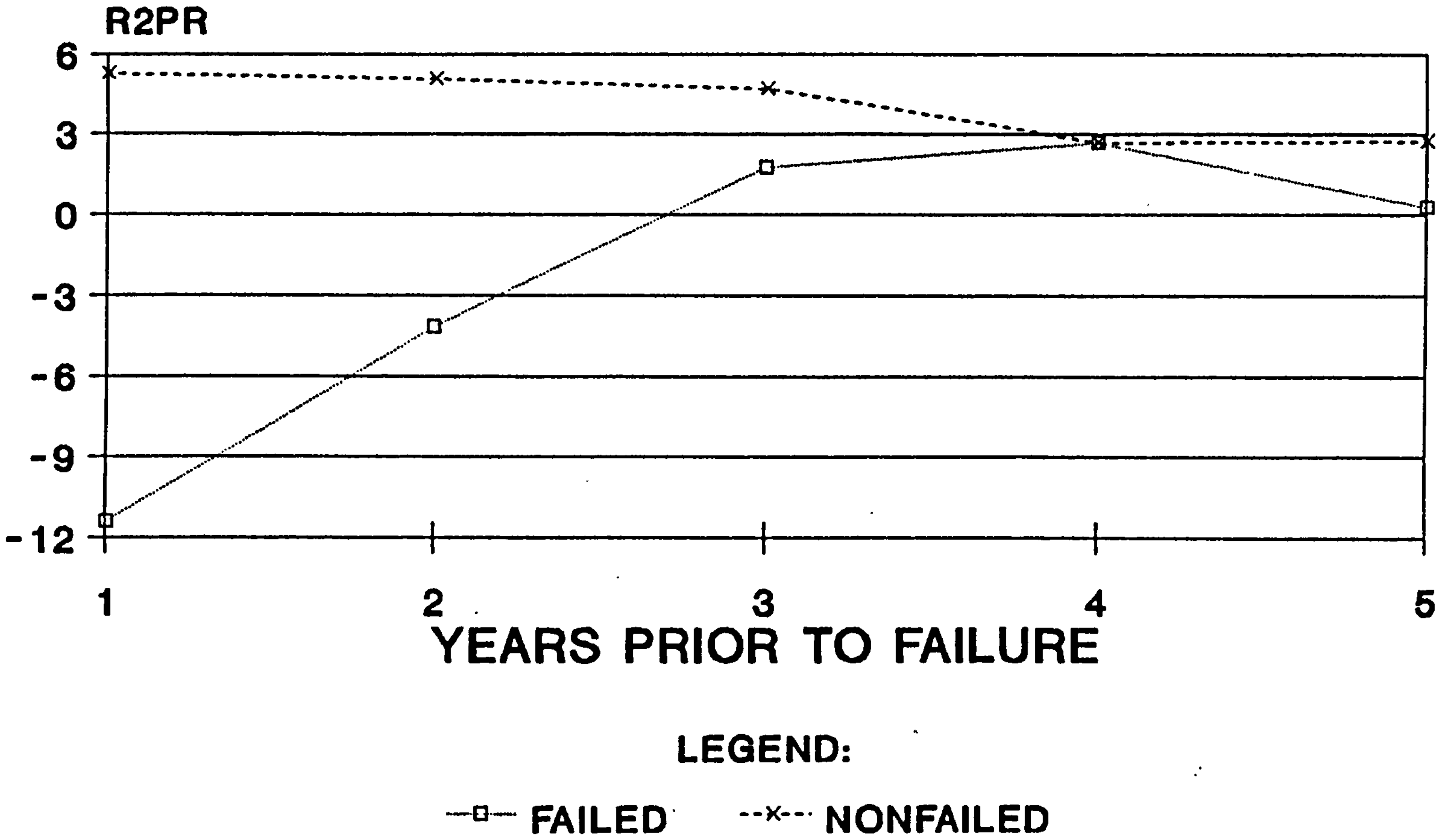
FINANCIAL RATIOS	YEARS PRIOR TO FAILURE 1	2	3	4	5
R2PR	-11.413	-4.180	1.774	2.677	0.295
R3PR	-41.202	-16.991	8.106	-15.484	-3.678
R4PR	-6.347	-0.246	5.323	7.742	4.273
R5PR	-12.163	-4.712	4.917	5.461	2.511
R6GE	68.853	64.012	59.441	62.590	59.756
R7GE	70.937	73.699	86.997	76.090	82.906
R10TR	961.054	591.852	370.573	650.257	460.628
R11TR	150.184	155.241	147.276	156.441	142.184
R12TR	440.744	520.272	480.348	490.005	446.647
R14TR	21.785	26.925	21.531	22.690	22.344
R20LQ	29.196	30.860	31.183	32.759	31.682
R21LQ	-0.255	9.329	14.216	13.677	13.769

TABLE 6.13

MEANS OF SELECTED FINANCIAL RATIOS FOR NONFAILED COMPANIES

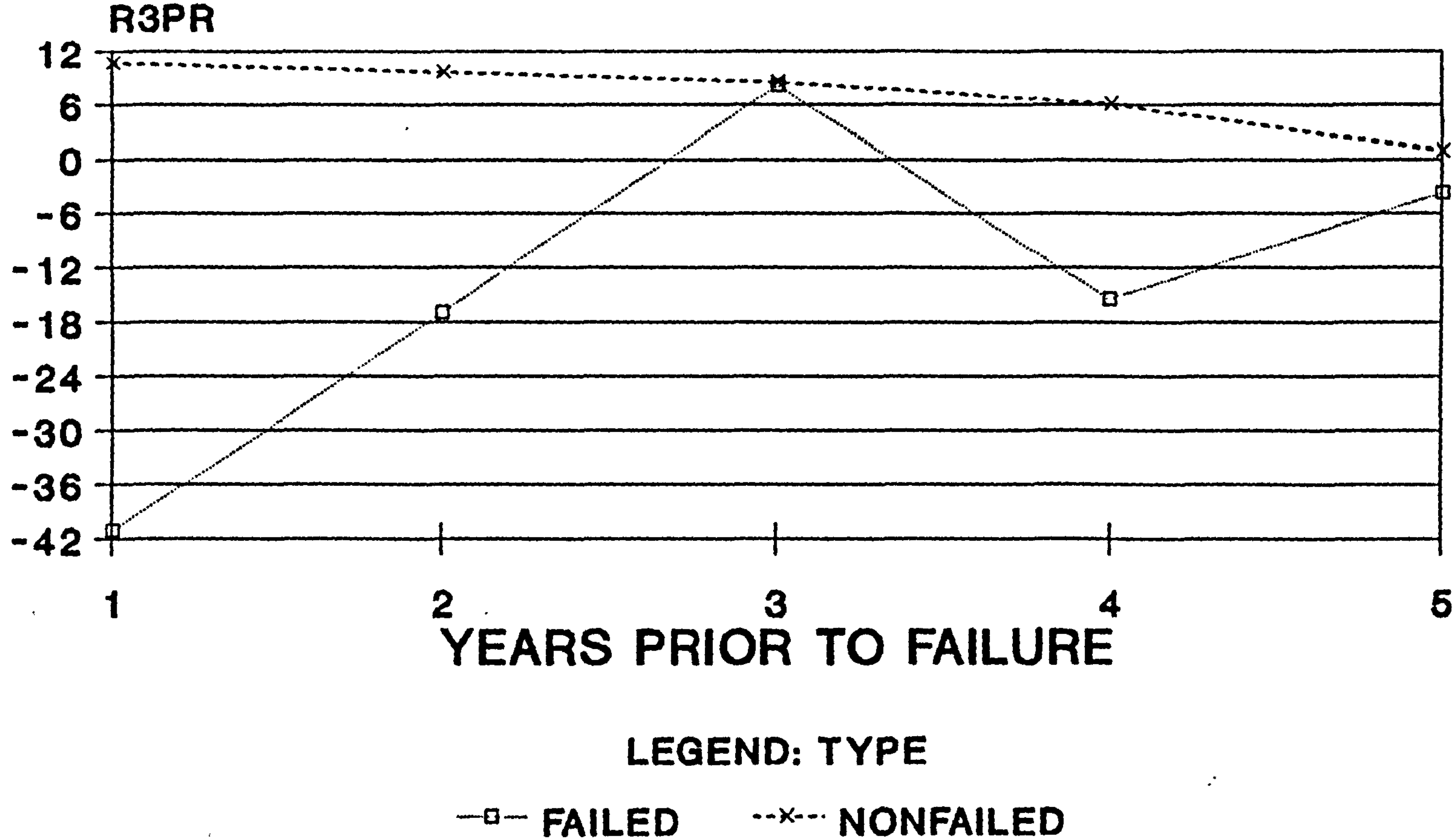
FINANCIAL RATIOS	YEARS PRIOR TO FAILURE 1	2	3	4	5
R2PR	5.281	5.080	4.684	2.683	2.755
R3PR	10.692	9.661	8.478	6.041	0.900
R4PR	9.535	9.134	8.298	5.791	6.295
R5PR	13.848	13.659	16.530	10.590	9.150
R6GE	43.112	42.898	41.832	41.326	41.847
R7GE	169.919	191.874	380.858	264.858	237.926
R10TR	343.790	358.147	378.036	382.764	402.605
R11TR	154.401	159.773	156.954	154.046	155.809
R12TR	738.852	756.554	752.735	696.716	737.233
R14TR	18.500	19.641	18.646	19.939	20.447
R20LQ	38.275	37.921	39.840	38.522	37.420
R21LQ	29.327	28.471	29.638	29.933	29.968

FIGURE 6.4
PLOT OF MEAN NET INCOME TO TOTAL ASSETS RATIO *100 FOR F & NF COMPANIES



F = FAILED NF = NONFAILED

FIGURE 6.5
PLOT OF MEAN NET INCOME TO NET WORTH RATIO *100 FOR F & NF COMPANIES

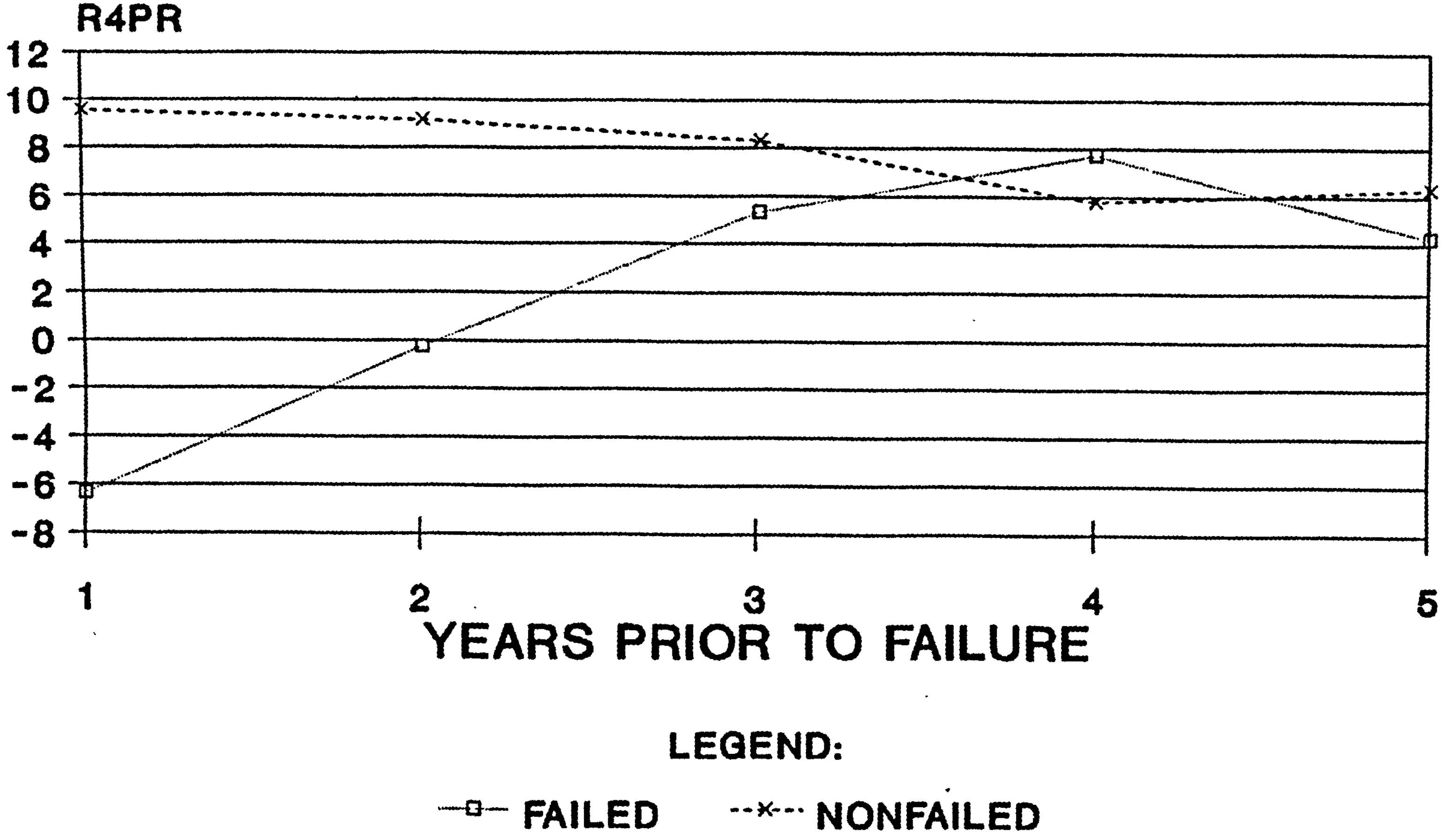


F = FAILED NF = NONFAILED

Figure 6.6 portrays the earnings before interest and taxes to total assets ratio (R4PR). This ratio measures the return on total assets before interest payment on debt and tax payments. As a rule, the higher this ratio the better utilisation of the assets. For the failed companies, this ratio decreased as the time of failure approached (except for the fourth year) and it was negative two years and one year prior to failure. Generally speaking as earnings continue to decline, the ability to obtain financing also declines and thus accelerates the demise of a company.

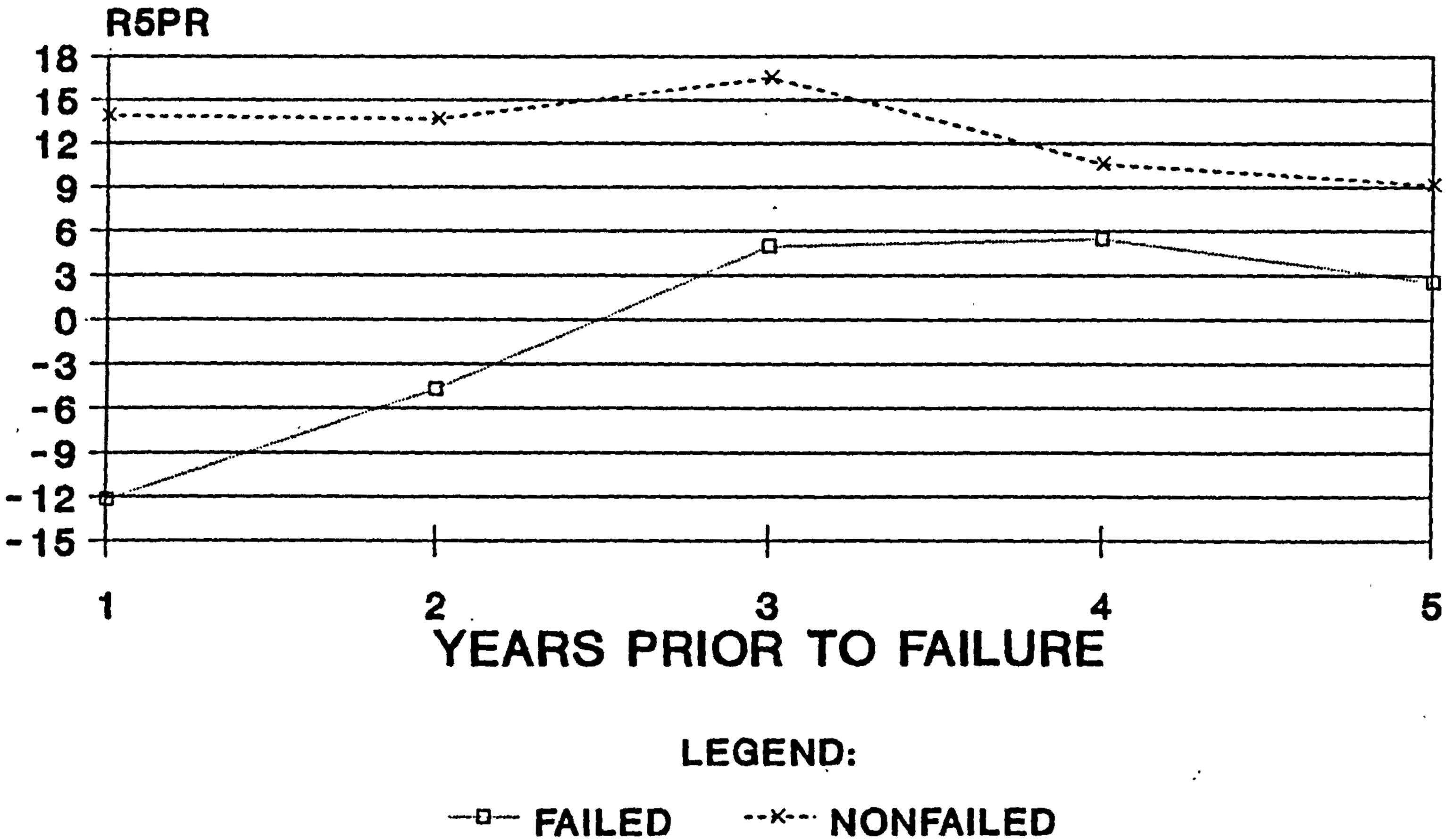
Figure 6.7 presents the trend between net income to total liabilities (R5PR). This ratio does not differ from the other profitability ratios discussed above which all indicate a large and sharp decrease for the failed companies as the time of failure approached, and even become negative particularly from the third year to final year before failure, while nonfailed companies maintained a relatively constant and higher ratio through the five years prior to failure. However, this is a clear indication that the profitability dimension, which is the net result of a large number of policies and decisions, gives some insight into the effectiveness of a company's management.

FIGURE 6.6
PLOT OF MEAN EBIT TO TOTAL ASSETS
RATIO * 100 FOR F & NF COMPANIES



F = FAILED NF = NONFAILED

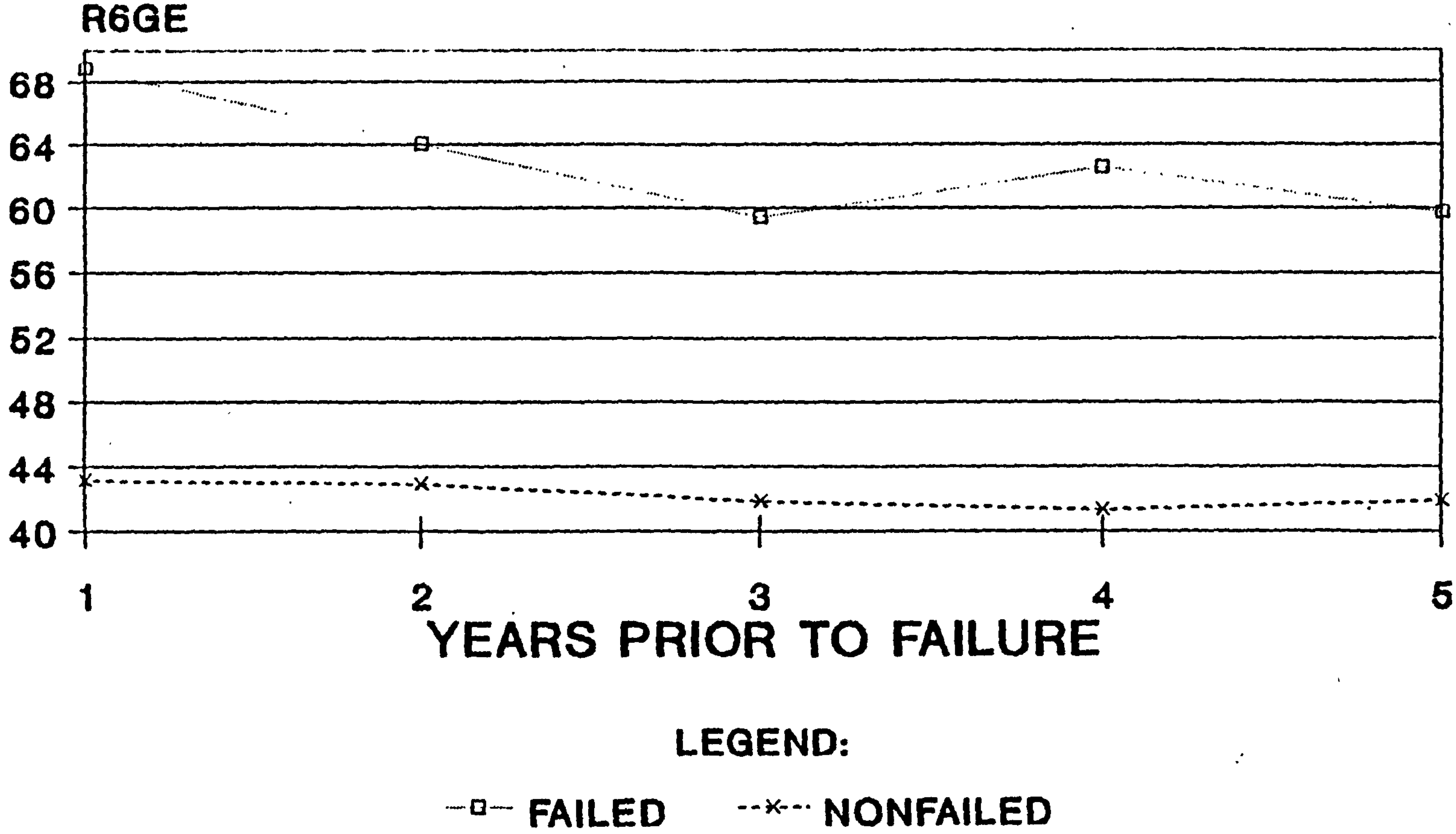
FIGURE 6.7
PLOT OF MEAN NET INCOME TO TOTAL LIABILY RATIO * 100 FOR F & NF COMPANIES



F = FAILED NF = NONFAILED

The trend between total liabilities to total assets (R6GE) is plotted in Figure 6.8. However total assets being based on book values are vulnerable to the effects of inflation. This ratio, generally called the debt ratio which measures the percentage of total funds that have been provided by creditors.
Creditors generally prefer moderate debt ratios, since the lower the ratio the greater the cushion against creditors' losses in the event of liquidation. Private companies are generally likely to be more highly geared than public companies which had the option available to raise more equity on the Stock Exchange. Private companies also tend to be more risk averse since they are generally funded by a few people. In circumstances that the owners'stake in their companies is large relative to the fund provided by creditors, their speculating activity may either yield a high return on assets or alternatively can result in a substantial loss to themselves and at the same time small losses to the creditors. For large companies, which have a large number of share holder, losses or gains to individual shareholders are expected to have a less effect in terms of the impact on each one. Beaver (1966) found this ratio to be the third best predictor of failure. In his study the mean of this ratio increased sharply five years prior to failure for the failed companies, whereas for the nonfailed it remained stable.

FIGURE 6.8
PLOT OF MEAN TOTAL LIABILITIES TO TOTAL ASSETS RATIO * 100 FOR F & NF COMPANIES

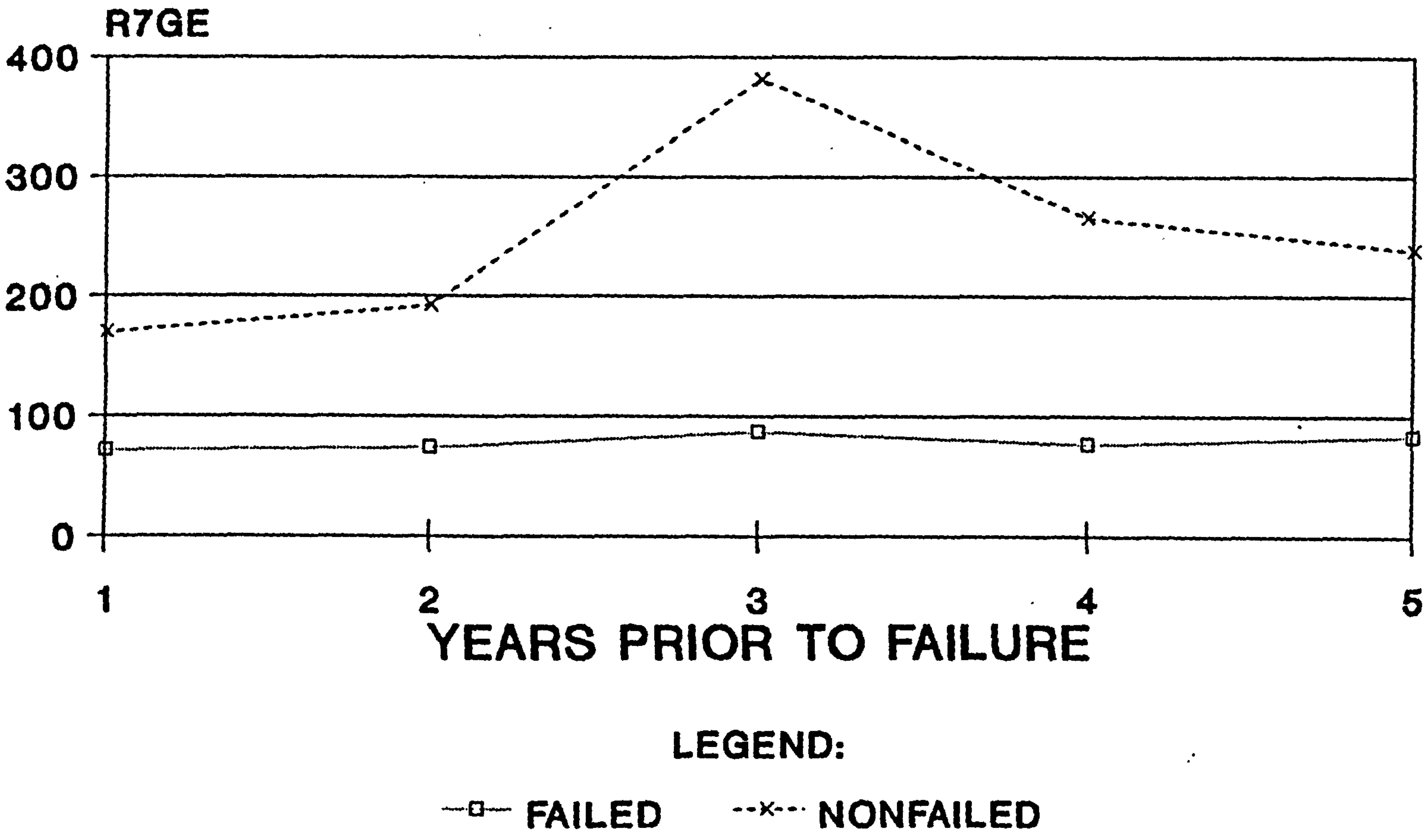


F - FAILED NF - NONFAILED

In this study however the situation is the same regarding the nonfailed companies which maintained a relatively constant and smaller ratio than the failed companies five years prior to failure, while for the failed companies a substantial increase in this ratio occurred between the third and second years prior to failure, and between the second and final year before failure. The trend of this ratio supports the fact, that the failed companies obtained more funds through long-term financing than through the equity markets,(see Table 6.5). Another point worth mentioning is that the mean of this ratio in Beaver's study for nonfailed companies one year prior to failure was around 0.37 as compared to 0.79 for failed companies. Whereas in this study it was 0.43 for the nonfailed companies and 0,69 for failed companies during the same period.

The relationship between net worth to total liabilities (R7GE) is plotted in Figure 6.9. Generally speaking the higher this ratio the more solvent is the company . For example, if the net worth of a company is £1000 and its total liabilities £500 , that means it could experience a two-thirds decline in asset value before insolvency, while the same company with £250 in net worth will be insolvent if its assets decline only one-third in value. This ratio is a measure of financial gearing or in U.S.A. leverage.

FIGURE 6.9
PLOT OF MEAN NET WORTH TO TOTAL LIABILTY RATIO * 100 FOR F & NF COMPANIES



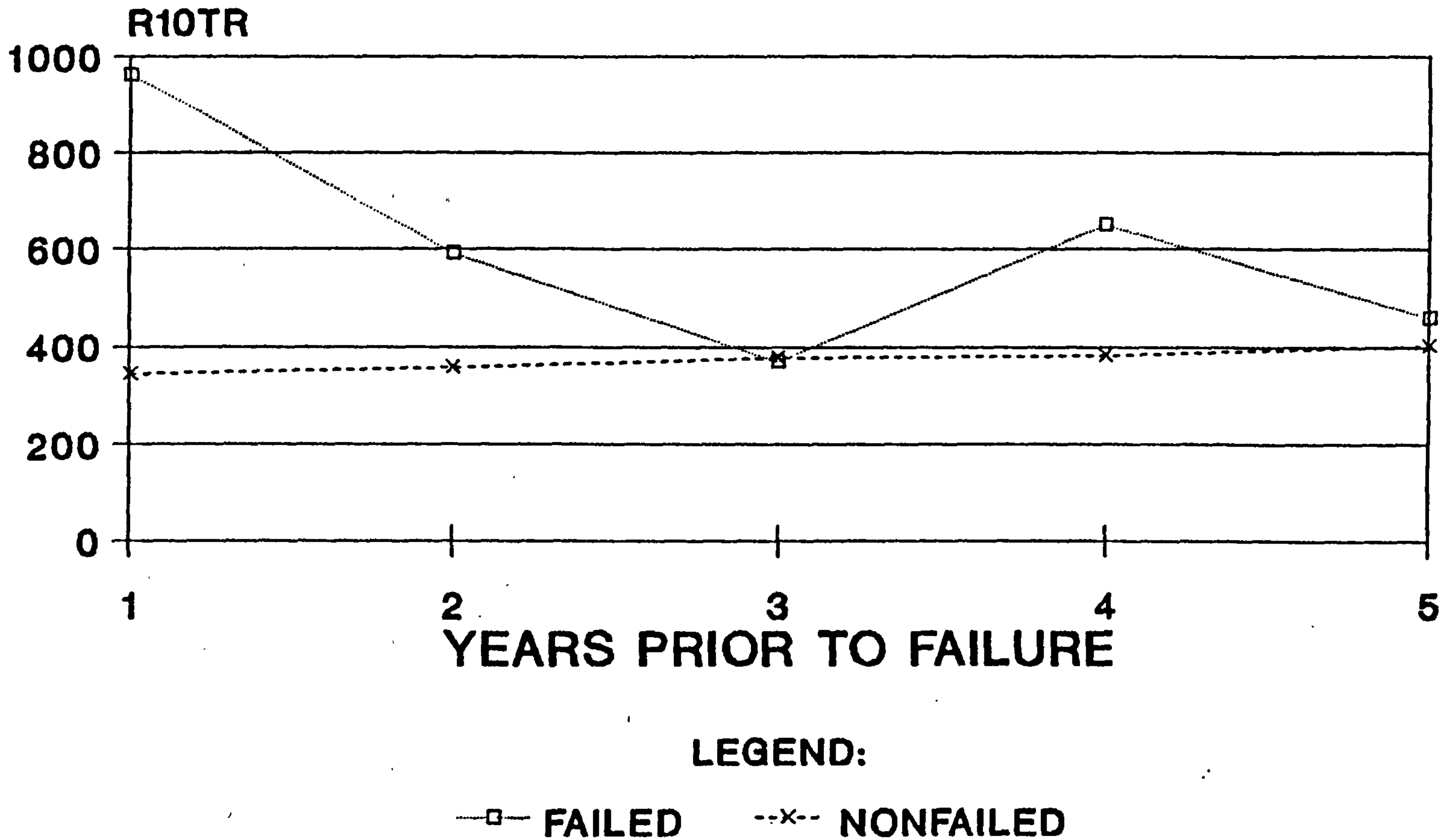
F = FAILED NF = NONFAILED

The graph illustrates the percentage of the total assets that are financed. The nonfailed companies had a higher ratio through five years prior to failure, while the failed companies had a lower ratio during the same time which indicate they are more heavily geared than the nonfailed companies.

The graph of sales to net worth (R10TR), a capital turnover and activity ratio is presented in figure 6.10. This ratio indicates the activity of the investment in a business. The level of this ratio varies significantly depending on the nature of the industry. For example a heavy engineering industry will have a lower ratio than a service industry because it would need substantial capital investment. However, a large increase in this ratio may indicate an increased volume of business but the company may be operating on a thin margin of invested capital and over usage of credit available, and the company may not realise it is overtrading.

This can be seen to be more the situation for failed companies by examining Figure 6.10 and Table 6.5. It is clear from Figure 6.10 that this ratio for failed companies five years prior to failure was nearly at the same level as for nonfailed companies, then it goes up in the forth years before failure to become very close to the same level of nonfailed companies by the third years before failure.

FIGURE 6.10
PLOT OF MEAN SALES TO NET WORTH RATIO * 100 FOR FAILED & NONFAILED COMPANIES

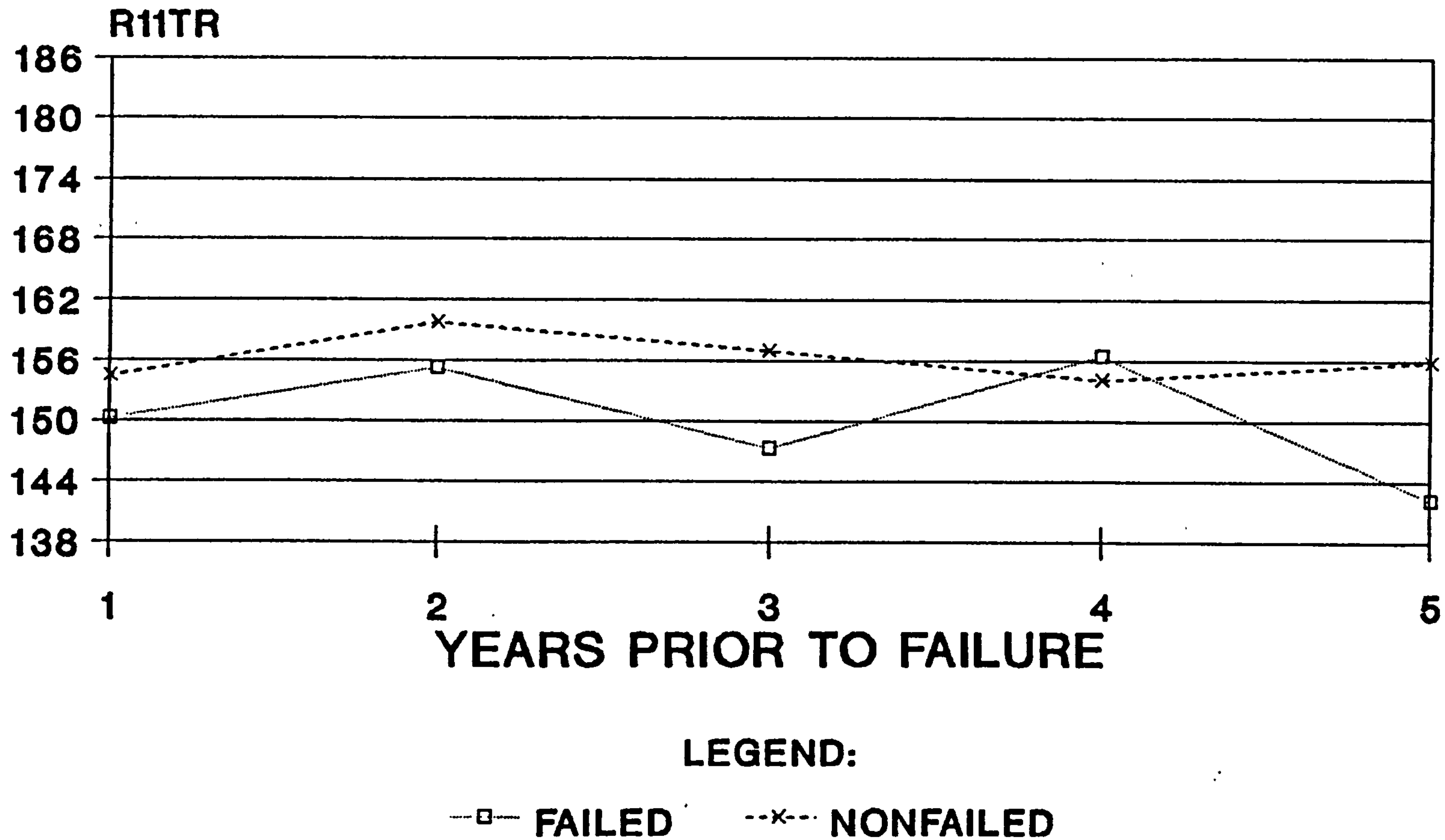


A sharp increase in this ratio appears between the third and second years, and between the second and final year prior to failure, while this ratio for nonfailed companies remained nearly stable through the same period.

The sales to total assets ratios (R11TR) is a measure of the activity of the assets and the efficient of the company to generate revenue from its assets; Figure 6.11. A higher ratio indicates more efficiency. During the five years prior to failure, the failed companies had a lower percentage of sales generated from their assets base, except for the forth years before failure, which suggest inefficient use of the assets.

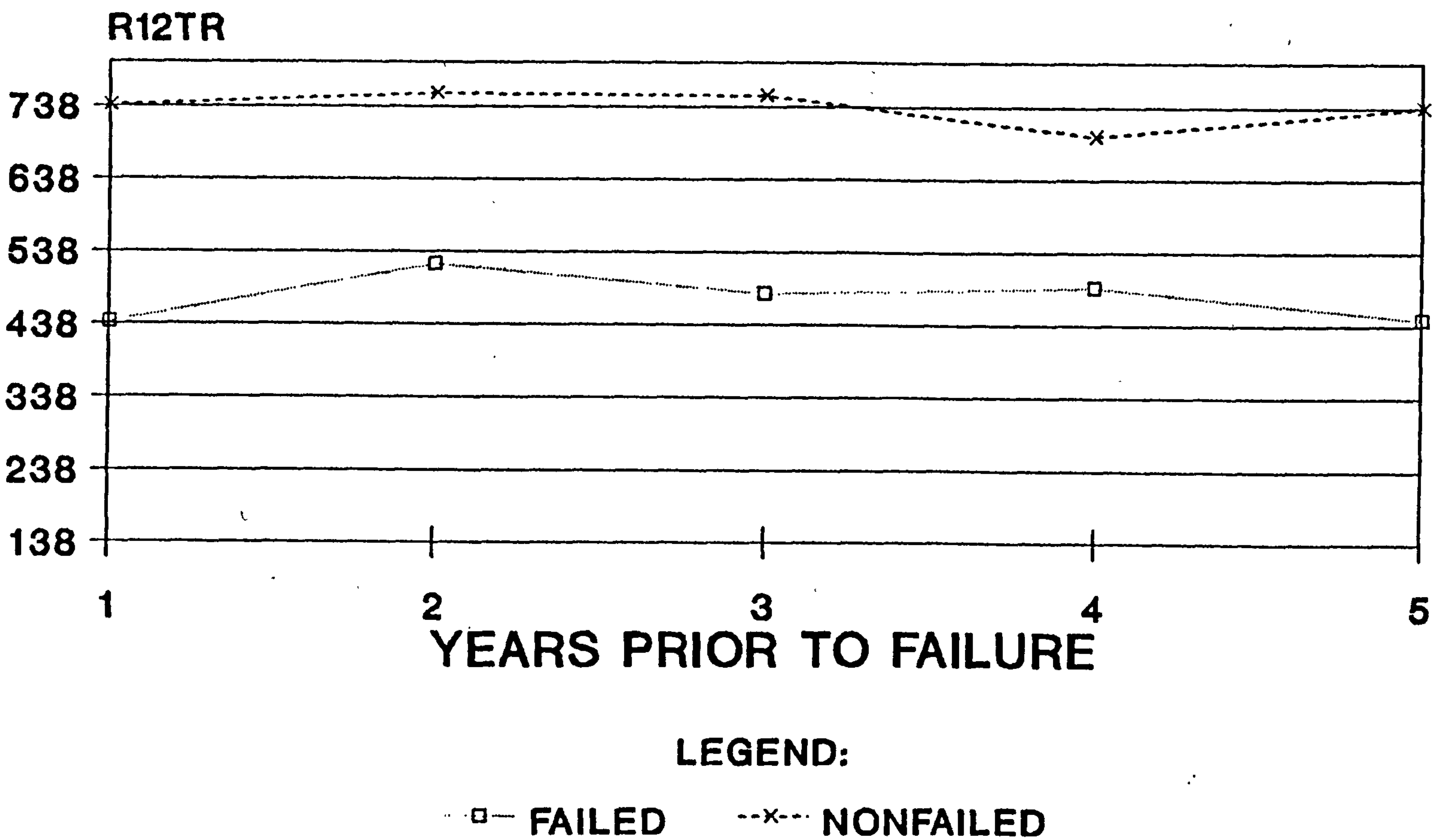
The plot of sales to fixed assets (R12TR) is presented in Figure 6.12. Again it can be seen that nonfailed companies maintained a higher percentage and were relatively constant during the five years prior to failure, while failed companies had a lower percentage through the same period. Caution however, should be taken when interpreting this ratio, as fixed assets being based normally on historic cost and sales on the current year's selling price, so when compared may be distorted. Further, the fixed assets figures of companies are affected in different way by changing prices, including the frequency of purchase and revaluations to current figures. For example land and buildings may be revalued for balance sheet purposes.

FIGURE 6.11
PLOT OF MEAN SALES TO TOTAL ASSETS
RATIO * 100 FOR F & NF COMPANIES



F = FAILED NF = NONFAILED

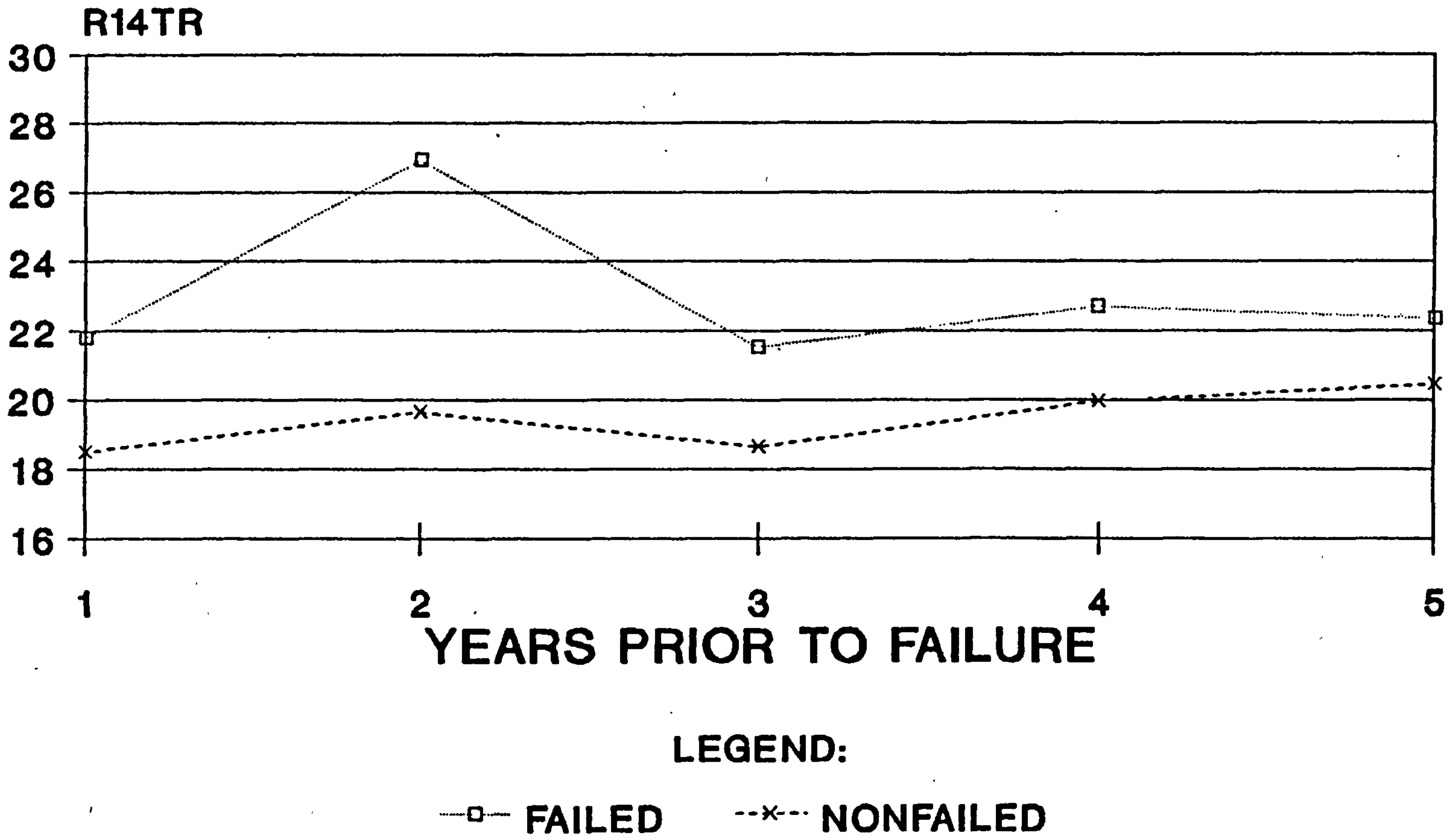
FIGURE 6.12
PLOT OF MEAN SALES TO FIXED ASSETS
RATIO * 100 FOR F & NF COMPANIES



F = FAILED NF = NONFAILED

Figure 6.13 is a plot of the relationship of the changes in the stock (inventory) to sales ratios (R14TR). This ratio is one measure of efficiency in employing inventory. While inventory is quite sensitive to changes in business activity. Inventory which is not in balance with business activity can create increased costs, production disruptions, ... etc. The graph indicates that the failed companies had a large increase in the percentage of inventory carried relative to net sales between the third and second years prior to failure. Then, between the second and final year before failure, the failed companies reduced inventory relative to sales. whereas for the nonfailed companies, this ratio seems to be stable through the five years before failure. In addition to unbalanced inventory with business activity , the inventory comprise stocks of raw materials, purchased components, work in progress and finished goods. As such this ratio is expected to vary significantly between industries. An above average level for the industry concerned means that too much inventory is being held and is not normally earning an adequate return. However, if replacement cost is rising fast useful gains may be earned in holding inventory. furthermore it may be an advantage due to tax reasons if a high inventory figure in the balance sheet produces inventory relief.

FIGURE 6.13
PLOT OF MEAN INVENTORY TO SALES RATIOS * 100 FOR F & NF COMPANIES

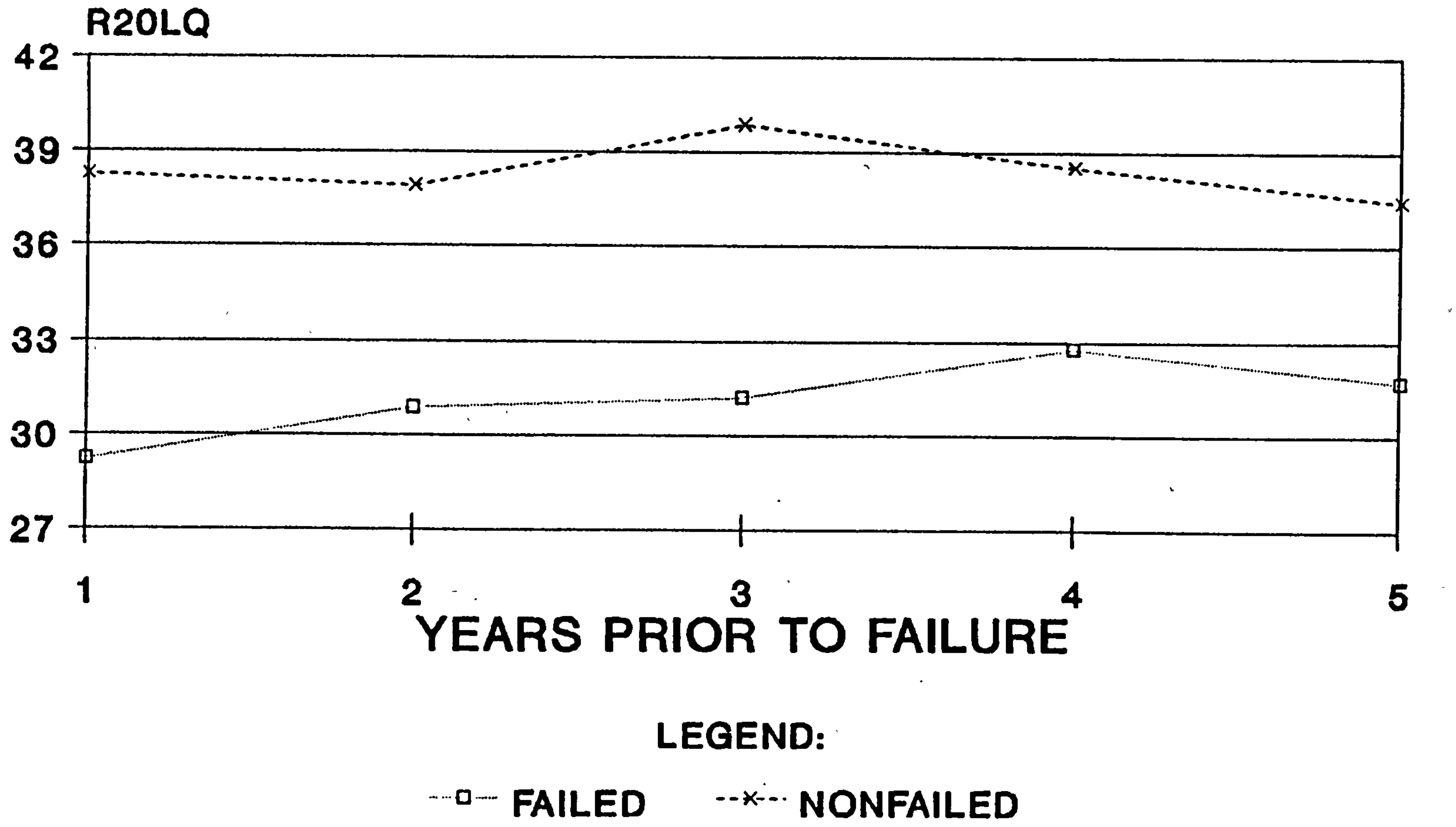


F = FAILED NF = NONFAILED

The quick assets to total assets ratio R20LQ, is a measure of liquidity position of the company. A plot of this ratio is presented in Figure 6.14. The quick assets are the items of current assets excluding the stock and work in progress, which potentially can be converted into cash. The higher the ratio, the higher the liquidity position of the company, and the greater the ability of a company to meet its short-term financial obligations when and as they fall due. However, examining Figure 6.14 clearly indicates, that nonfailed companies maintained a higher percentage of quick assets relative to total assets through five years prior to failure, while failed companies had a lower percentage of quick assets relative to total assets during the same period, and moreover a large decrease in this ratio is quite clear between the forth year and final year prior to failure which support the weakness position of liquidity of the failed companies.

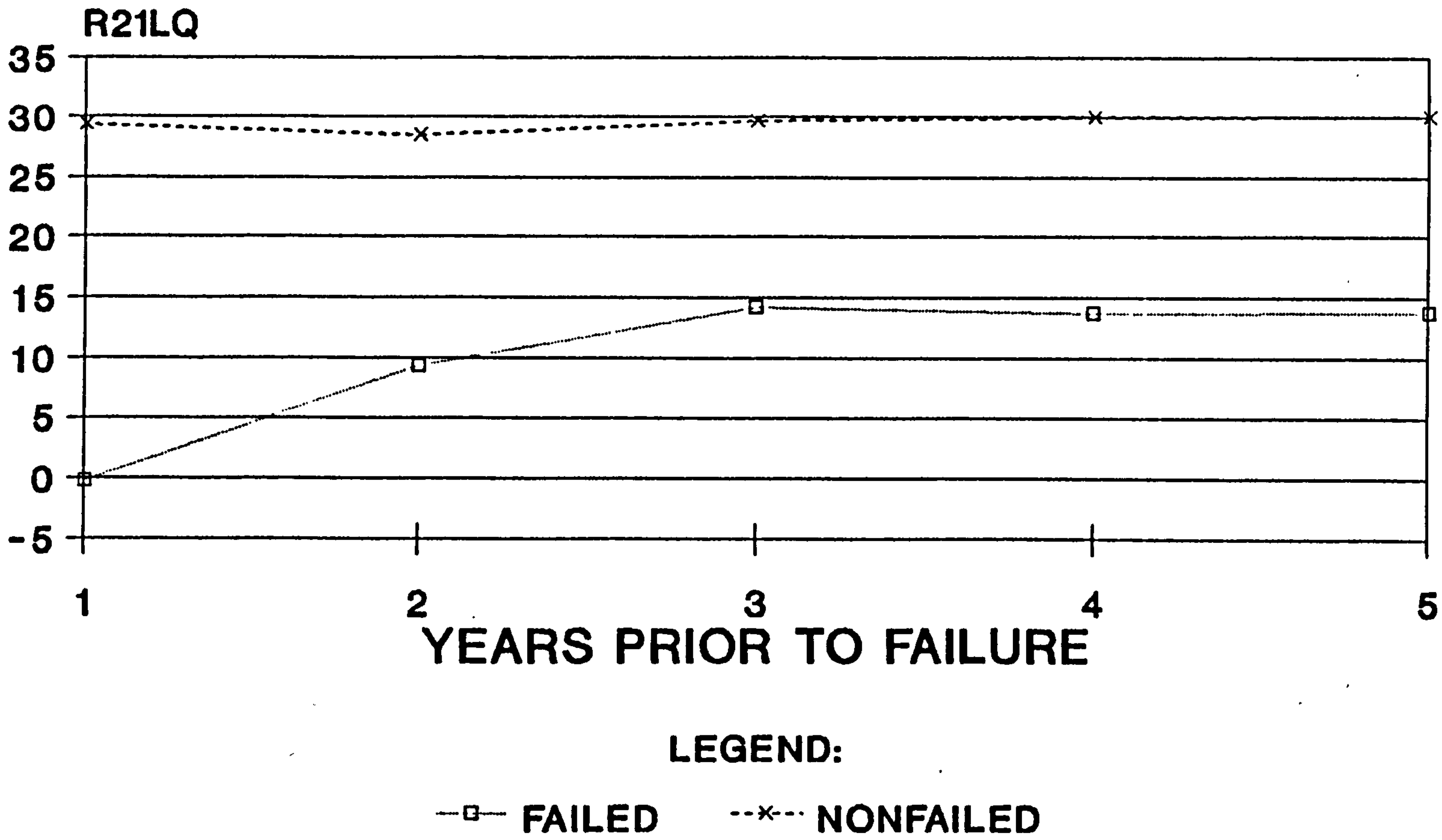
A plot of working capital to total assets ratio, R21LQ, is presented in Figure 6.15. This ratio is a measure of the net liquid assets of the company relative to the total assets. Working capital is the surplus of the current assets which can be realised in the short run, over and above those needed to meet short-term claims on the company.

FIGURE 6.14
PLOT OF MEAN QUICK ASSETS TO TOTAL ASSET RATIO * 100 FOR F & NF COMPANIES



F = FAILED NF = NONFAILED

FIGURE 6.15
PLOT OF MEAN WORKING CAPITAL TO TOTAL ASSETS RATIO * 100 FOR F & NF COMPANIES



F = FAILED NF = NONFAILED

Ordinarily, a company suffering from operating losses will have shrinking current assets in relation to total assets, and this is really the situation for the failed companies when the examination of profitability ratios ; Figure 6.4 to 6.6 ; was discussed earlier in this section. As a rule, the higher this ratio the better the ability of the company to meet its current obligations as and when they fall due. For the failed companies, this ratio decreased as the time of failure approached and was negative one year prior to failure, while the nonfailed companies maintained a relatively constant ratio. This ratio was found to be the best indicator differentiating between failed and nonfailed companies by Smith (1930), Smith and Winakor (1945) and by Merwin (1942), in their univariate studies, whereas Altman found this ratio to be the most valuable among the three liquidity ratios evaluated in his study in 1968.

6.5 THE PERFORMANCE OF DFY2 ON THE VALIDATION SAMPLE:

This section is concerned with testing the effectiveness of model DFY2 in identifying failed companies that have not been used in the construction of the model. It should be recalled that the main reason for constructing the discriminant model is to help to identify failing companies as soon as possible in order to take appropriate action to reverse the failure process before it could be too late.

As this is the case, therefore the trend in companies' z-scores would be useful in predicting the future z-scores. However, it is worth mentioning that a company might not have a negative z-score and therefore not have a financial profile of a failed company, but when examining its z-score trends, a negative z-score could be expected next year, which indicates action should be taken in advance to prevent the impending failure.

The method of presenting the z-scores is to compute the z-scores of failed companies for which published accountancy data is readily available and to plot these z-scores against time. However the literature on z-scores generally does not present an analysis of the effectiveness of the discriminant models in identifying failing companies whose published accounting data was not used in their construction. Watts (1983) has criticised Taffler and Tisshaw (1977) for not having any ex-post test. In response to this criticism Taffler (1983) reexamined the performance of companies that had negative z-scores in 1975. He found that about 50% of these companies have since effectively failed. That means they have gone into receivership, have received emergency support from government, a bank or elsewhere , or have been acquired by another company to avoid receivership or have been closed. 33% of the companies at risk in his 1976 sample still had an at risk profile in 1983. Only 32% managed to recover, Betts (1984).

6.5.1 EX-POST ANALYSIS OF THE PERFORMANCE OF THE MODEL:

The required data to compute the z-scores of model DFY2 was extracted from the Exstat tape. Since companies report annually, a z-score will be computed only once a year, therefore the z-scores for each company in the failed companies set were computed and plotted against time. The graphs of the z-scores realised by DFY2 model together with graphs of the seven financial ratios appearing in the model for the same ten failed companies in validation sample are later shown as figures 6.16 to 6.35, while tables 6.14 to 6.23 contain the numerical value of these variables for each year prior to failure.

Certainly there is no conceivable functional relationship between successive annual z-scores. However, when z-scores plotted against time the user of the model will have a visual aid which may help in assessing the future of company performance. For example if z-scores have been positive but decreasing over recent years, the analyst could recognize that if the trend continued, then the company could assume a financial profile similar to companies that have failed in the past. In other words, the analyst may be able to predict when the z-score will go negative.

However out of ten failed companies comprising the validation sample , the model identified eight as having failed company financial profiles before receivers were appointed. That is correctly identify 80% of the failed companies. The two companies that were not identified were: Lifecare International figure 6.30 which failed to report for 18 months before a receiver was appointed and Nova Jersey Knit company figure 6.32 which failed to report for 33 months before a receiver was appointed.

So in both cases at least the last years accounting data were missing. However, it should be noted that both companies would have been identified if their z-score trend given by the model continued ; see figure 6.30 and 6.32. Therefore the performance of DFY2 is quite remarkable in identifying companies in danger of failure.

6.5.2 THE PERFORMANCE OF UNIVARIATE ANALYSIS IN IDENTIFYING FAILED COMPANIES:

To compare the effectiveness of z-score models in assessing the financial position of companies over the univariate financial ratios analysis, a plot of seven financial ratios comprising the discriminant model for each failed company in the validation sample was carried out for the same period of time.

Examining these graphs reveals that some of these ratios might be useful for identify failed companies. For instance, the profitability ratio R3PR appear to be a good indicator in which nine out of the ten companies have this ratio declining immediately before failure. However the question which arises here is at which value or level of this ratio would the company be considered or classified as a failed company. As this ratio measures the profitability dimension , the obvious level to choose is that R3PR to be negative. Eight out of ten companies have declining and negative value for R3PR ratio immediately before failure .

The next ratio to examine as a good indicator is the gearing ratio R6GE. Eight out of ten companies have a continuous increase in this ratio for at least three years prior to failure. The remaining two companies are Lifecare International, figure 6.31 and table 6.21, which portray a sharp increase from the fifth year to the fourth year prior to failure then a slight increase in the following three years and finally a sharp decline from the second year (75.90) to the first year (48.28) prior to failure, which could be due to creative accounting as a possible reason for unexpected final movement. The other remaining company was Nova Jersey Knit, figure 6.33 and table 6.22. The gearing ratio R6GE for this company seems to be more or less equal during the same period of time.

However, the problem to determine the level for which a company could classify as a failed company still arises. Therefore the continuous increasing of three years prior to failure might be an indication that the company is in trouble.

Examining the graphs of sales to net worth ratio (R10TR) as a useful indicator of companies' performance reveals, that nine out of ten failed companies have this ratio increasing one year prior to failure, which is quite an unexpected result for the failed companies despite a number of failed companies in the validation sample having this ratio declining as far as from the forth to the second year prior to failure. See figures (6.17, 6.23, 6.29, 6.35).

However, a detailed discussion of the significance and magnitude of this ratio was carried out in section 6.4. It was reported that it is quite difficult to determine the threshold value of this ratio because it varies significantly depending on the nature of the industry. Furthermore, if this ratio is excessive, the company is often referred to as a poor credit risk due to insufficient capital to support sales (Altman, 1968). Therefore this ratio alone is not a good indicator of company failure.

The next financial ratio to appear in the discriminant model is the sales to total assets R11TR. This ratio seems to behave in the same way as ratio R10TR and that means it cannot be used as a possible useful indicator of forecasting companies in danger of failure if it is taken alone.

Regarding the stock to sales ratio R14TR which measures the efficiency of employing the stock, again it was stated in section 6.4 that this ratio is quite sensitive to changes in business activity and its level varies significantly between industries (for more discussion on this ratio see section 6.4), Therefore this ratio taken alone is not an indicator of company performance.

However, if the graphs of quick assets to total assets (R20LQ) are examined for the failed companies in the validation sample, this ratio seems to be more or less constant over time. Again it is not a good indicator of company performance if considered alone.

The final ratio in the model is the working capital to total assets R21LQ. This ratio measures the liquidity dimension. Examining the graphs displayed by this ratio for the failed companies in the validation sample, reveals that, eight out of ten companies have this ratio declining prior to failure. The problem of no obvious value or level to choose in order to classify a company as failed still arises and is not easy to specify.

The discussion presented in this section seems to suggest that in general to choose such good indicators in order to classify companies in danger of failure , it might be helpful to have a negative profitability ratio R3PR, together with a continuous increase in gearing ratios R6GE and declining liquidity ratio R21LQ. Therefore if the conditions described above are used, then only six out of ten companies in the validation sample would be classified as failed.

In conclusion univariate ratio analysis is useful in that it indicates some measures of company performance, but setting critical levels for single ratios to spot companies in financially risk does not appear to be a satisfactory approach and hence it is a poor substitute for the multivariate approach in identifying companies in danger of failure.

6.5.3 MULTIVARIATE VERSUS UNIVARIATE ANALYSIS:

The only means by which comparison between the performance of the univariate and multivariate approach appears appropriate here is on the grounds of getting a much earlier warning . It can be seen when examining the graphs represented by univariate financial ratios appearing in the model for the failed companies in validation sample, that, changes in these ratios are quite noticeable prior to failure. Meanwhile, the major shifts of ratios occur one or two years prior to failure. However, by comparing these movements with changes in the z-score trends, it is obvious that the trends in the z-scores give early warning of companies in financial trouble better than the trends obtained by any one or all financial ratios in the DFY2 model. This was the case for Lifecare International Company figure 6.30, and Nova Jersey Knit figure 6.32.

Both companies did not have failed company z-scores for the data which was available, but an examination of trend in their z-scores illustrated by DFY2 will indicate that, their predicted z-score would have been negative in the year prior to failure. Whereas, examining the trends of financial ratios for both companies does not reveal that it is possible to be recognizable as having failed companies profile.

FIGURE 6.16
ZSCORES FOR COMPANY
ELLENROAD MILL

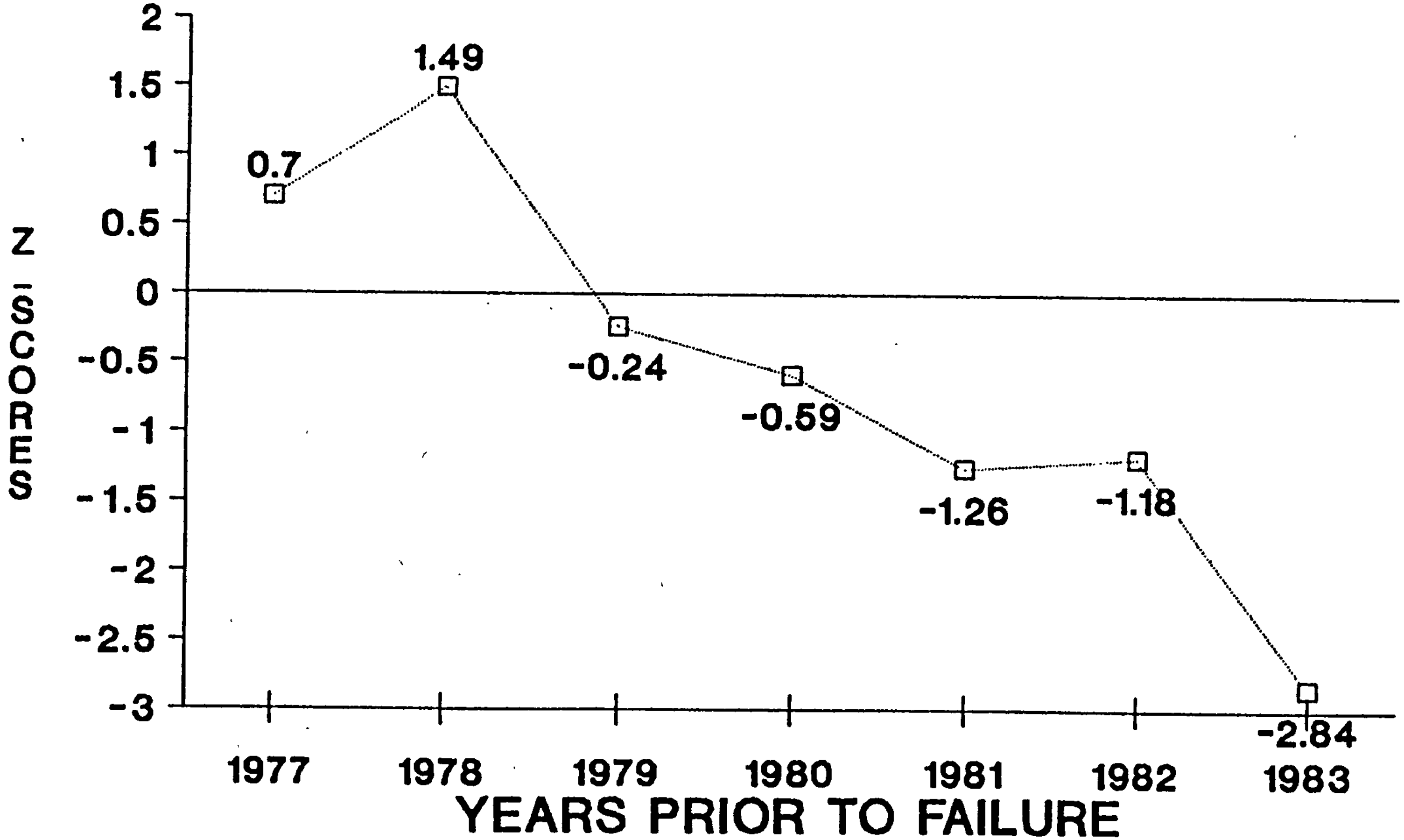


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TABLE 6.14

VALUE OF RELEVANT FINANCIAL RATIOS *100 FOR

COMPANY ELLENROAD MILL

	YEARS						
RATIOS	1977	1978	1979	1980	1981	1982	1983
R3PR	9.86	6.05	3.53	-17.69	-14.21	-12.35	-42.77
R6GE	60.45	51.63	61.87	59.36	63.85	64.95	75.84
R10TR	599.20	626.86	501.08	544.77	513.07	493.14	722.07
R11TR	237.01	303.21	191.07	416.22	185.46	172.84	174.47
R14TR	12.89	13.41	19.21	13.23	17.76	17.02	15.36
R20LQ	40.31	27.16	31.44	37.22	25.05	29.52	35.91
R21LQ	33.07	38.92	23.33	18.02	7.94	5.82	-1.84

FIGURE 6.17
RELEVANT FINANCIAL RATIOS FOR COMPANY ELLENROAD MILL

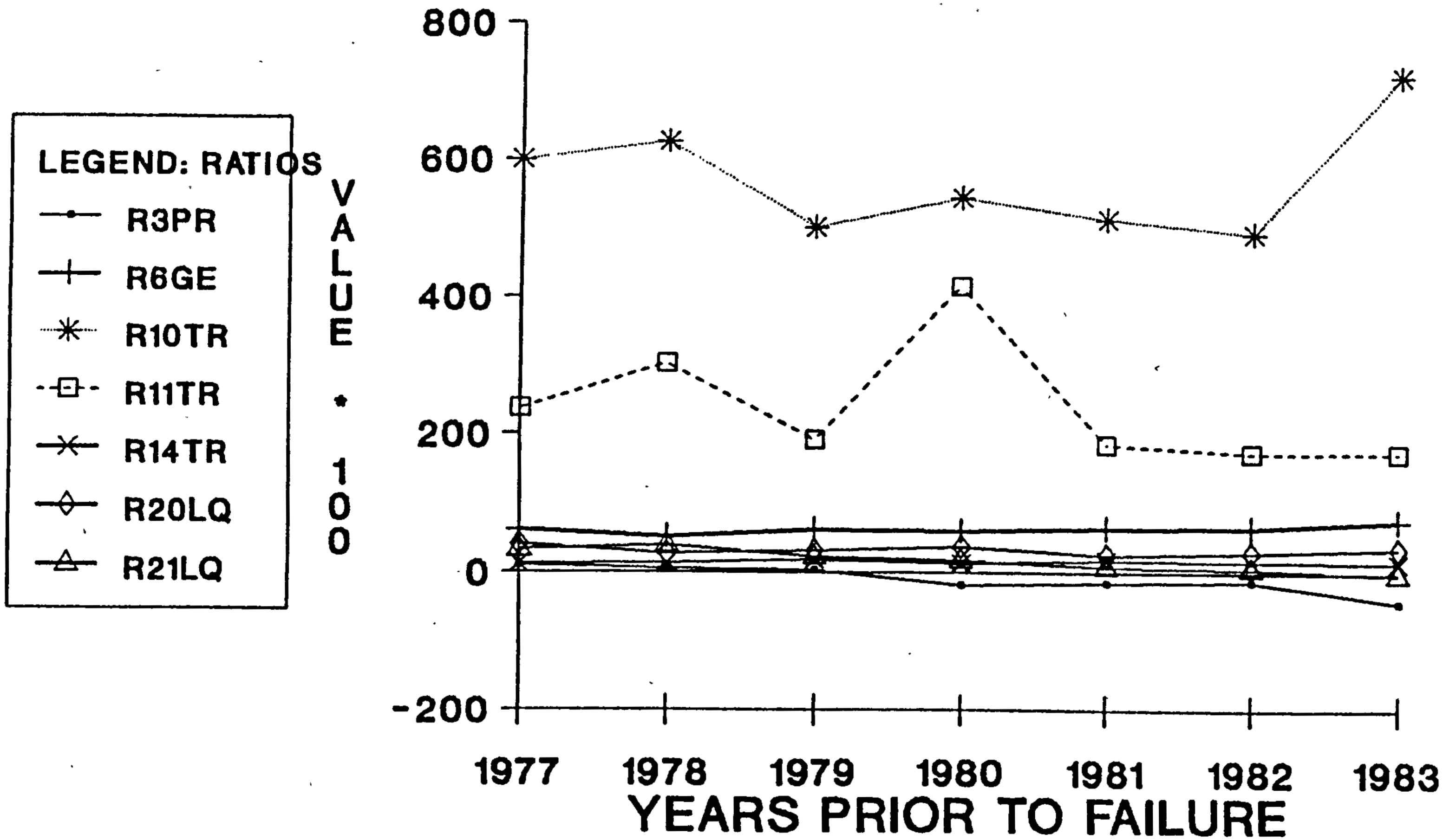

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FIGURE 6.18
Z-SCORES FOR COMPANY
METAMEC JENTIQUE

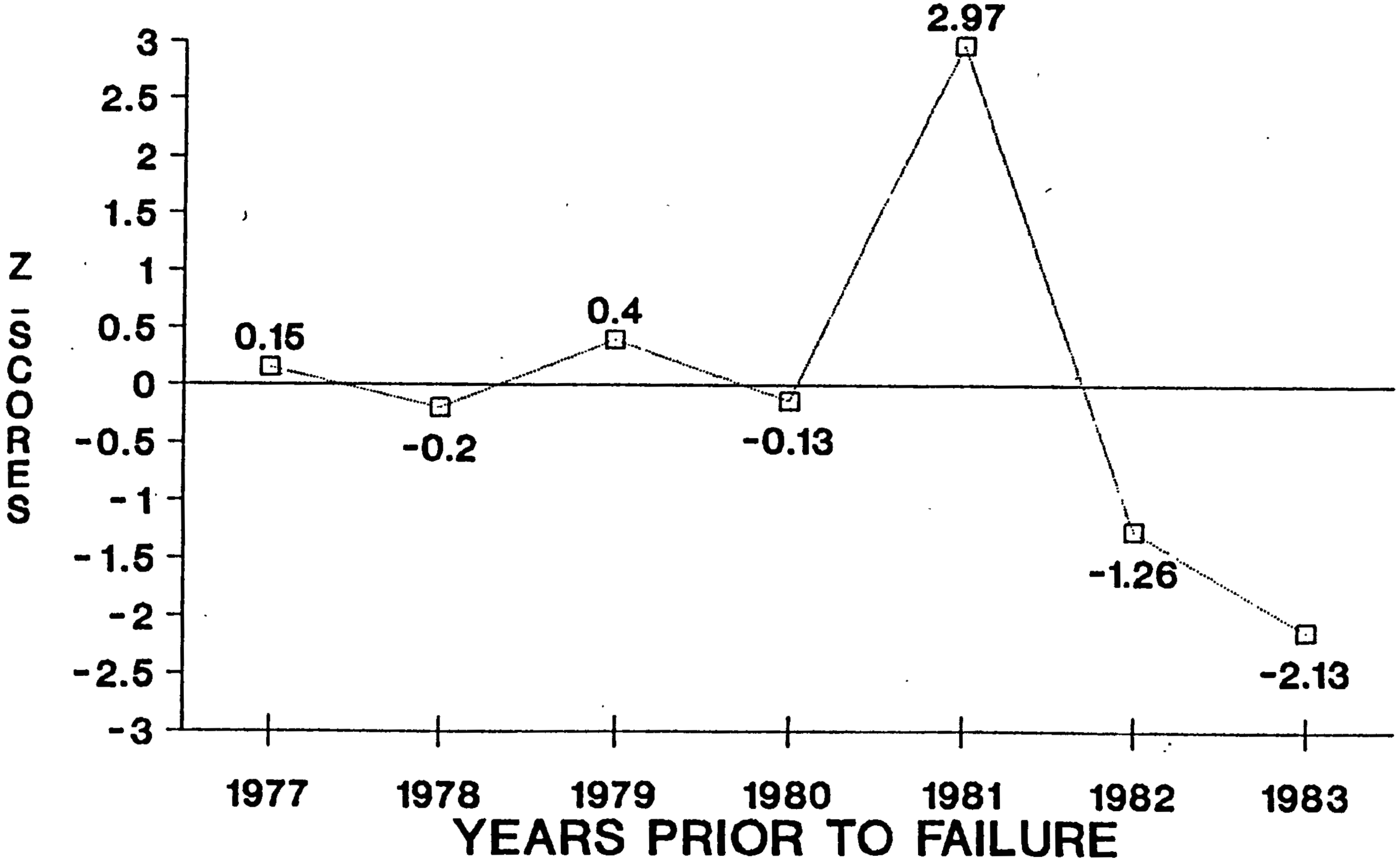

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TABLE 6.15

VALUE OF RELEVANT FINANCIAL RATIOS *100 FOR

COMPANY METAMEC JENTIQUE

	YEARS						
RATIOS	1977	1978	1979	1980	1981	1982	1983
R3PR	10.13	8.21	10.37	5.42	.00	-17.14	-34.99
R6GE	47.68	53.04	48.65	48.65	42.28	49.48	54.25
R10TR	286.97	292.02	306.25	266.42	26.57	238.18	303.08
R11TR	150.15	137.13	157.25	257.21	15.33	120.33	138.67
R14TR	29.49	31.30	23.89	30.18	235.68	33.68	23.67
R20LQ	20.76	24.30	27.42	24.96	29.20	19.35	22.60
R21LQ	33.03	29.18	28.89	33.18	32.55	15.30	4.38

FIGURE 6.19
RELEVANT FINANCIAL RATIOS FOR COMPANY METAMEC JENTIQUE

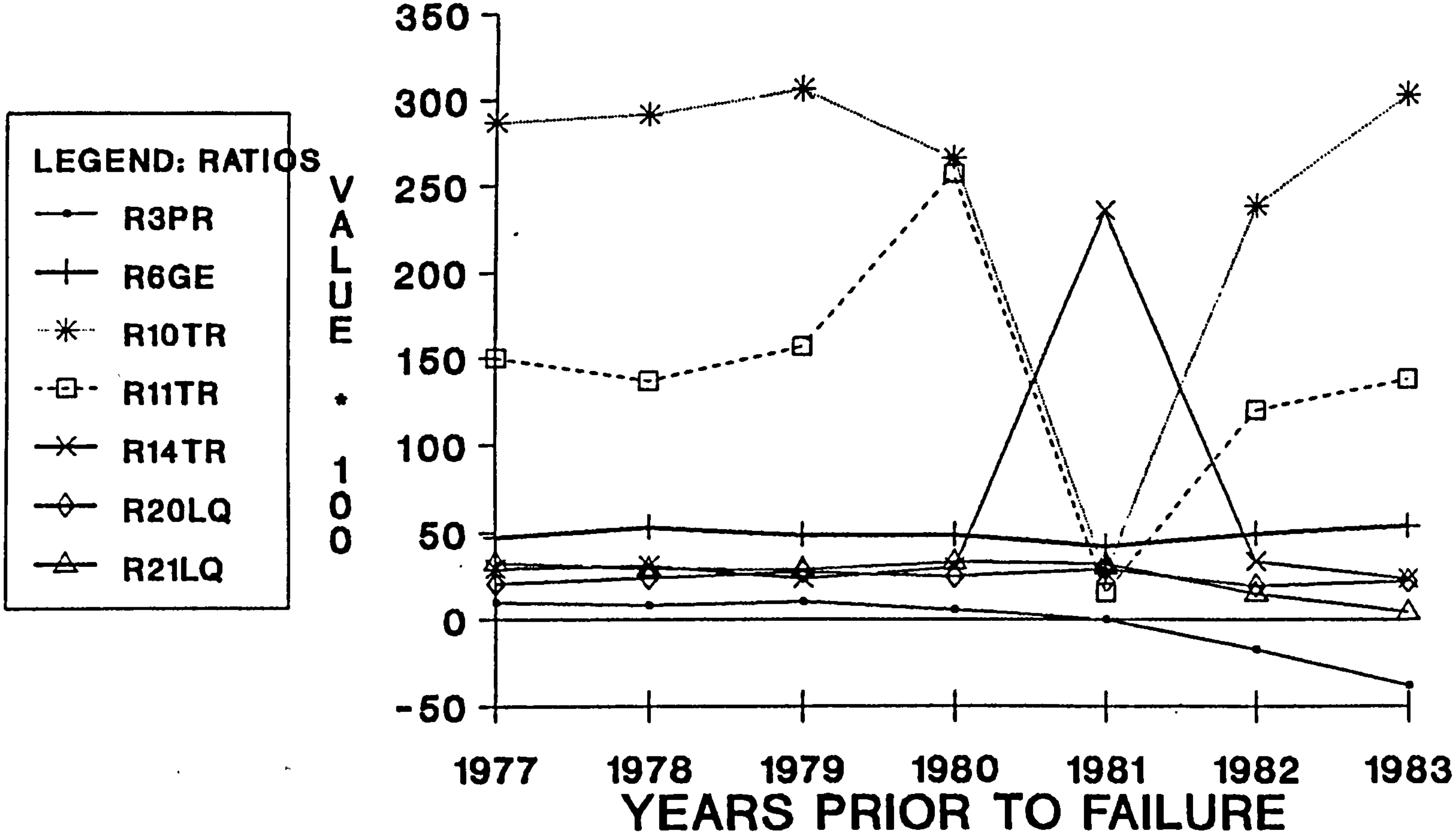

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FIGURE 6.20
ZSCORES FOR COMPANY
SPENCER (GEORGE)

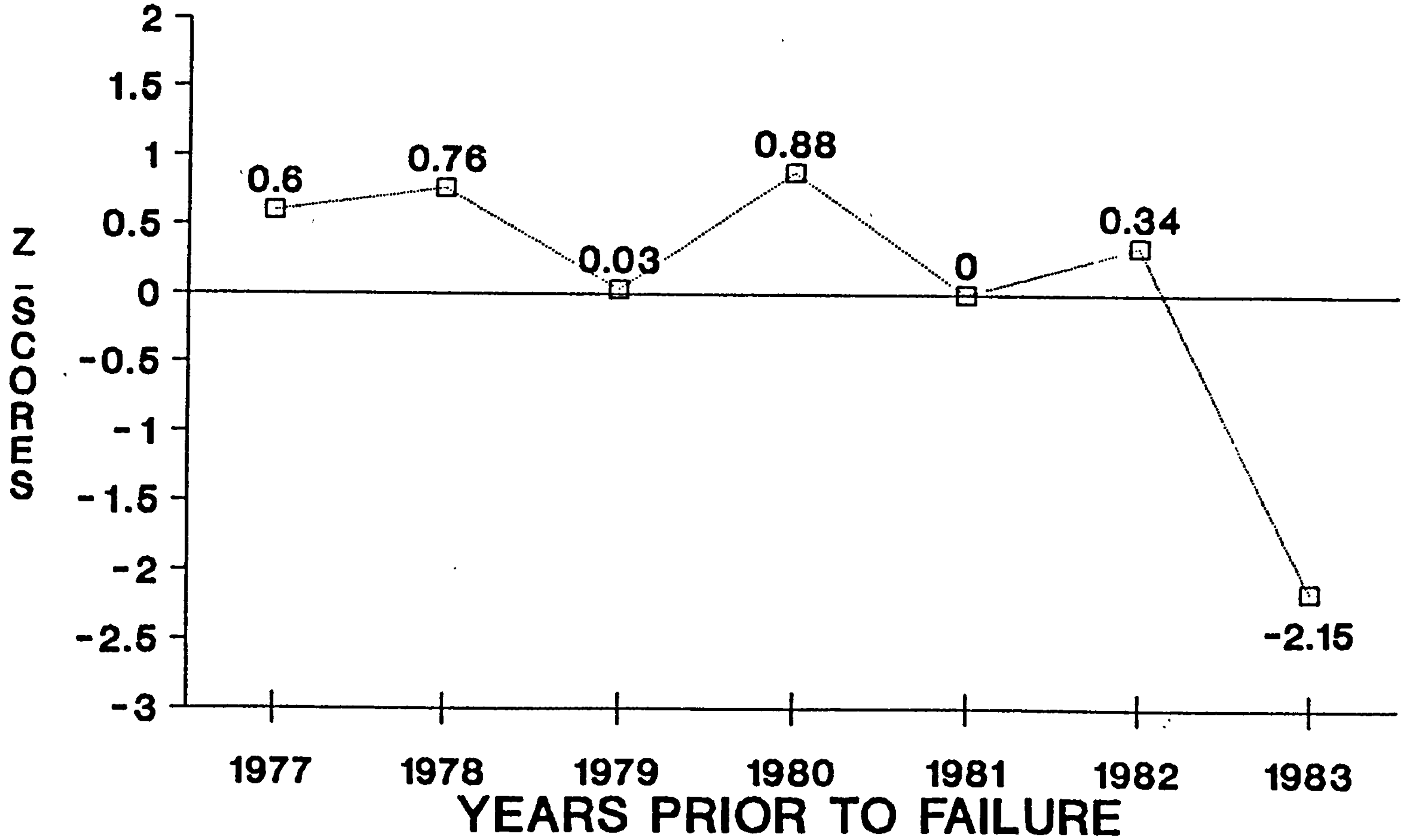

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TABLE 6.16

VALUE OF RELEVANT FINANCIAL RATIOS *100 FOR

COMPANY SPENCER (GEORGE)

	YEARS						
RATIOS	1977	1978	1979	1980	1981	1982	1983
R3PR	5.92	4.55	6.18	2.44	.	-3.67	-39.47
R6GE	38.69	37.07	33.77	34.00	.	41.40	49.88
R10TR	243.38	249.28	214.83	218.90	.	240.63	376.91
R11TR	149.22	156.87	142.28	271.60	.	141.01	188.92
R14TR	22.88	21.46	24.64	24.29	.	19.64	17.42
R20LQ	22.05	23.34	24.45	25.78	.	32.73	18.88
R21LQ	27.76	30.60	27.08	27.65	.	19.68	22.86

FIGURE 6.21
RELEVANT FINANCIAL RATIOS FOR COMPANY SPENCER (GEORGE)

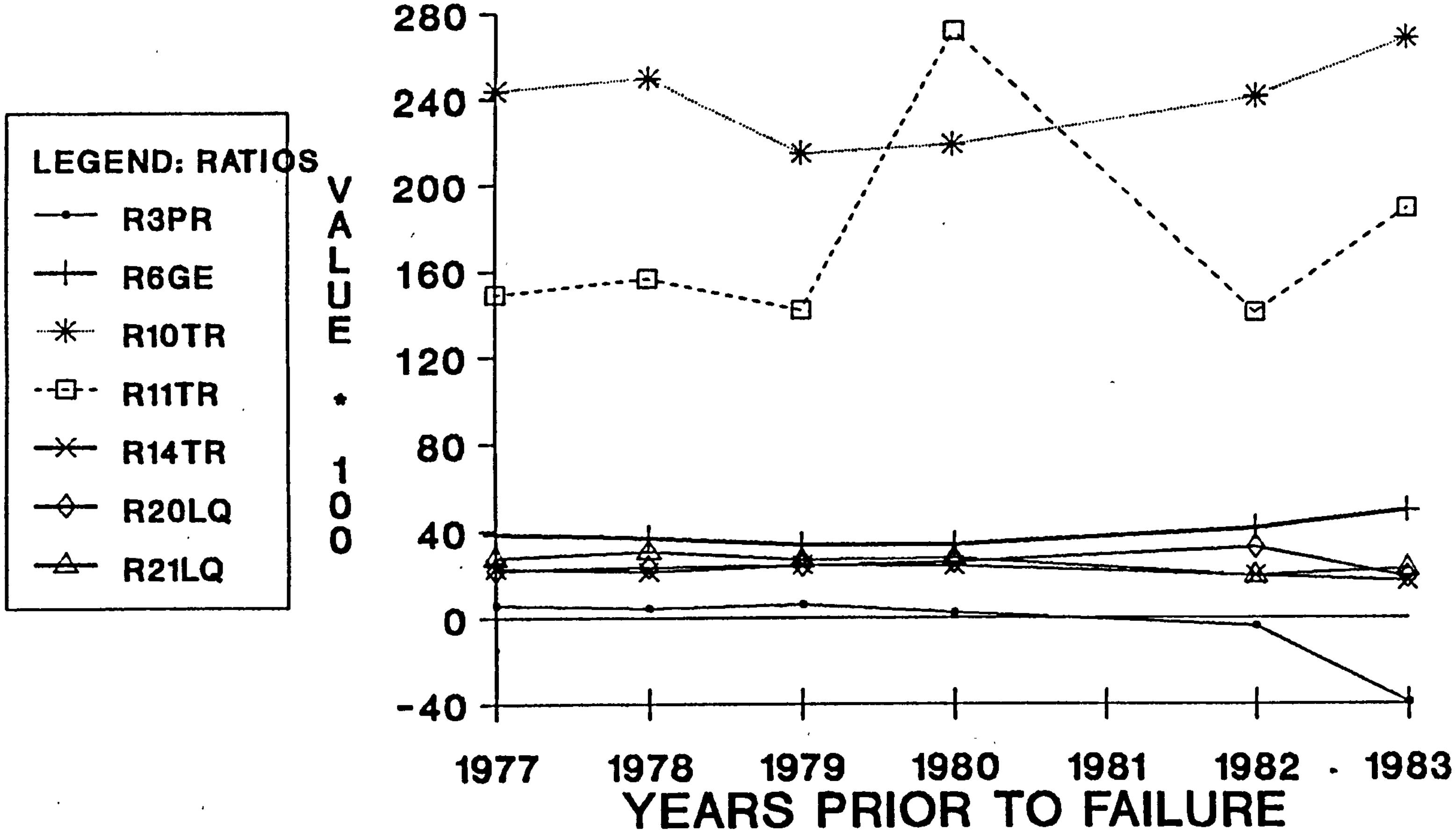

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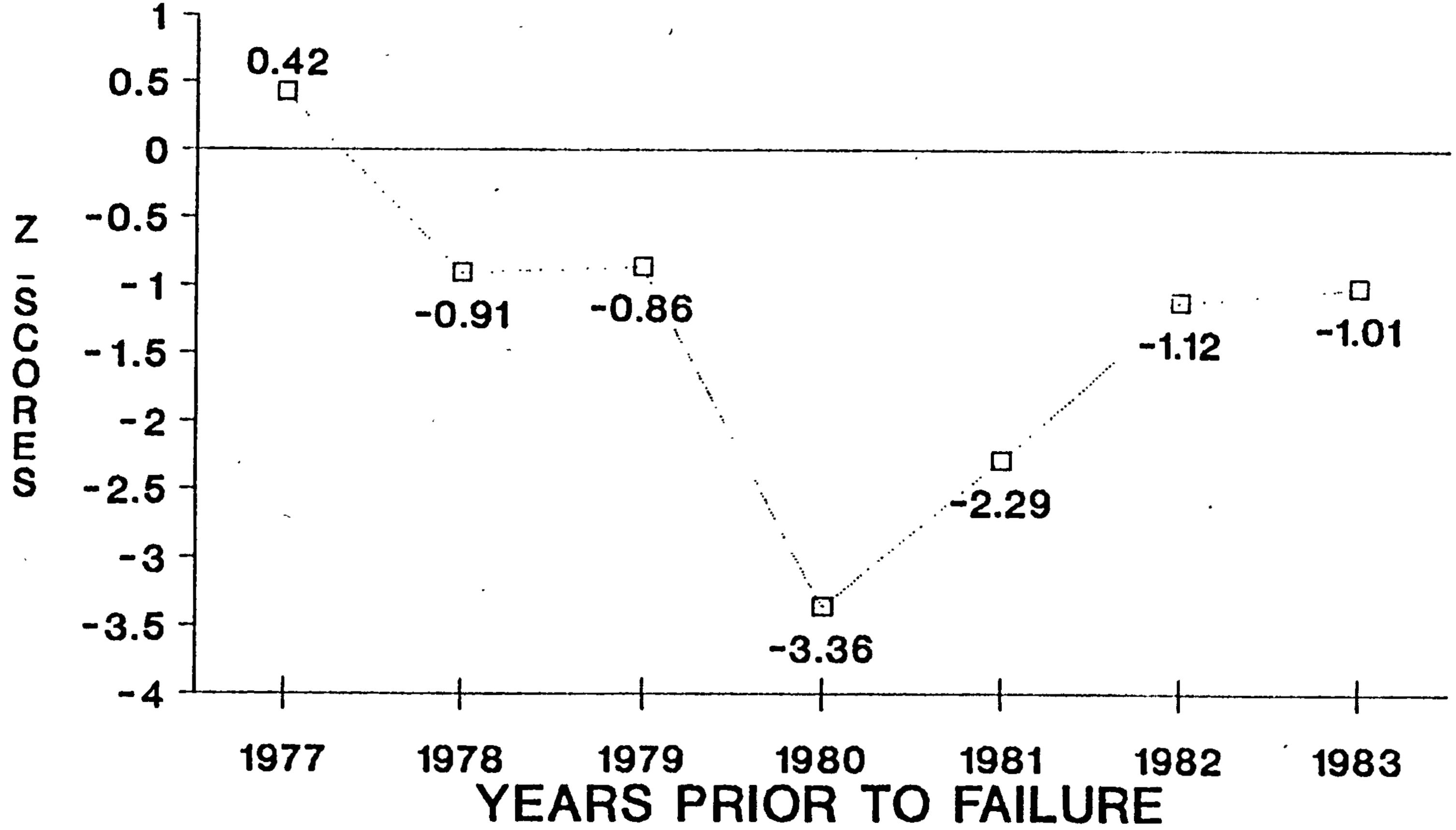
FIGURE 6.22
ZSCORES FOR COMPANY
W'RIBBONS HOLDINGS



Went into voluntary liquidation 23rd MaY
1986.

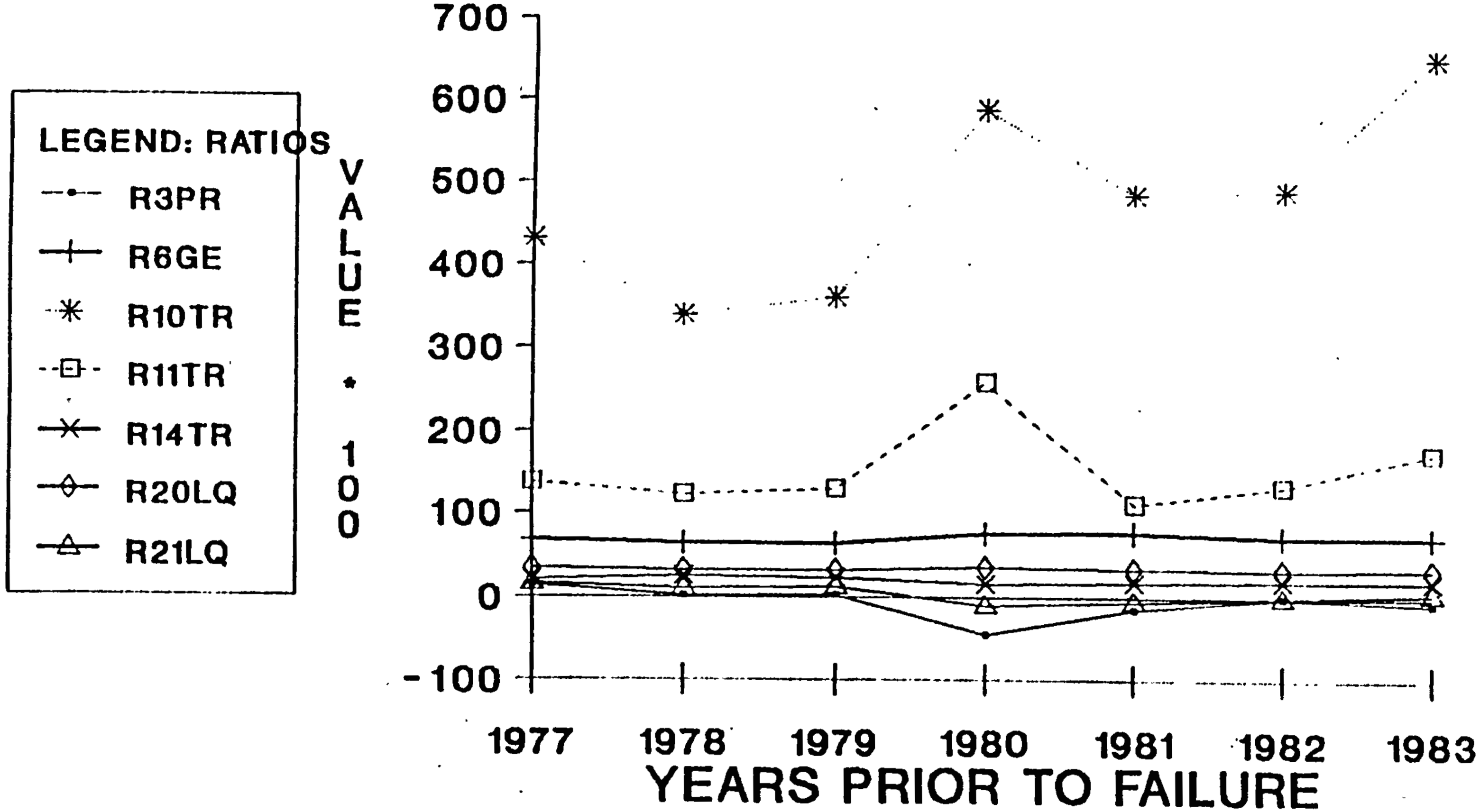
TABLE 6.17

VALUE OF RELEVANT FINANCIAL RATIOS *100 FOR

COMPANY W'RIBBONS HOLDINGS

	YEARS						
RATIOS	1977	1978	1979	1980	1981	1982	1983
R3PR	14.59	2.21	2.45	-45.73	-14.22	.40	-6.92
R6GE	68.34	64.25	64.42	76.70	77.15	72.84	73.14
R10TR	431.46	339.74	362.40	589.23	485.23	489.89	651.37
R11TR	136.58	121.45	128.94	258.16	110.85	133.05	174.94
R14TR	21.19	25.26	23.47	16.28	18.04	20.33	19.59
R20LQ	34.95	32.63	32.38	35.97	34.52	34.08	34.69
R21LQ	16.35	11.03	13.17	-10.12	-5.65	-.18	5.33

FIGURE 6.23
RELEVANT FINANCIAL RATIOS FOR
COMPANY W'RIBBONS HOLDINGS



Went into voluntary liquidation 23rd MaY
1986.

FIGURE 6.24
ZSCORES FOR COMPANY
ALLEN(W.G.) & SONS (TIPTON)

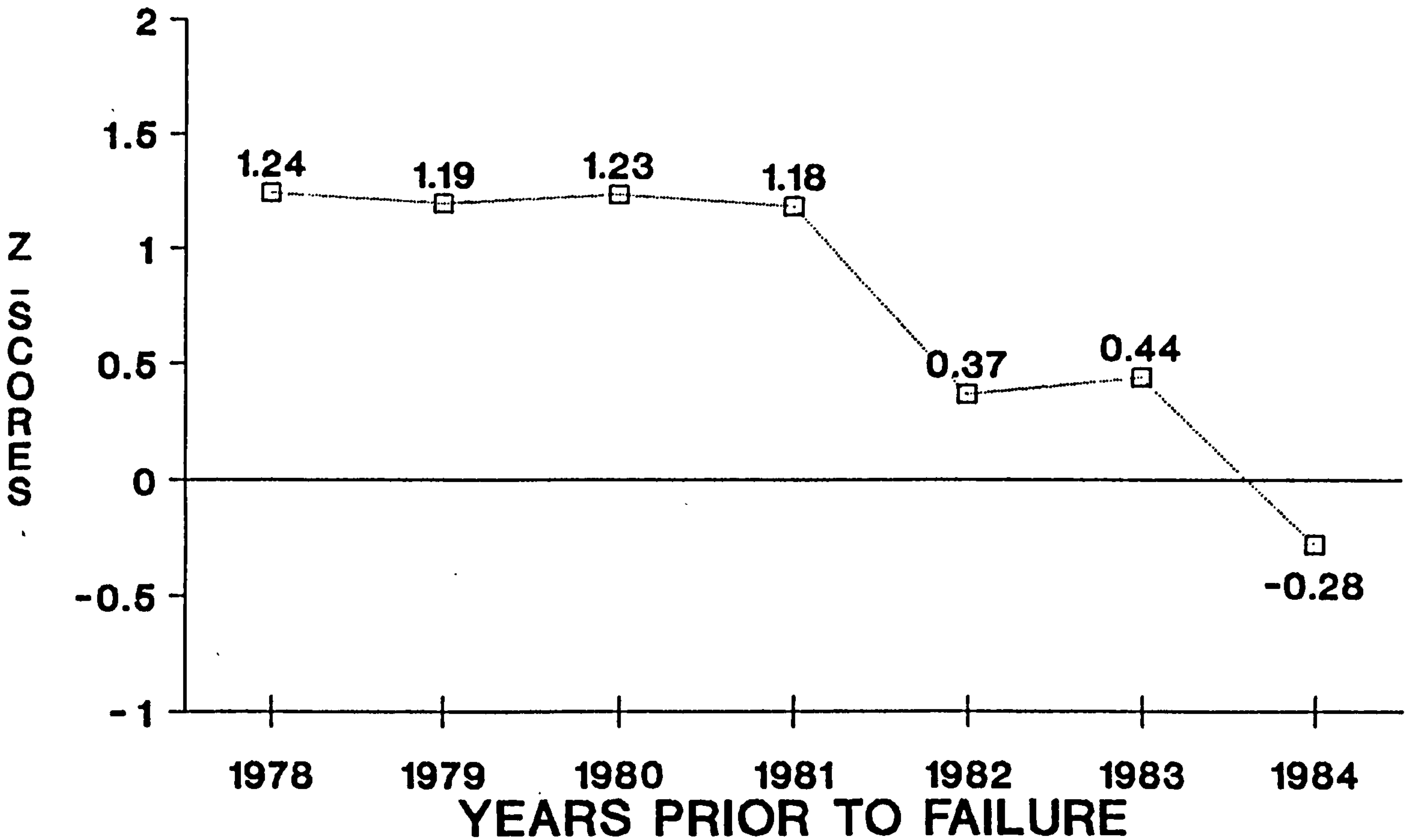


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TABLE 6.18

VALUE OF RELEVANT FINANCIAL RATIOS *100 FOR

COMPANY ALLEN (W.G.) & SONS (TIPTON)

RATIOS	1978	1979	1980	1981	1982	1983	1984
R3PR	10.70	8.33	8.95	4.15	-11.39	-2.28	-8.22
R6GE	32.90	34.50	32.87	28.26	26.63	36.34	44.72
R10TR	176.51	186.56	169.38	148.47	135.98	155.51	189.25
R11TR	118.43	122.20	113.70	200.24	99.77	99.01	104.61
R14TR	30.81	28.88	29.49	27.38	29.77	28.45	29.08
R20LQ	29.06	34.59	33.59	31.67	26.17	34.05	34.05
R21LQ	33.26	35.38	34.24	32.57	29.24	25.88	19.74

FIGURE 6.25
RELEVANT FINANCIAL RATIOS FOR COMPANY ALLEN (W.G.) & SONS

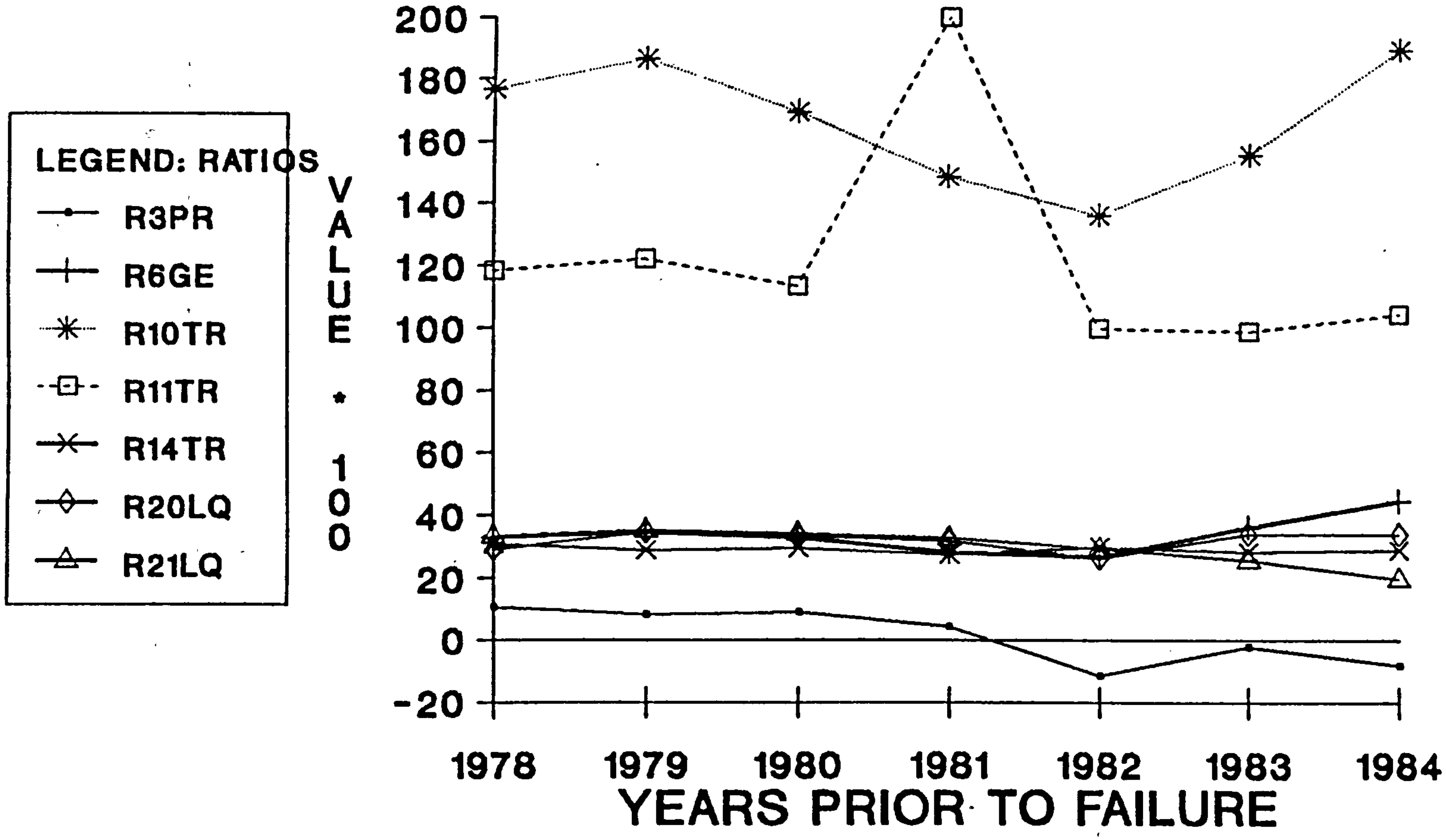

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FIGURE 6.26
ZSCORES FOR COMPANY
COCKSEDGE (HOLDINGS)

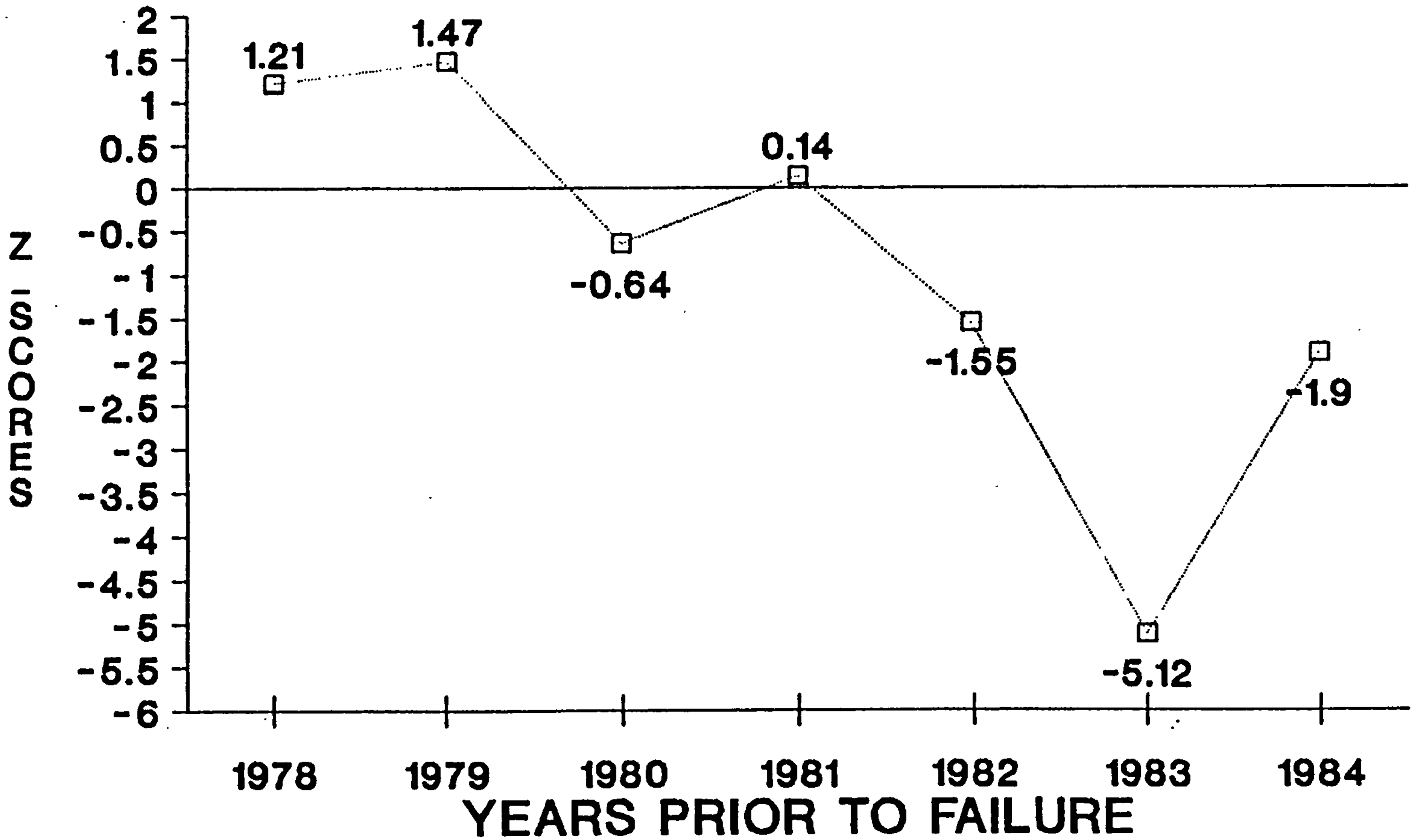

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TABLE 6.19

VALUE OF RELEVANT FINANCIAL RATIOS *100 FOR

COMPANY COCKSEDGE (HOLDINGS)

	YEARS						
RATIOS	1978	1979	1980	1981	1982	1983	1984
R3PR	18.92	11.13	-14.78	-14.38	-29.36	-77.73	-18.34
R6GE	33.39	26.83	36.01	24.11	43.11	65.96	71.97
R10TR	195.60	141.66	135.12	131.68	150.56	250.42	436.93
R11TR	130.30	103.66	86.46	187.87	85.65	85.23	122.47
R14TR	27.01	23.42	25.93	16.63	16.24	9.82	4.99
R20LQ	15.10	18.49	18.44	11.97	22.14	24.99	29.84
R21LQ	30.27	29.36	12.04	4.47	-7.06	-31.43	-34.53

FIGURE 6.27
RELEVANT FINANCIAL RATIOS FOR COMPANY COCKSEDGE (HOLDINGS)

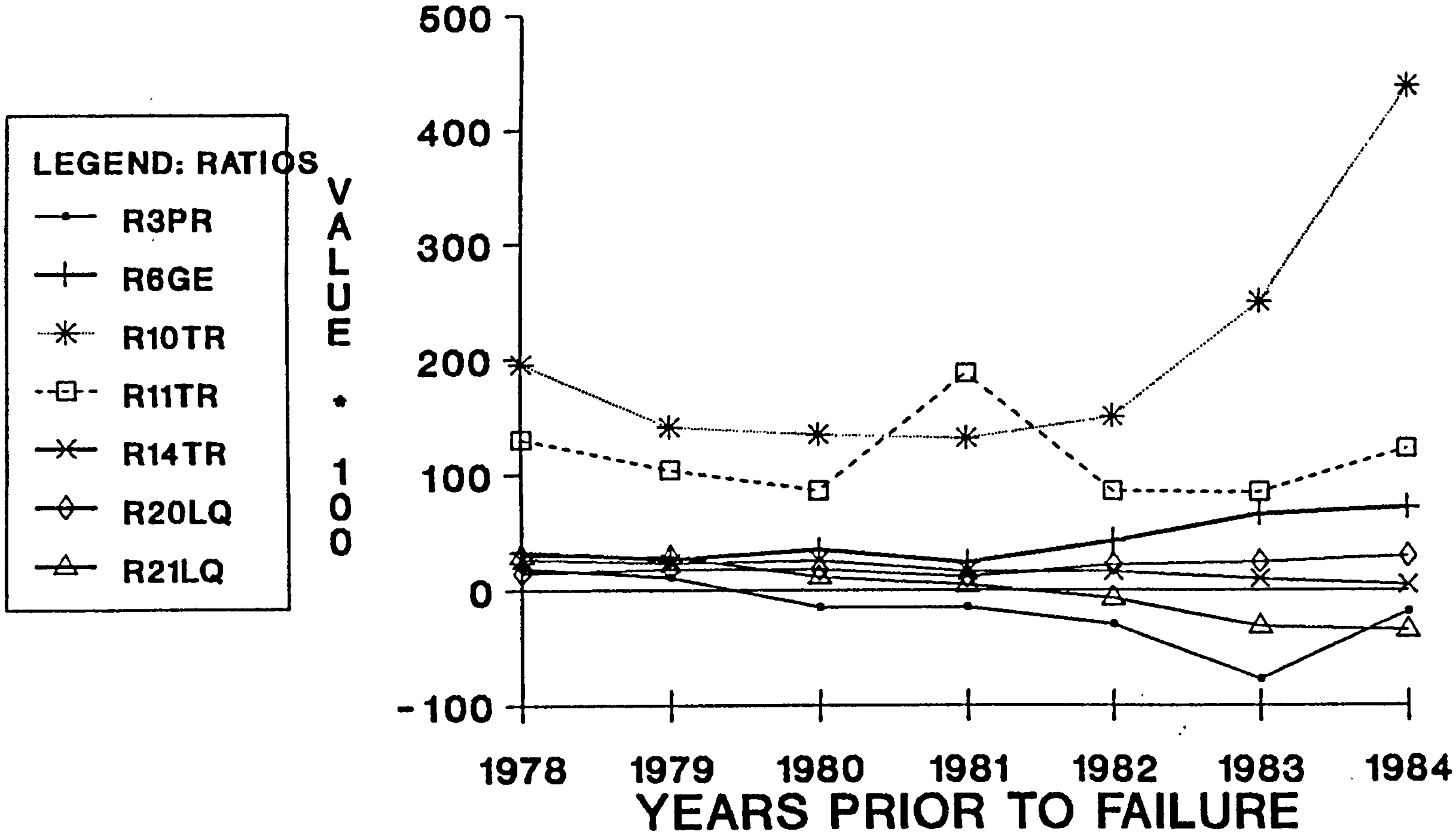

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FIGURE 6.28
ZSCORES FOR COMPANY
HERMAN SMITH

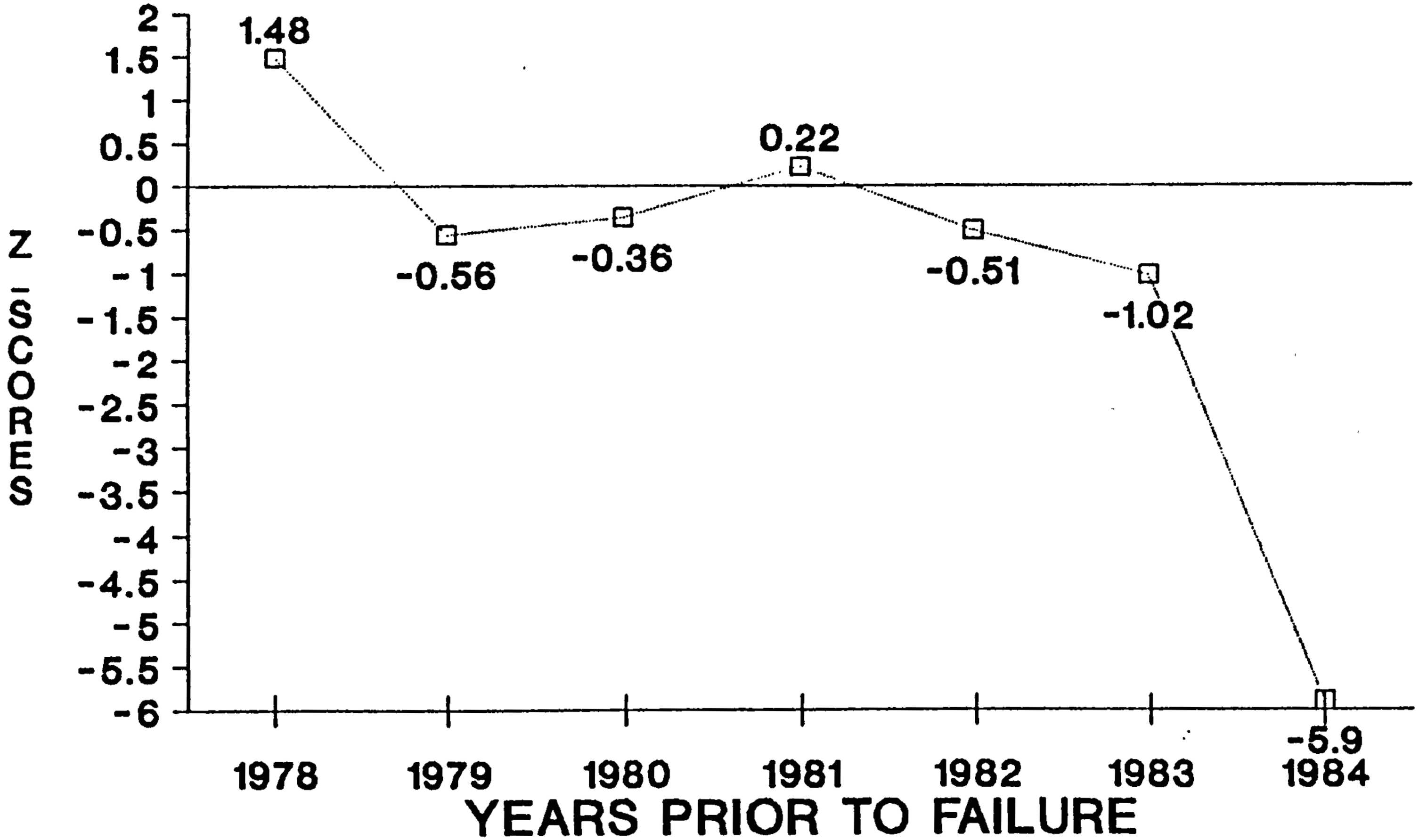

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TABLE 6.20

VALUE OF RELEVANT FINANCIAL RATIOS *100 FOR

COMPANY HERMAN SMITH

	YEARS						
RATIOS	1978	1979	1980	1981	1982	1983	1984
R3PR	-2.38	6.35	13.31	17.47	9.44	3.07	-82.41
R6GE	67.99	64.85	69.88	59.16	60.61	65.38	75.06
R10TR	377.34	396.73	471.12	377.18	322.50	284.51	436.24
R11TR	120.77	139.46	141.92	289.63	127.05	98.49	108.80
R14TR	31.81	26.63	25.68	23.26	30.29	39.76	32.80
R20LQ	30.18	35.82	39.45	37.26	32.81	28.27	26.34
R21LQ	19.71	23.48	21.70	36.29	30.74	9.28	6.86

FIGURE 6.29
RELEVANT FINANCIAL RATIOS FOR
COMPANY HERMAN SMITH

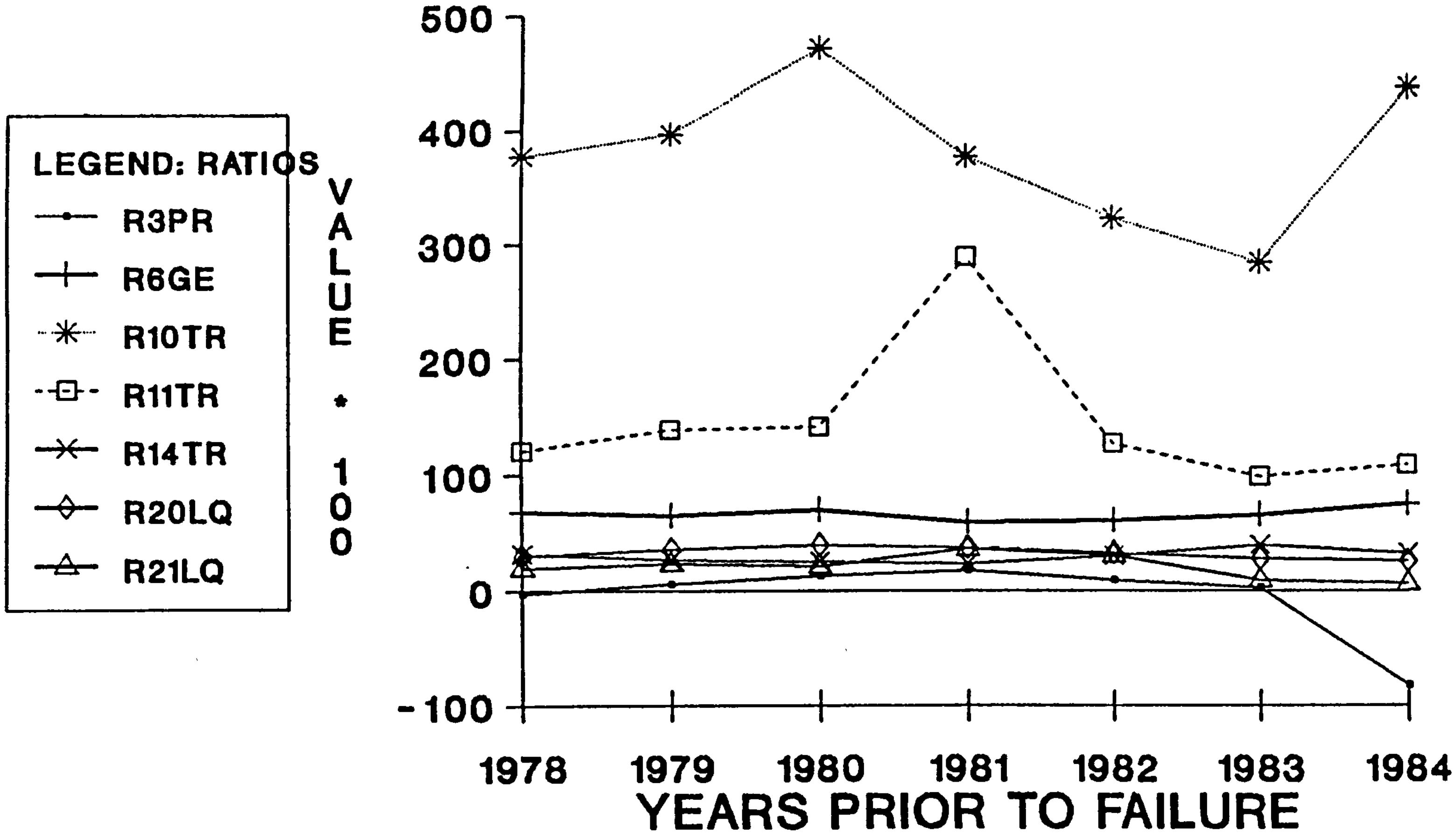

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FIGURE 6.30
ZSCORES FOR COMPANY LIFECARE INTERNATIONAL

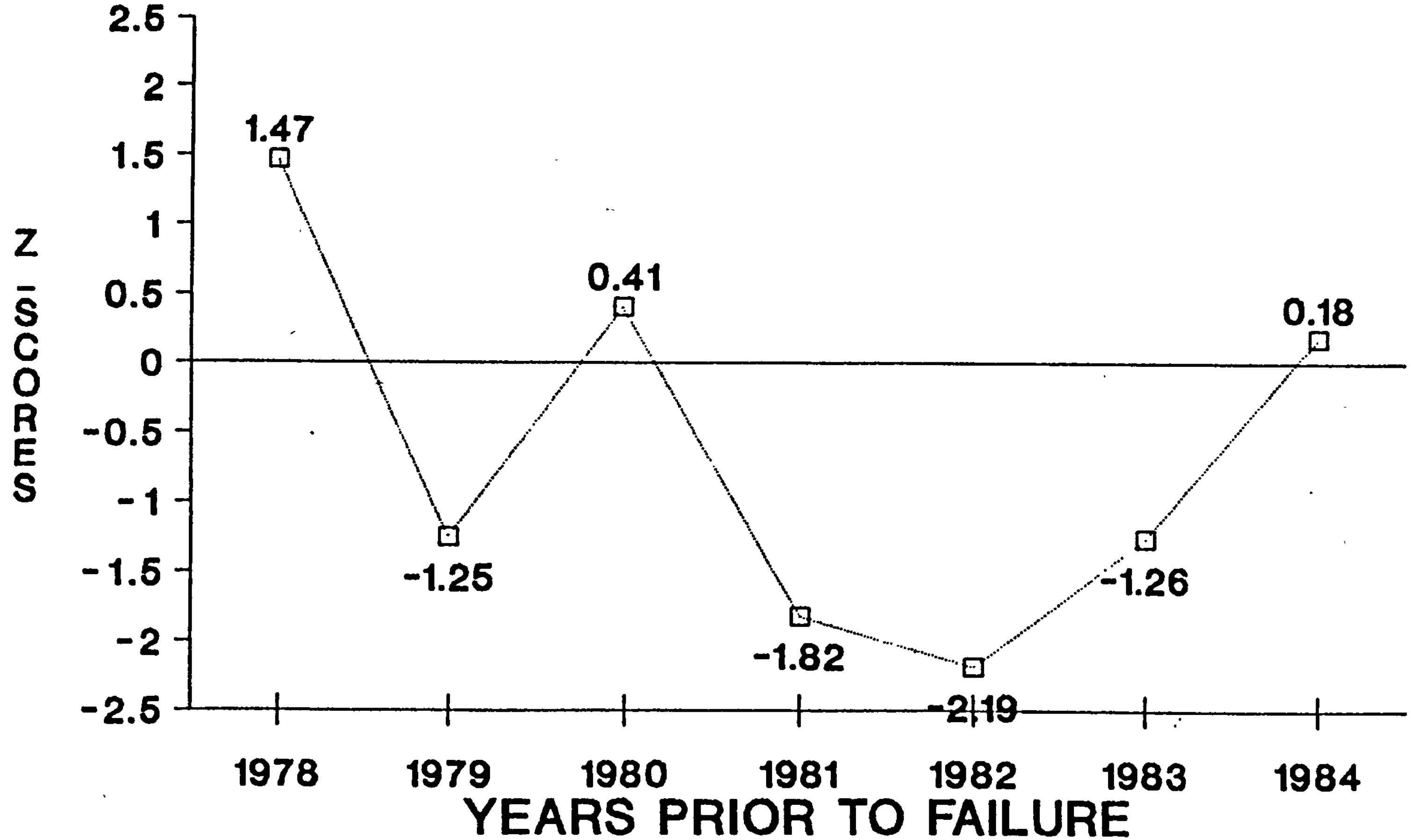

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TABLE 6.21

VALUE OF RELEVANT FINANCIAL RATIOS *100 FOR COMPANY LIFECARE INTERNATIONAL

	YEARS						
RATIOS	1978	1979	1980	1981	1982	1983	1984
R3PR	-4.80	-5.38	2.58	-19.86	-32.15	-20.11	3.28
R6GE	69.19	65.33	61.01	70.12	72.98	75.90	48.28
R10TR	638.60	559.34	691.59	658.84	825.82	1006.23	170.18
R11TR	196.73	193.91	269.68	370.12	223.12	242.46	88.02
R14TR	29.85	33.38	20.11	21.42	17.41	17.71	18.74
R20LQ	10.04	9.54	20.00	33.17	37.48	47.03	45.65
R21LQ	18.24	17.28	16.72	30.58	33.79	43.96	15.44

FIGURE 6.31
RELEVANT FINANCIAL RATIOS FOR COMPANY LIFECARE INTERNATIONAL

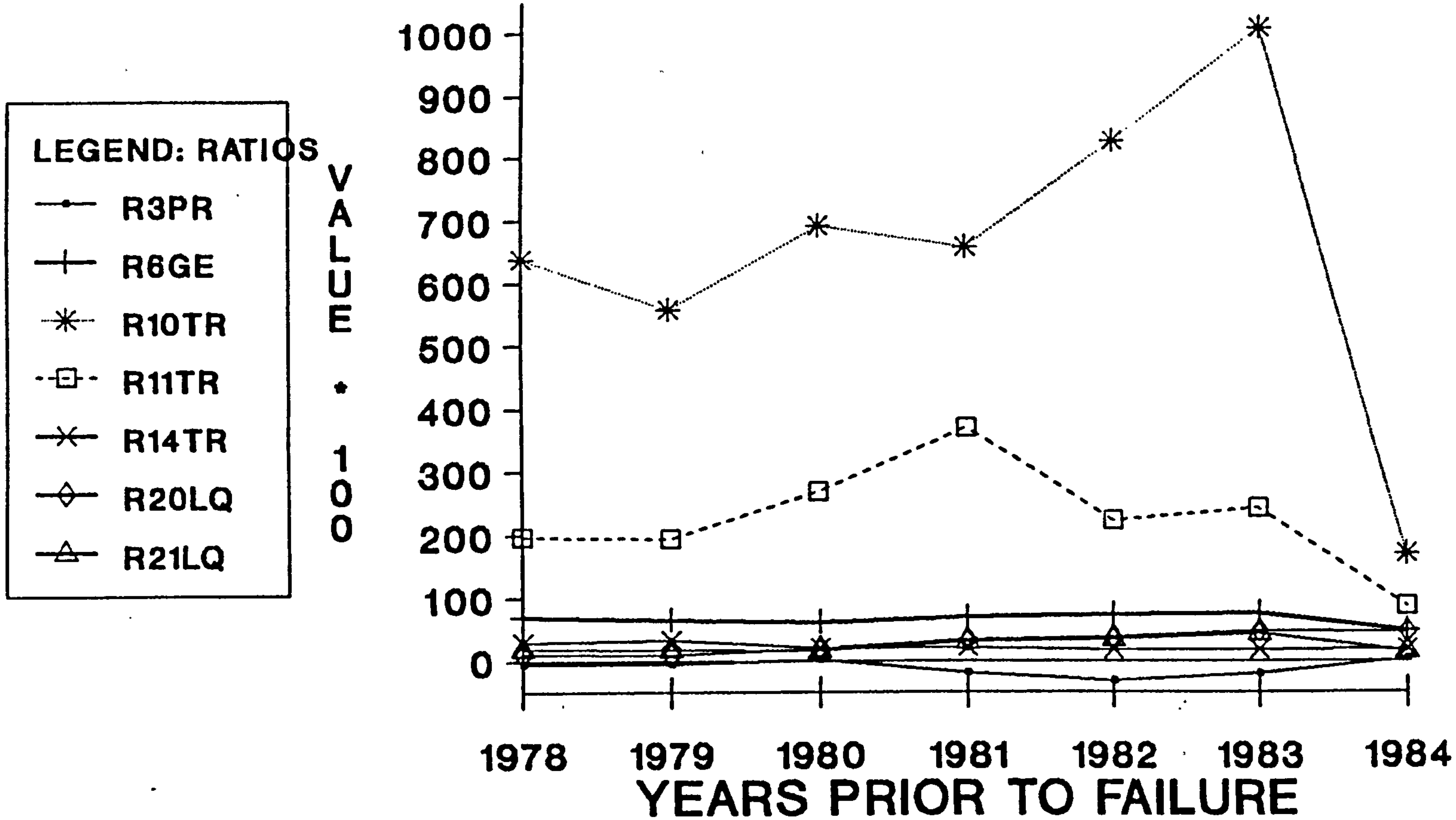

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FIGURE 6.32
ZSCORES FOR COMPANY
NOVA (JERSEY) KNIT

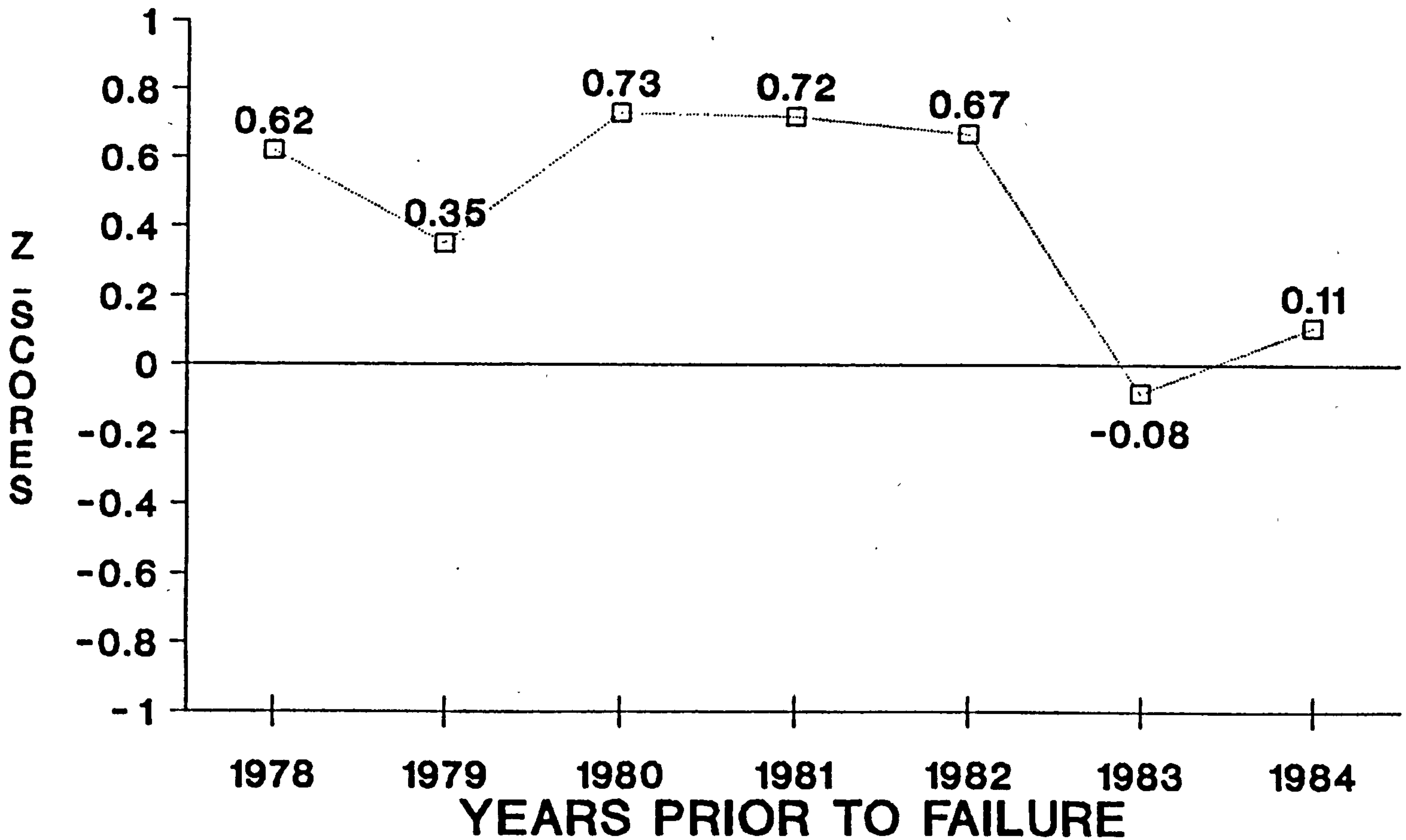

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TABLE 6.22

VALUE OF RELEVANT FINANCIAL RATIOS *100 FOR

COMPANY NOVA (JERSEY) KNIT

	YEARS						
RATIOS	1978	1979	1980	1981	1982	1983	1984
R3PR	3.85	17.43	18.45	20.53	19.19	8.33	7.21
R6GE	64.26	60.90	55.43	55.69	56.72	57.11	55.93
R10TR	392.23	383.77	291.30	249.60	277.63	254.59	271.36
R11TR	140.17	150.05	129.84	207.94	120.16	109.20	119.59
R14TR	13.28	15.76	5.91	8.24	11.88	13.75	19.04
R20LQ	36.06	43.50	54.08	54.06	49.26	44.92	38.52
R21LQ	8.58	27.41	26.17	22.61	18.28	15.31	6.49

FIGURE 6.33
RELEVANT FINANCIAL RATIOS FOR
COMPANY NOVA (JERSEY) KNIT

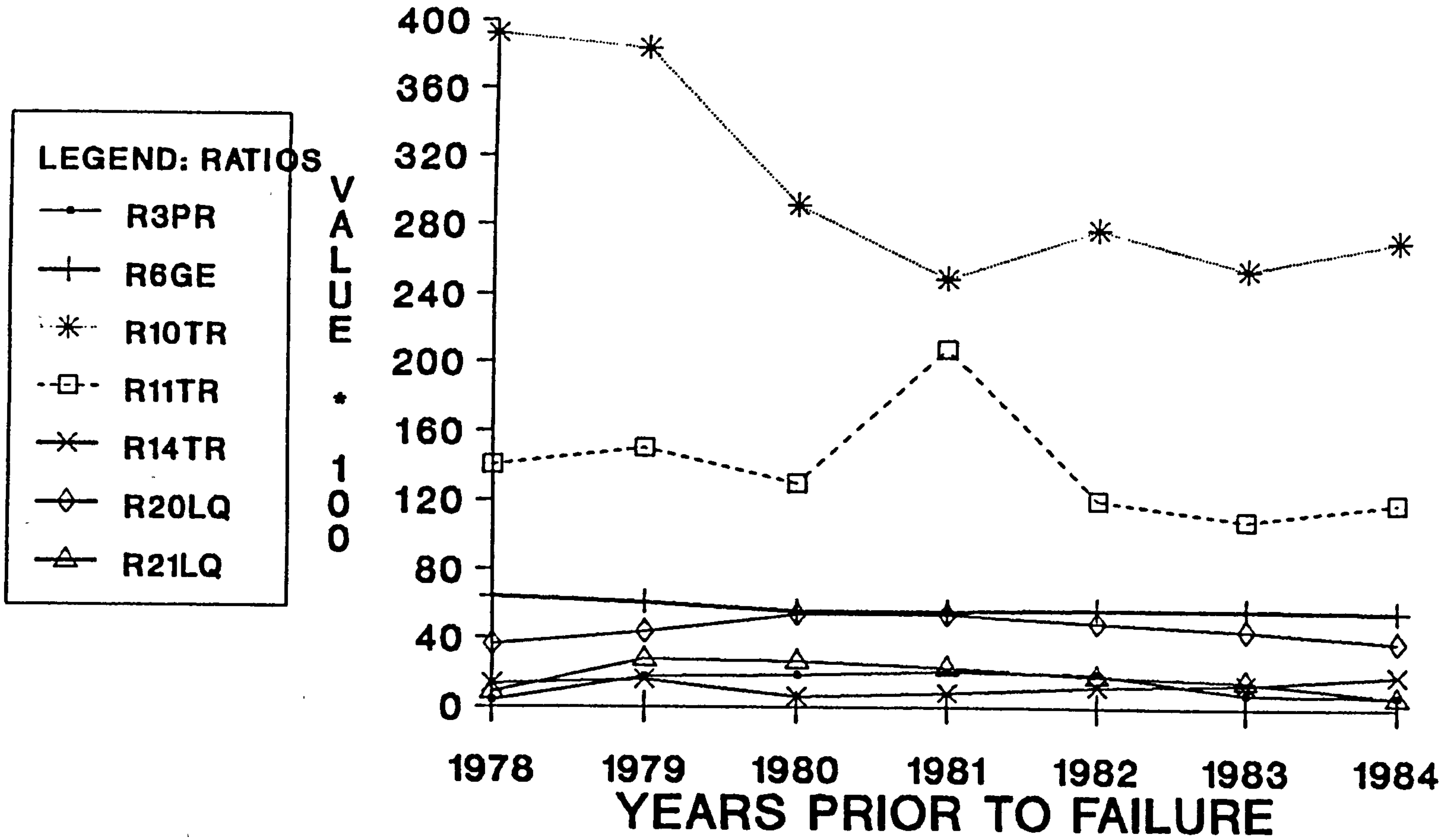

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FIGURE 6.34
ZSCORES FOR COMPANY
CASTLE (G. B.)

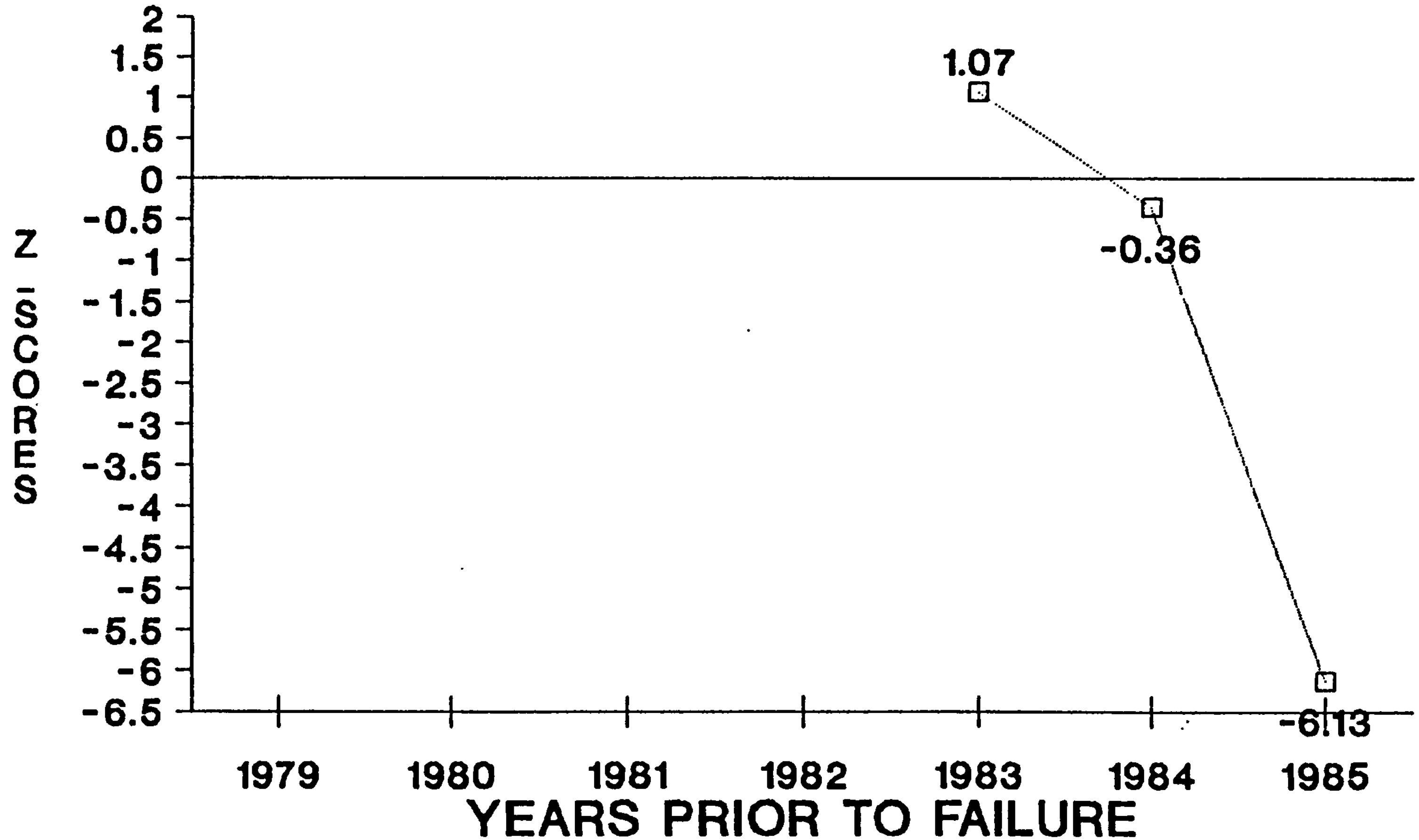

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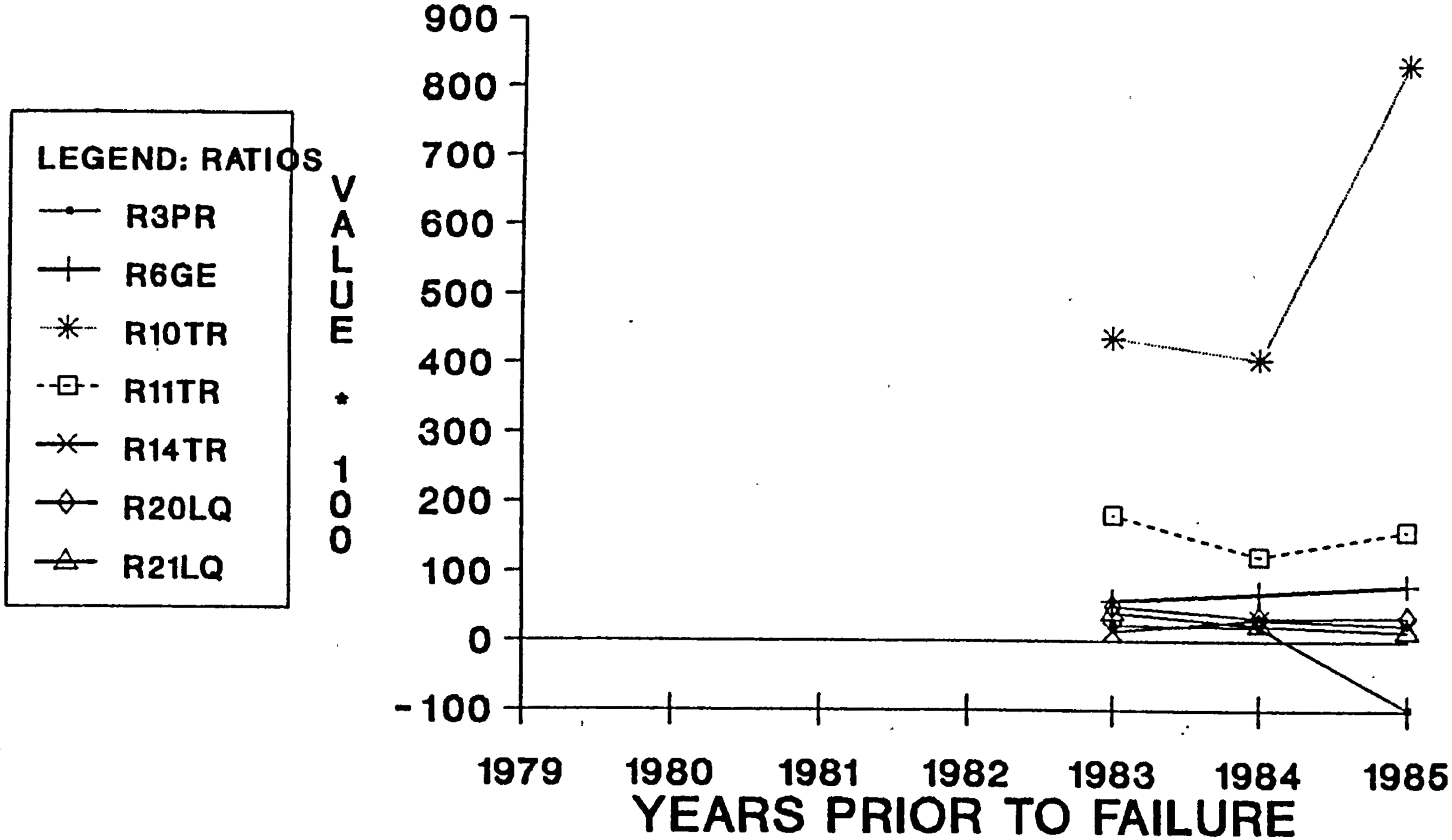
TABLE 6.23

VALUE OF RELEVANT FINANCIAL RATIOS *100 FOR

COMPANY CASTLE (G.B.)

	YEARS						
RATIOS	1979	1980	1981	1982	1983	1984	1985
R3PR	.	.	.	.	22.74	20.52	-97.62
R6GE	.	.	.	.	58.51	69.70	80.83
R10TR	.	.	.	.	437.68	406.04	833.02
R11TR	.	.	.	.	181.60	123.04	159.72
R14TR	.	.	.	.	14.42	31.41	23.75
R20LQ	.	.	.	.	50.82	33.71	35.14
R21LQ	.	.	.	.	40.96	23.24	14.12

FIGURE 6.35
RELEVANT FINANCIAL RATIOS FOR COMPANY CASTLE (G . B)



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6.5.4 AN ANALYSIS OF THE PERFORMANCE OF DFY2 ON NONFAILED COMPANIES:

It was thought to examine the z-scores histories together with the trends in financial ratios appearing in the model DFY2 for a number of nonfailed companies in a validation sample for a comparison purposes. Figures 6.36 to 6.55 show the Z-score histories created by DFY2 together with trends of the seven univariate financial ratios entering DFY2 for ten nonfailed companies in the validation sample.

It can be seen that for many cases it is easy to detect changes in the z-scores correlated at the same time with changes in many financial ratios entering the DFY2. In particular, the profitability ratio R3PR, the gearing ratio R6GE and the liquidity ratios R20LQ and R21LQ. In other words, for any year through the analysis period an increase in the profitability ratio R3PR, together with a decrease in the gearing ratio R6GE, coupled with an increase in the liquidity ratios (either R20LQ or R21LQ) will reflect an increase in the z-score for the same time and vice versa . It should be noted also that the movement of capital turnover and activity ratios R10TR, R11TR, are more or less in the same direction of Z-scores.

This is well illustrated by Breedon & Cloud Hill Lime Works company; Figure 6.36, 6.37 and table 6.24. It can be seen that the increase in the z-score from 1980 to 1981, and 1982 to 1983 and from 1985 to 1986, is well reflected by an increase in profitability ratio net income to net worth R3PR, together with a decrease in the gearing ratio total liabilities to total assets R6GE, coupled with an increase of both capital turnover and activity ratios, sales to net worth R10TR, sales to total assets R11TR, and finally an increase in the liquidity ratios quick assets to total assets R20LQ, and working capital to total assets R21LQ, for the same period of time. At the same time the decline in the z-scores from 1981 to 1982, and between 1984 to 1985 is also well reflected in the financial ratios specified above, but with the opposite sign for each individual ratio and for the same years.

A similar phenomenon is again displayed by Bruntons (Musselburgh) Company (Figures 6.38, 6.39 and table 6.25), and by Elbief Company (Figures 6.40, 6.41 and table 6.26). The changes in z-scores from 1979 to 1983 are very well correlated by changes in the individual ratios entering DFY2. However, later it could be identified as a high performing company despite the model not being designed to identify high performing companies.

The changes in the z-scores reflected by changes in the individual ratios in DFY2, particularly the profitability ratio R3PR is interesting in the case of Friendly Hotels (Figures 6.42, 6.43 and table 6.27). This company has a sharp decline in its z-score from (1.21) in 1980 to a (-0.08) in 1981, then a continuous decline in years 1982, and 1983, followed by an increase in z-score in years 1984 and 1985. Examining the individual ratios movement, reveal that the profitability ratio, net income to net worth R3PR is almost parallel to z-scores which display a negative R3PR value in years 1981, 1982, 1983 together with an increase in the gearing ratio, total liabilities to total assets and a decrease in both capital turnover and activity ratios, sales to net worth R10TR, and sales to total assets, R11TR. It should be noted that also the liquidity ratios, quick assets to total assets, R20LQ and working capital to total assets, R21LQ, are moving in the same direction during the same period of time.

A similar phenomenon is illustrated by Harvey and Thompson (Figures 6.46, 6.47 and table 6.29). This company has a continuous decline in z-scores in 1979 to 1980 then a negative z-score for the following two years, 1981, 1982, followed by a sharp increase from (-0.79) in 1982 to (0.75) in 1983, then an increase in 1984, followed by a decrease in 1985. Examining Figure 6.47, reveals that the profitability ratio R3PR is always almost in parallel to z-scores for the same years. It should be noted that the increase in gearing ratio R6GE, together with the changes in sales to total assets R11TR and working capital to total assets R21LQ are moving in the same direction as the profitability ratio R3PR, from 1979 to 1985 which reflected very well the changes in z-scores.

In general the analysis of z-score histories produced in this section reflected very well the changes in many individual ratios in DFY2 through the same period of time for any of those companies that have been discussed, or the remaining which display more or less similar trends in z-scores reflected by changes in the individual ratios entering the DFY2 model.

It is clear that univariate analysis is useful in measuring company performance, but these analyses are not as good as the z-score analysis. In other words the analysis of company performance using univariate financial ratio, will produce a reasonable indication of company's financial position and that can be obtained only when companies must not be in real danger of failure. As we saw in preceding section, the univariate ratio analysis for the failed companies revealed that this kind of analysis is not helpful in identifying companies in danger of failure.

The z-score method should be used when the aim is to help to predict company failure as soon as possible in order to take appropriate action to reverse the failure process before it is too late.

FIGURE 6.36
ZSCORES FOR COMPANY
BREEDON & CLOUD HILL LIME WORKS

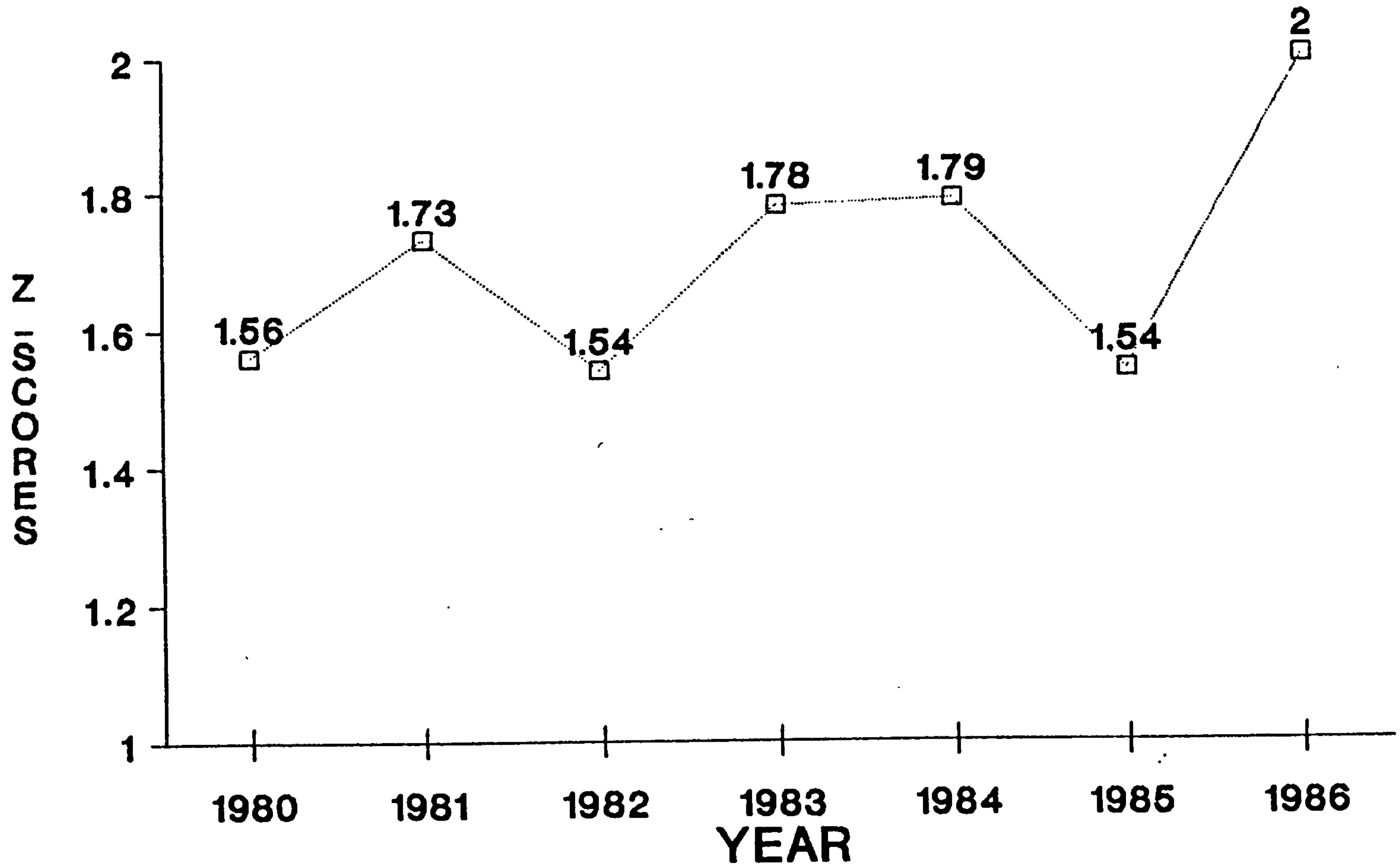

TABLE 6.24

VALUE OF RELEVANT FINANCIAL RATIOS *100 FOR

COMPANY BREEDON & CLOUD HILL LIME WORKS

	YEARS						
RATIOS	1980	1981	1982	1983	1984	1985	1986
R3PR	15.33	17.25	14.33	17.25	17.30	14.69	17.41
R6GE	35.57	31.25	28.00	22.12	21.62	27.28	22.04
R10TR	154.59	164.67	137.45	147.05	147.66	115.51	126.26
R11TR	106.29	109.97	98.96	105.32	103.49	84.00	98.43
R14TR	8.20	9.08	11.93	12.75	9.80	19.23	15.52
R20LQ	26. 09	37.77	29.48	38.08	43.89	40.09	46.06
R21LQ	34.00	34.96	31.99	41.69	41.63	22.04	22.66

FIGURE 6.37
RELEVANT FINANCIAL RATIOS FOR COMPANY BREEDON & CLOUD HILL LIME WORKS

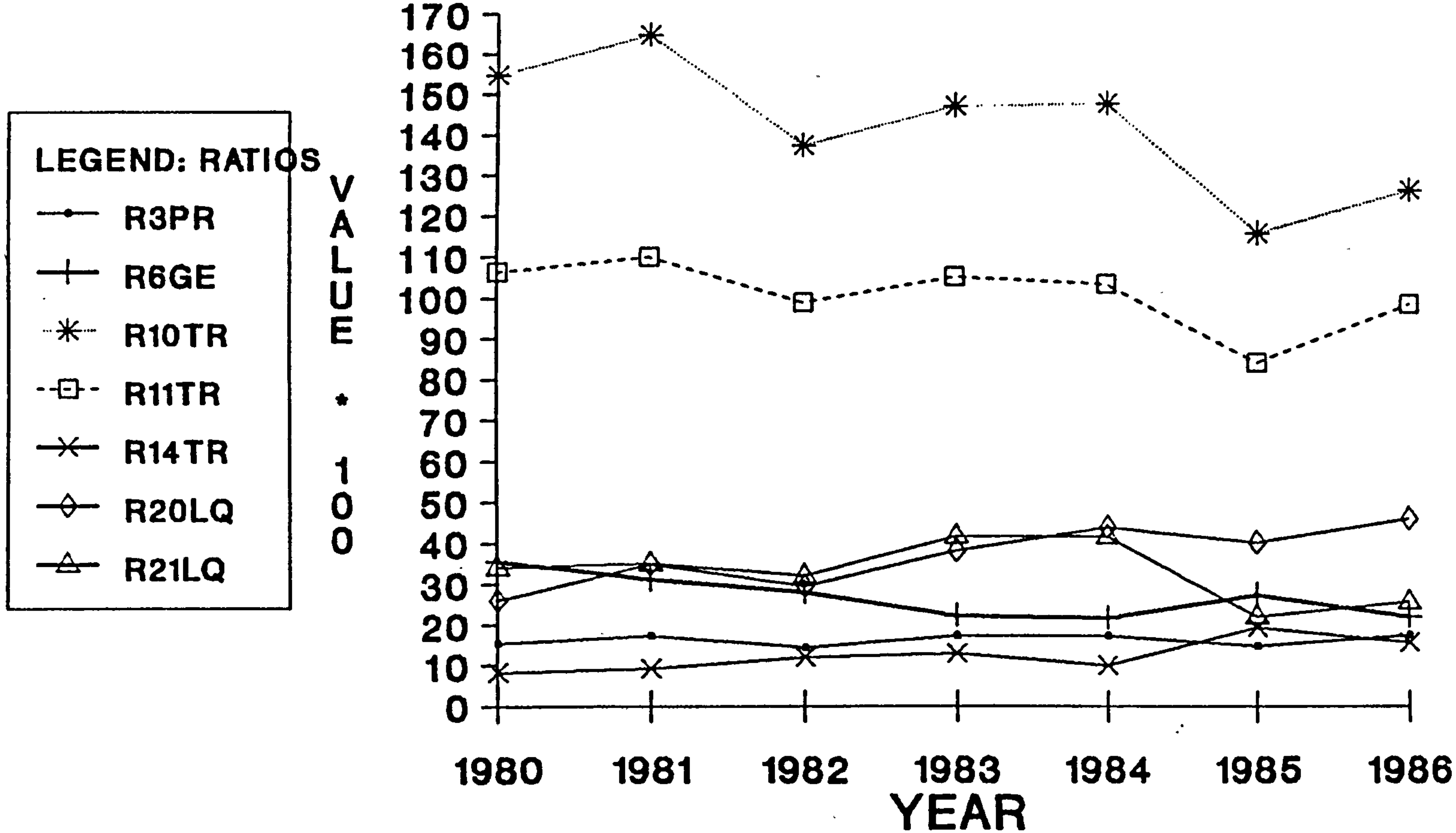

FIGURE 6.38
ZSCORES FOR COMPANY
BRUNTONS (MUSSELBURGH)

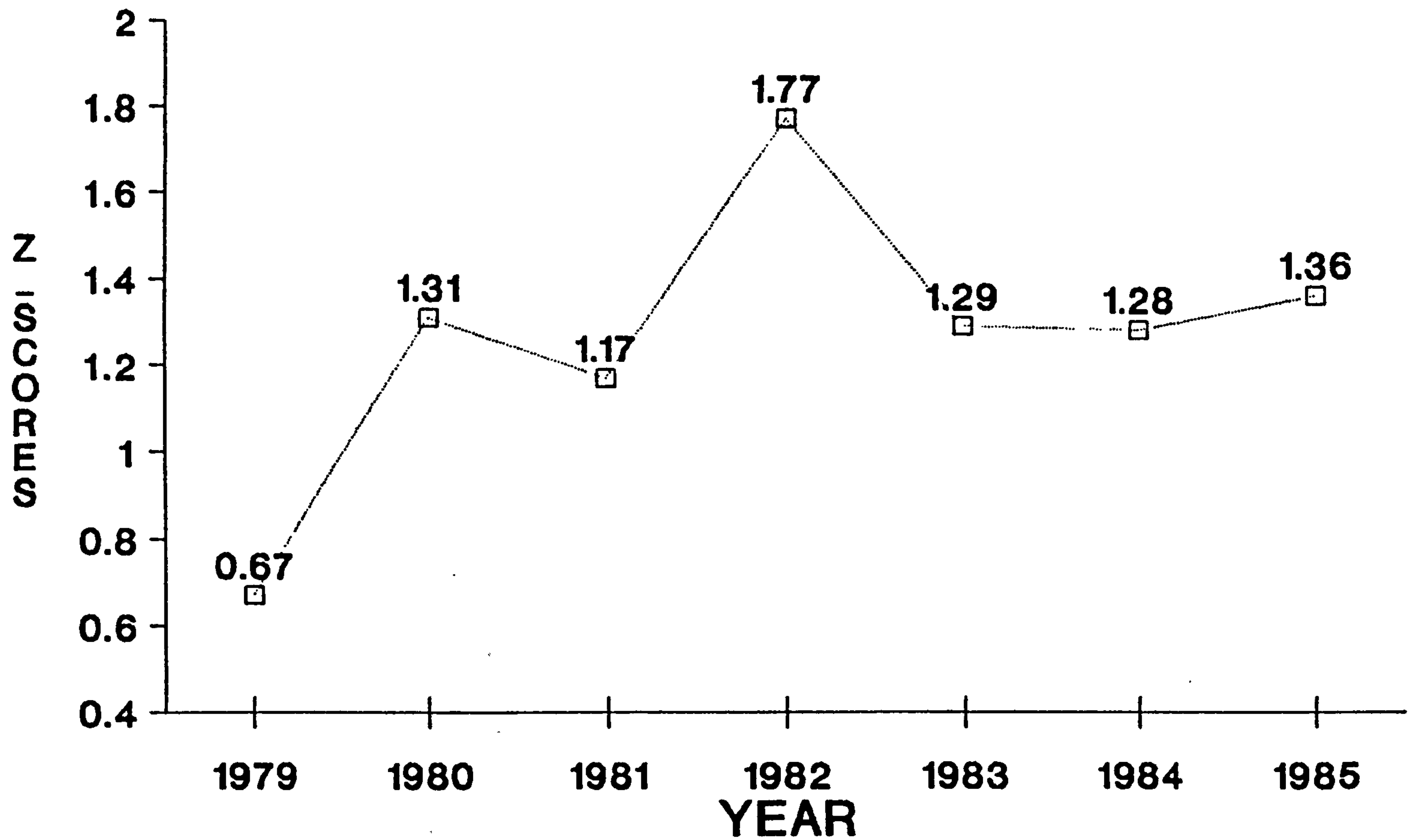

TABLE 6.25

VALUE OF RELEVANT FINANCIAL RATIOS *100 FOR

COMPANY BRUNTONS(MUSSELBURGH)

	YEARS						
RATIOS	1979	1980	1981	1982	1983	1984	1985
R3PR	14.44	18.55	14.76	18.24	12.47	5.08	5.62
R6GE	43.92	38.87	37.00	30.67	32.94	24.94	24.66
R10TR	206.18	202.31	156.99	154.79	150.90	149.69	162.29
R11TR	115.62	123.67	98.91	130.74	101.20	85.36	90.27
R14TR	29.70	23.07	28.57	22.87	25.76	26.98	23.52
R20LQ	39.42	42.65	40.37	42.23	37.50	27.37	26.83
R21LQ	47.23	50.03	47.42	49.73	36.98	30.99	32.77

FIGURE 6.39
RELEVANT FINANCIAL RATIOS FOR COMPANY BRUNTONS (MUSSELBURGH)

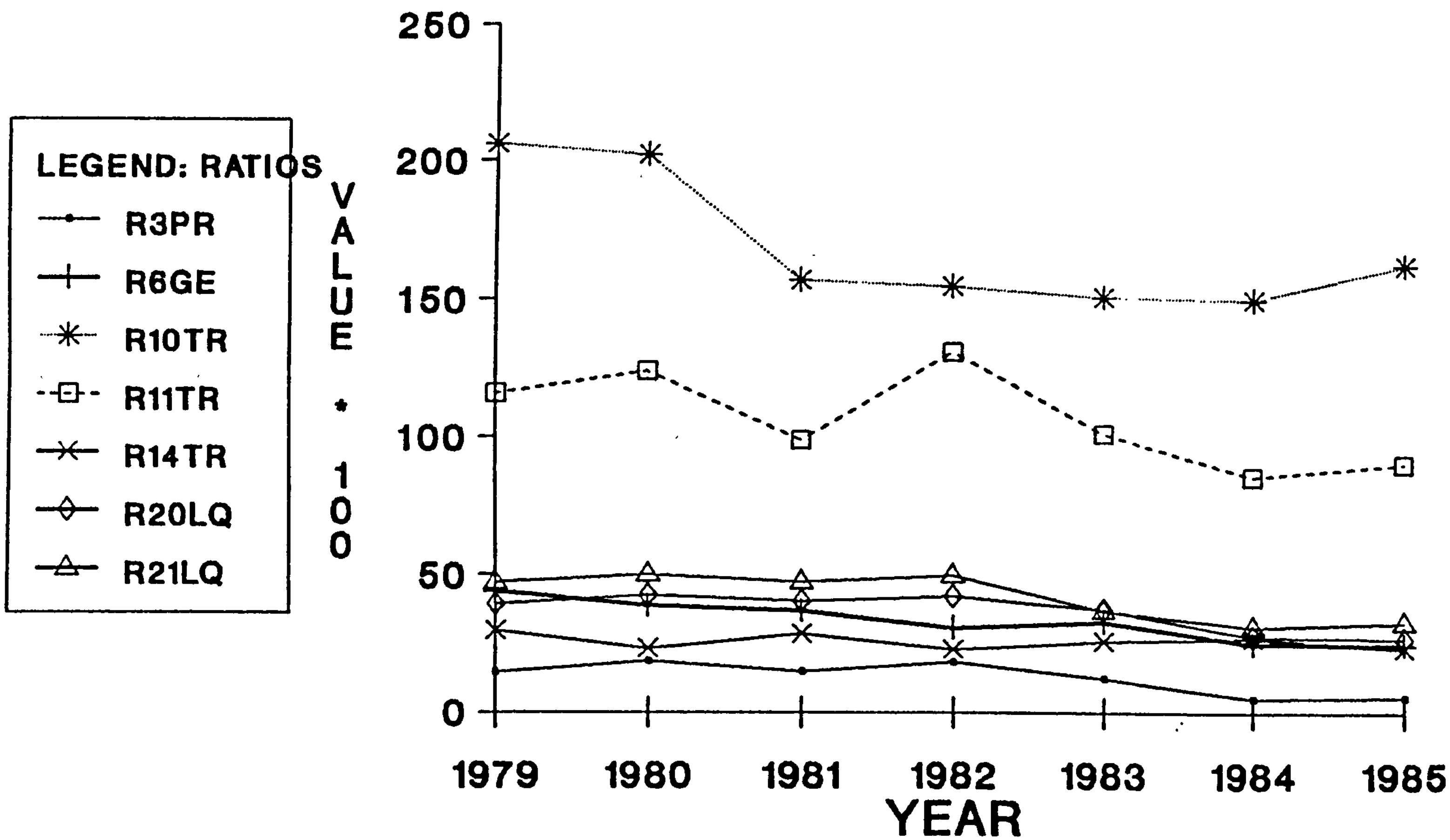

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FIGURE 6.40
ZSCORES FOR COMPANY
ELBIEF

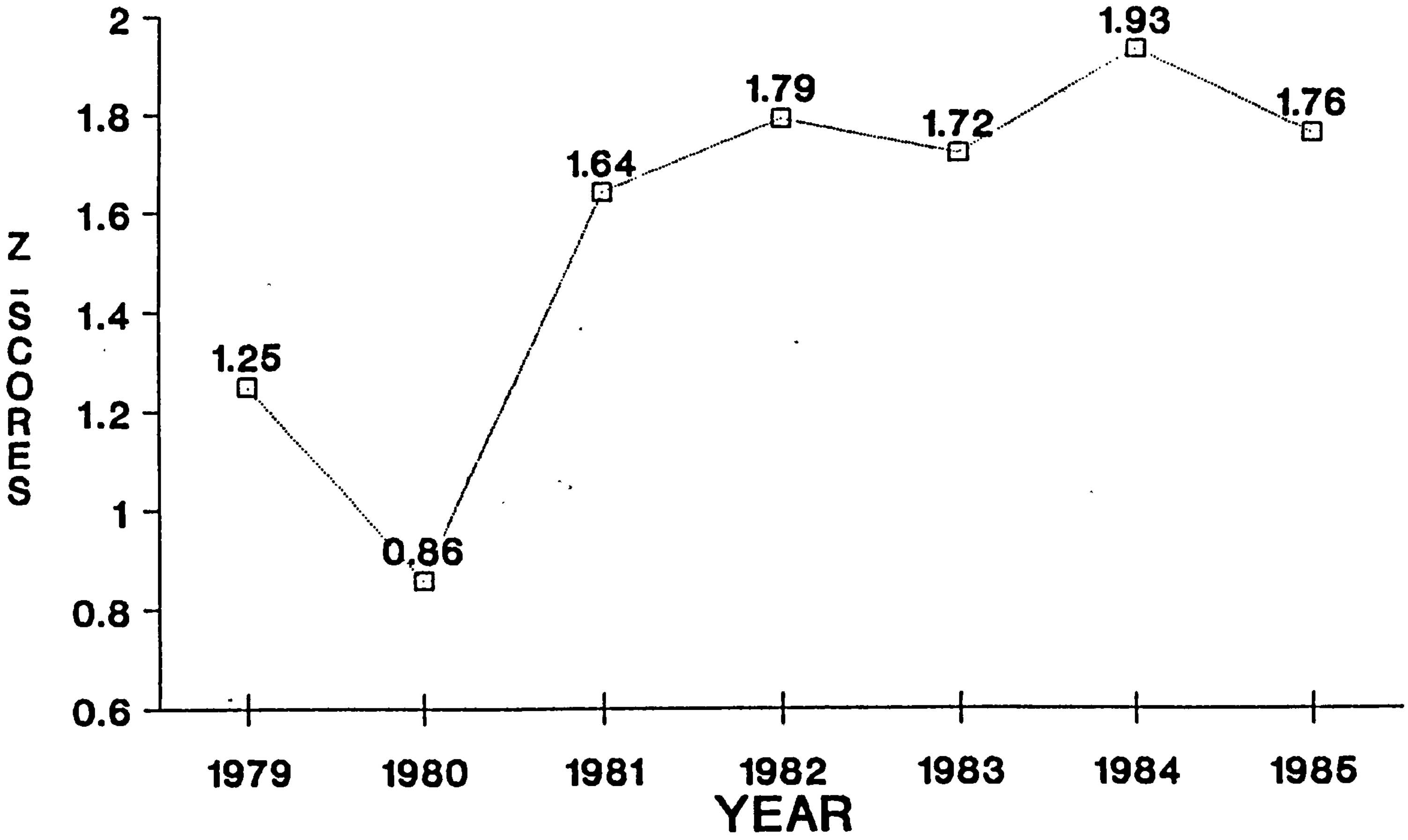


TABLE 6.26

VALUE OF RELEVANT FINANCIAL RATIOS *100 FOR

COMPANY ELBIEF

RATIOS	1979	1980	1981	1982	1983	1984	1985
R3PR	7.08	5.12	9.85	10.26	9.50	10.06	8.70
R6GE	24.20	29.40	25.51	20.26	19.28	20.61	19.73
R10TR	94.01	105.28	75.54	74.67	77.66	96.20	98.56
R11TR	71.26	60.81	74.32	116.15	92.69	115.37	91.11
R14TR	40.23	38.83	49.19	40.92	47.72	36.61	37.44
R20LQ	32.97	28.97	32.31	37.46	35.40	40.94	37.48
R21LQ	44.59	41.85	43.83	47.68	49.27	53.20	50.80

FIGURE 6.41
RELEVANT FINANCIAL RATIOS FOR
COMPANY ELBIEF

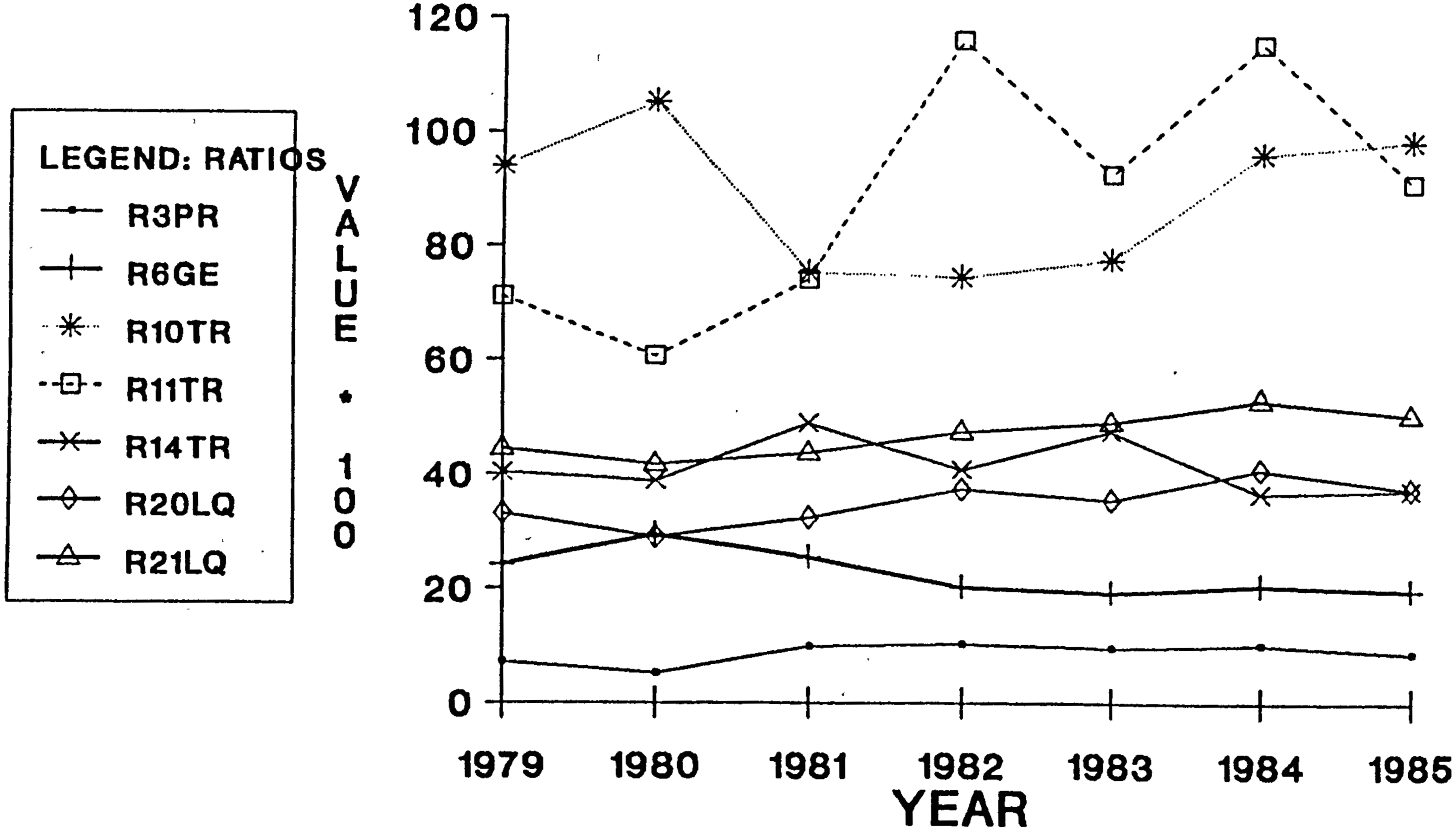


FIGURE 6.42
ZSCORES FOR COMPANY
FRIENDLY HOTELS

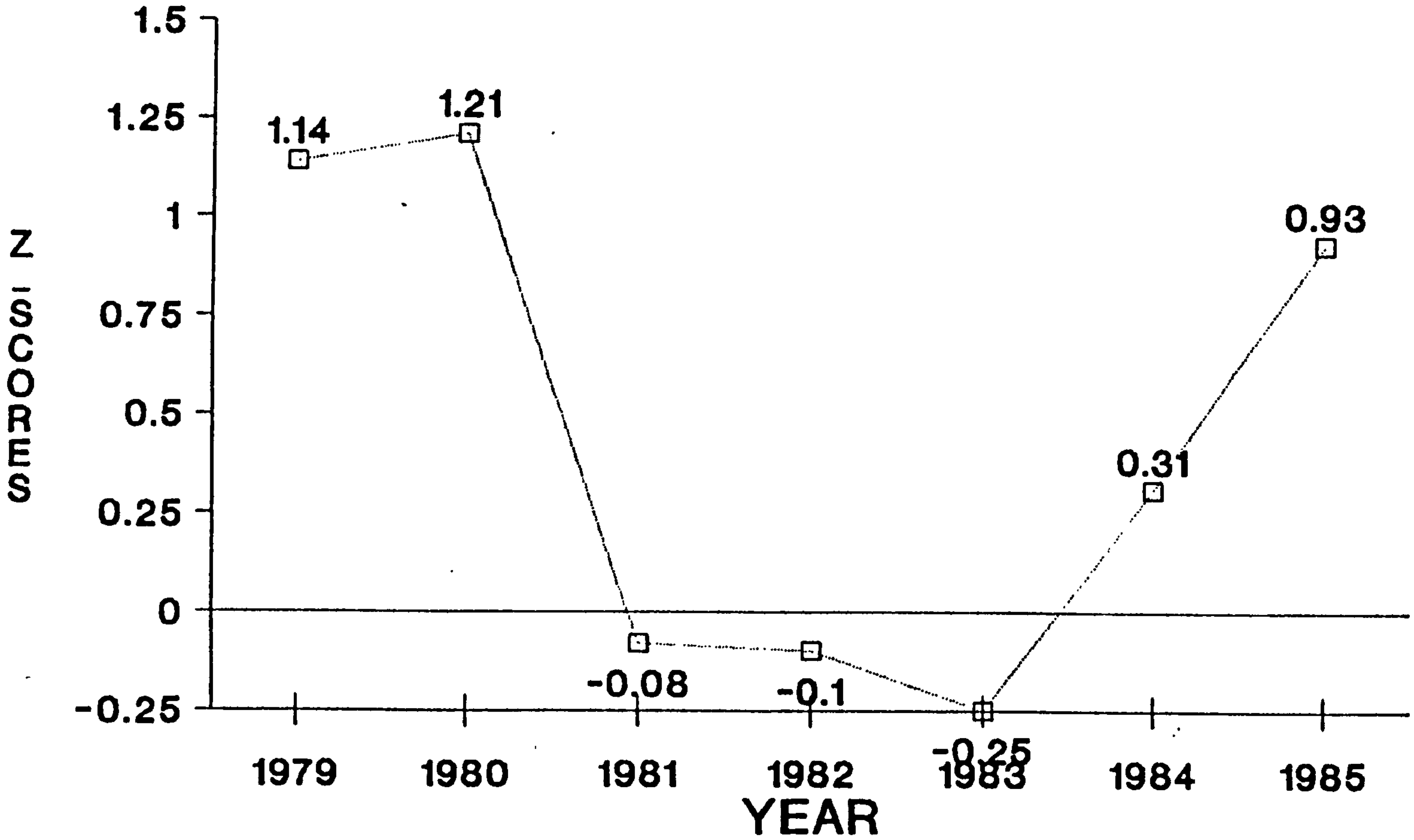


TABLE 6.27

VALUE OF RELEVANT FINANCIAL RATIOS *100 FOR COMPANY FRIENDLY HOTELS

	YEARS						
RATIOS	1979	1980	1981	1982	1983	1984	1985
R3PR	14.34	12.05	-0.78	-3.11	-8.05	2.44	4.92
R6GE	26.84	29.71	37.72	38.42	41.90	34.35	29.20
R10TR	123.22	121.44	118.49	119.91	105.09	109.60	115.01
R11TR	90.14	85.36	73.33	68.84	47.24	80.37	90.69
R14TR	2.11	2.33	2.26	2.20	2.28	2.00	1.75
R20LQ	13.84	6.29	3.62	4.47	3.00	4.45	1.67
R21LQ	34.06	23.31	18.06	16.78	6.13	17.04	20.13

FIGURE 6.43
RELEVANT FINANCIAL RATIOS FOR COMPANY FRIENDLY HOTELS

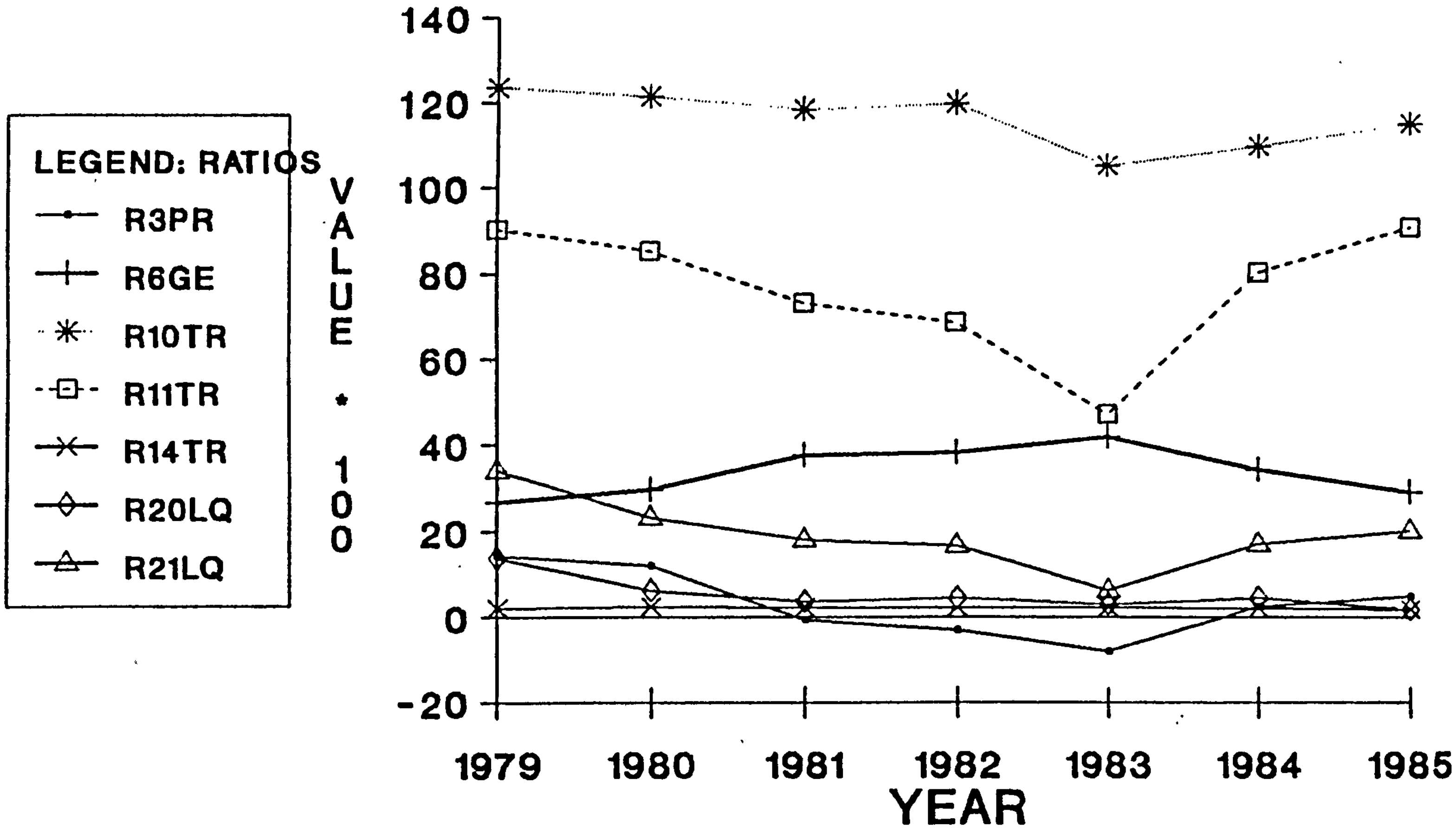


FIGURE 6.44
ZSCORES FOR COMPANY
GNOME PHOTOGRAPHIC PRODUCTS

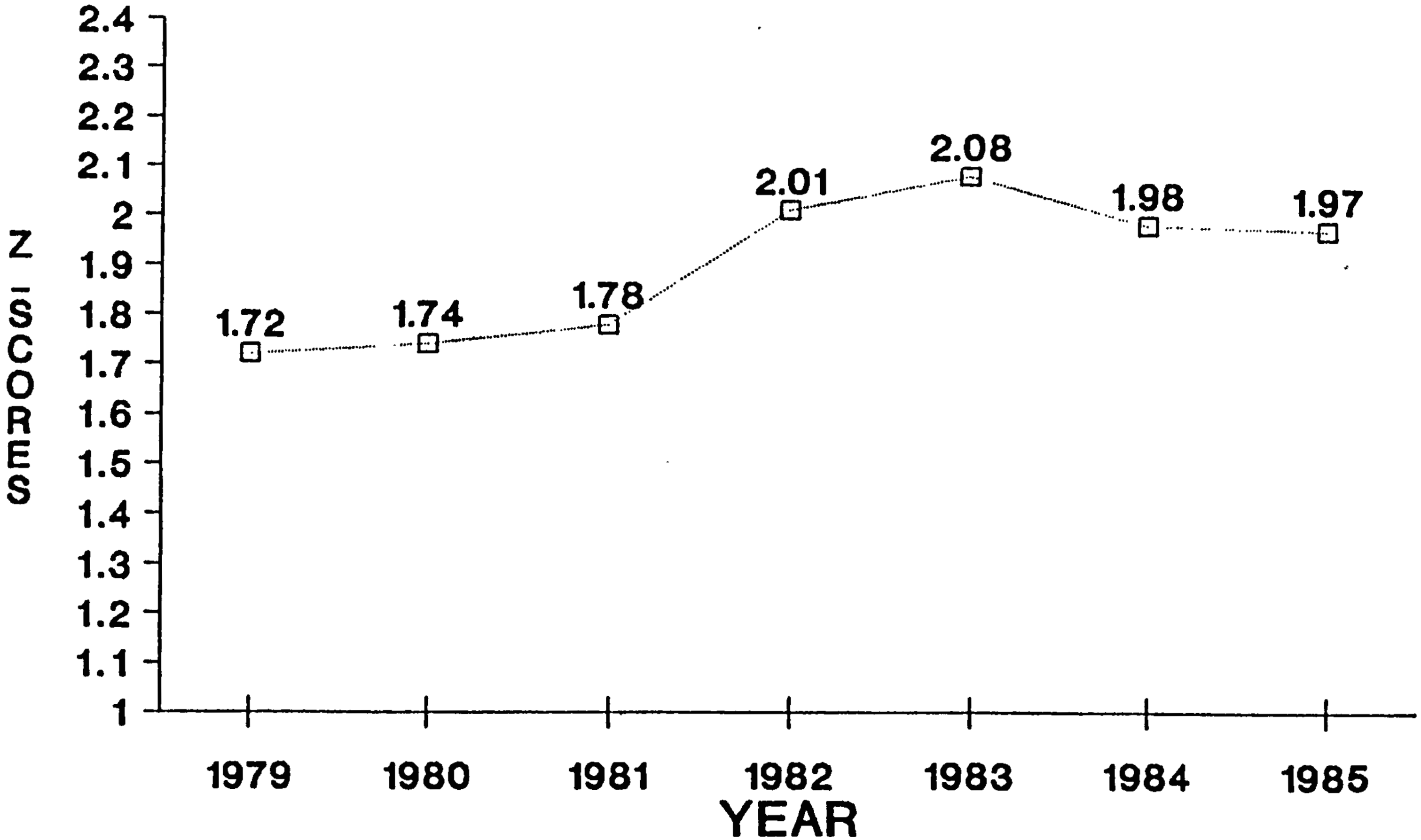


TABLE 6.28

VALUE OF RELEVANT FINANCIAL RATIOS *100 FOR

COMPANY GNOME PHOTOGRAPHIC PRODUCTS

	YEARS						
RATIOS	1979	1980	1981	1982	1983	1984	1985
R3PR	9.44	9.60	9.88	15.60	18.41	13.24	10.81
R6GE	37.91	34.27	29.05	25.76	24.79	27.67	30.04
R10TR	101.64	105.63	110.64	117.82	124.45	111.62	125.09
R11TR	72.11	75.35	78.56	92.58	102.50	80.73	87.52
R14TR	25.40	27.29	28.24	21.87	22.03	21.53	20.46
R20LQ	69.07	67.59	66.91	68.45	69.59	70.01	68.86
R21LQ	60.41	60.76	61.09	64.95	65.53	64.54	63.25

FIGURE 6.45
RELEVANT FINANCIAL RATIOS FOR
COMPANY GNOME PHOTOGRAPHIC PRODUCTS

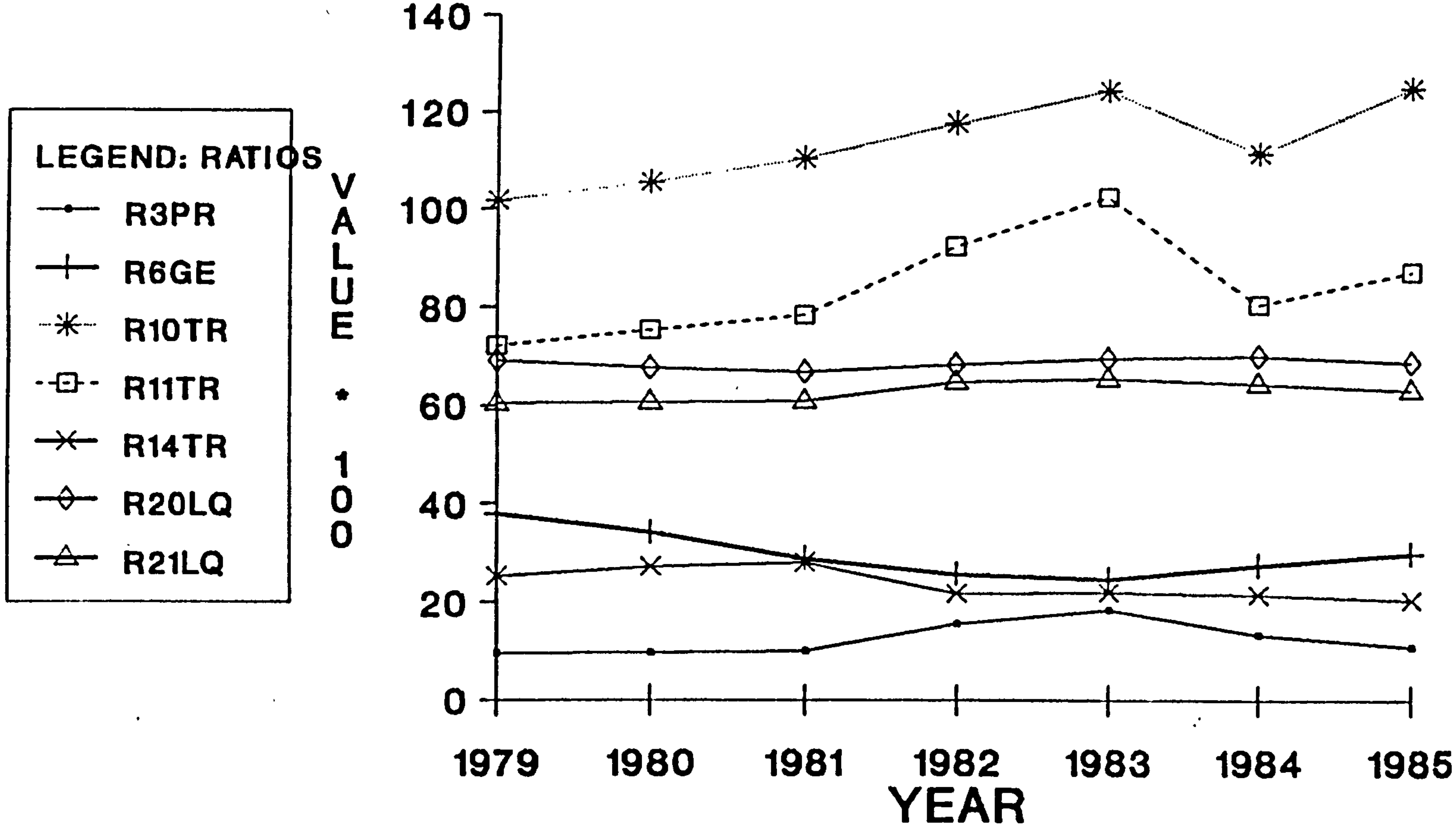


FIGURE 6.46
ZSCORES FOR COMPANY
HARVEY & THOMPSON

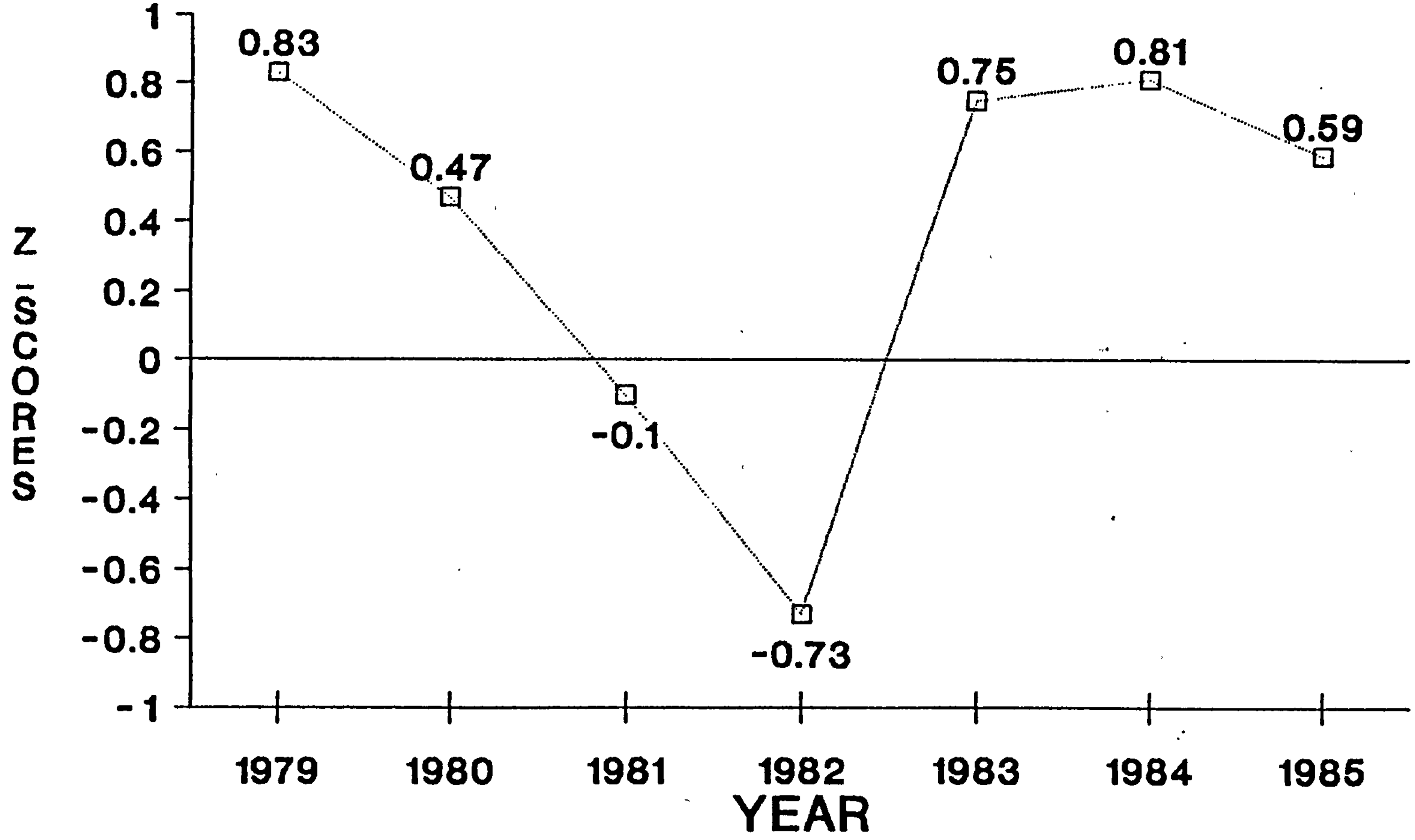


TABLE 6.29

VALUE OF RELEVANT FINANCIAL RATIOS *100 FOR

COMPANY HARVEY & THOMPSON

RATIOS	1979	1980	1981	1982	1983	1984	1985
	YEARS						
R3PR	12.47	7.35	-6.17	-16.54	10.65	15.34	14.18
R6GE	39.49	43.64	48.21	55.19	44.17	40.09	42.66
R10TR	118.97	132.81	113.93	71.00	68.40	81.07	83.41
R11TR	71.99	61.85	41.84	35.16	55.19	62.09	60.15
R14TR	56.47	51.84	38.80	8.72	6.01	6.01	4.44
R20LQ	30.84	36.14	45.56	72.25	77.20	78.58	82.27
R21LQ	38.27	32.41	30.77	25.35	36.86	39.79	36.90

FIGURE 6.47
RELEVANT FINANCIAL RATIOS FOR COMPANY HARVEY & THOMPSON

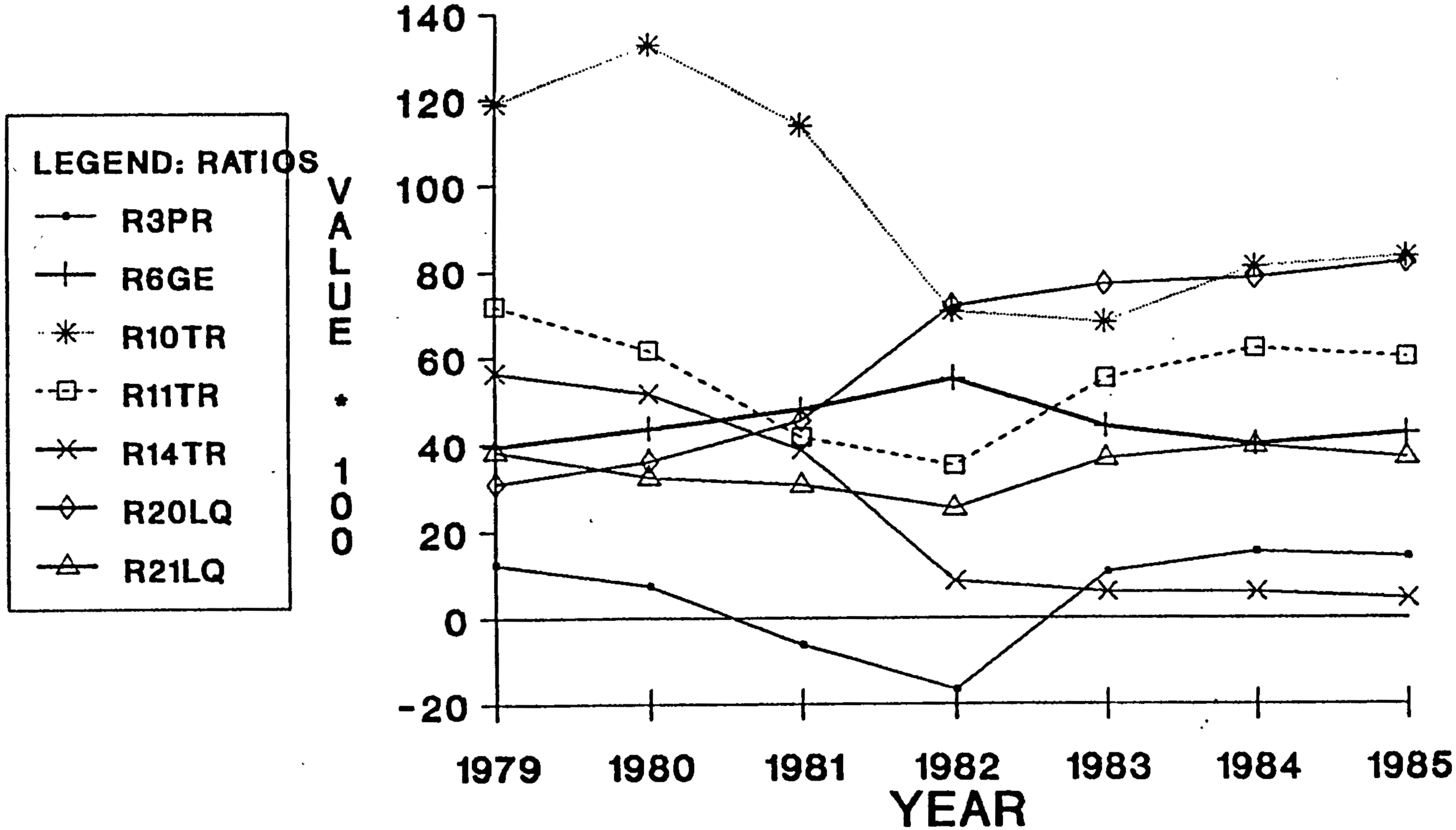


FIGURE 6.48
ZSCORES FOR COMPANY
HIGH GOSFORTH PARK

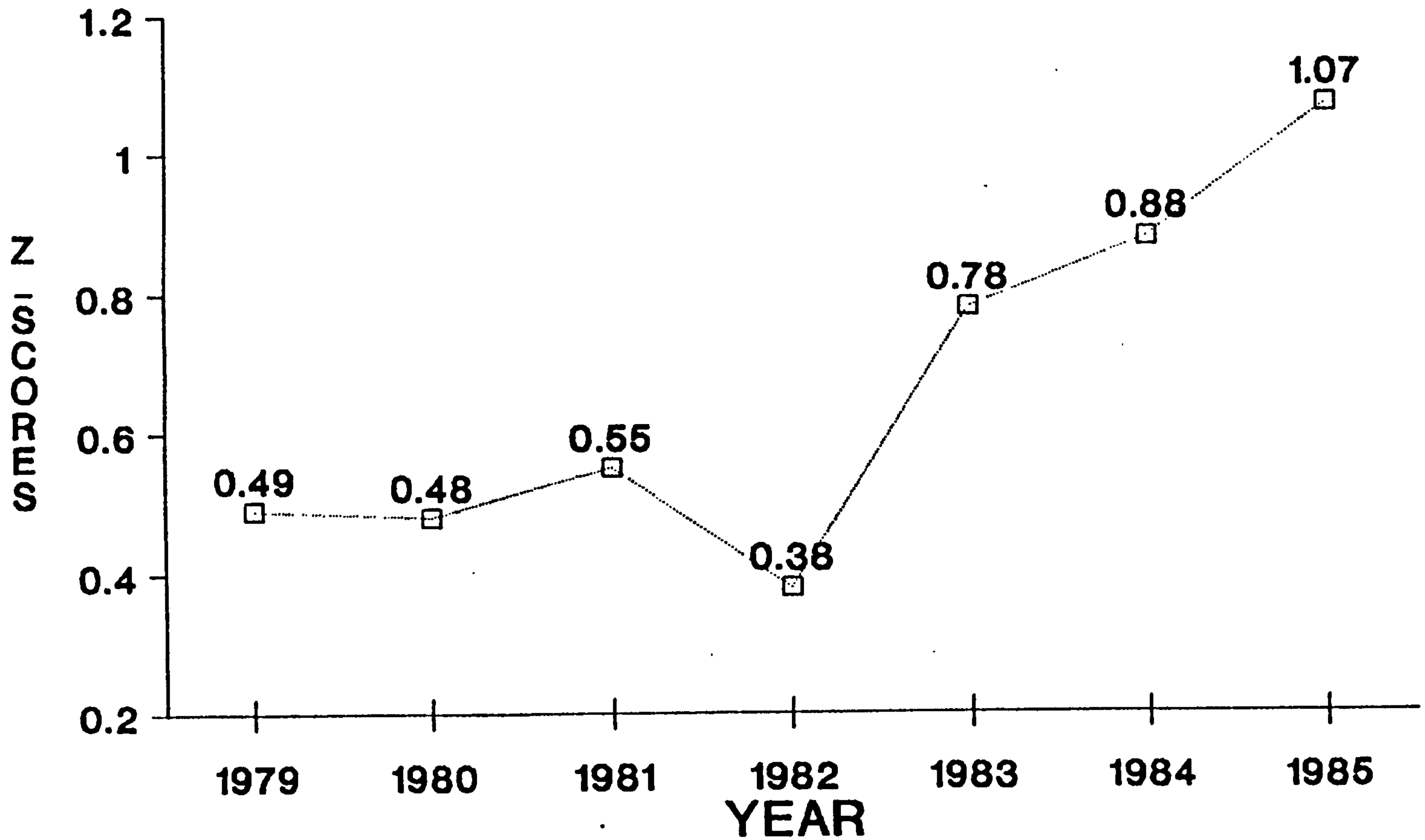


TABLE 6.30

VALUE OF RELEVANT FINANCIAL RATIOS *100 FOR

COMPANY HIGH GOSFORTH PARK

	YEARS						
RATIOS	1979	1980	1981	1982	1983	1984	1985
R3PR	.00	.56	1.30	0.74	1.41	1.48	3.56
R6GE	19.00	20.78	20.70	20.02	20.46	15.93	15.42
R10TR	64.58	68.91	72.88	55.71	55.58	58.86	59.52
R11TR	46.82	47.01	52.31	50.04	54.64	57.74	83.77
R14TR	2.29	1.99	.31	.00	.00	.00	.00
R20LQ	10.06	14.59	16.84	15.23	22.22	24.06	26.86
R21LQ	1.48	2.96	6.87	4.16	10.57	11.88	15.50

FIGURE 6.49
RELEVANT FINANCIAL RATIOS FOR COMPANY HIGH GOSFORTH PARK

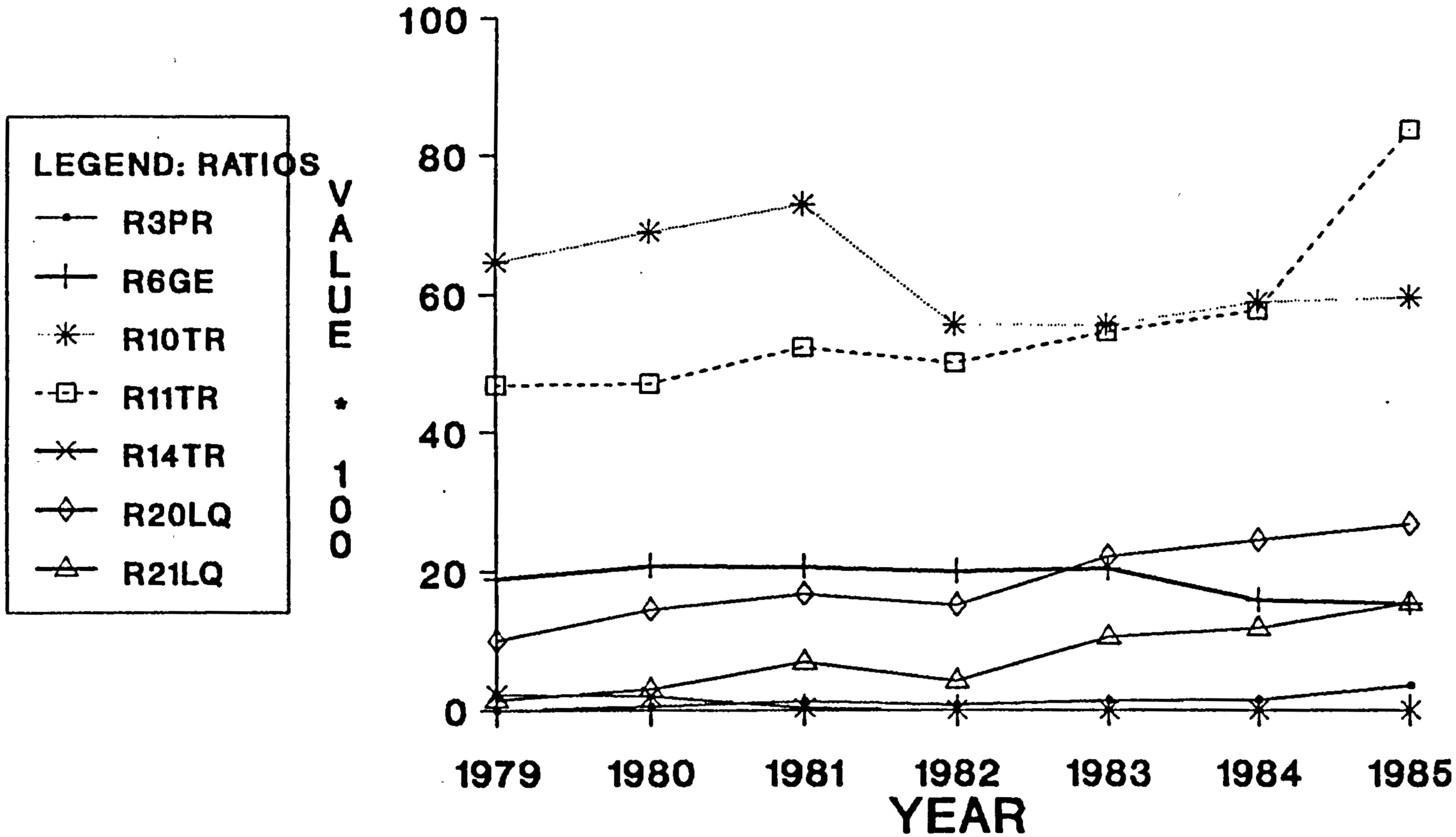


FIGURE 6.50
ZSCORES FOR COMPANY
RANSOM(WILLIAM) & SON

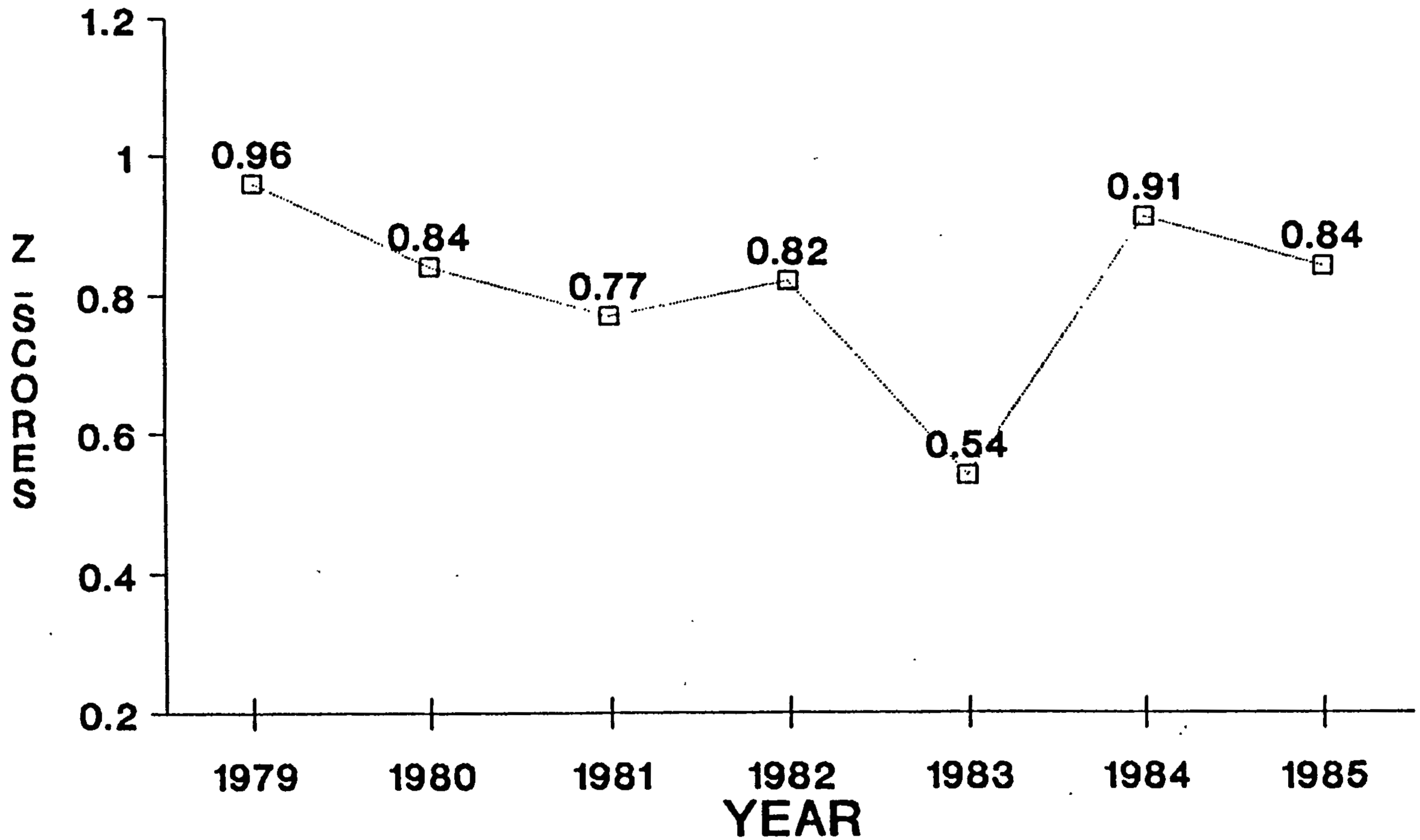


TABLE 6.31

VALUE OF RELEVANT FINANCIAL RATIOS *100 FOR

COMPANY RANSOM (WILLIAM) & SON

	YEARS						
RATIOS	1979	1980	1981	1982	1983	1984	1985
R3PR	17.56	16.81	8.88	9.56	6.61	10.37	8.28
R6GE	36.33	36.39	33.27	30.65	32.56	29.30	33.26
R10TR	134.74	125.47	120.68	126.47	122.97	140.68	135.09
R11TR	85.79	83.73	76.77	85.30	76.05	99.89	91.18
R14TR	35.24	39.71	34.49	35.66	44.83	40.48	37.02
R20LQ	29.38	27.37	21.96	26.14	20.13	29.37	25.85
R21LQ	47.36	42.09	37.29	40.80	38.69	42.14	36.55

FIGURE 6.51
RELEVANT FINANCIAL RATIOS FOR
COMPANY RANSOM (WILLIAM) & SON

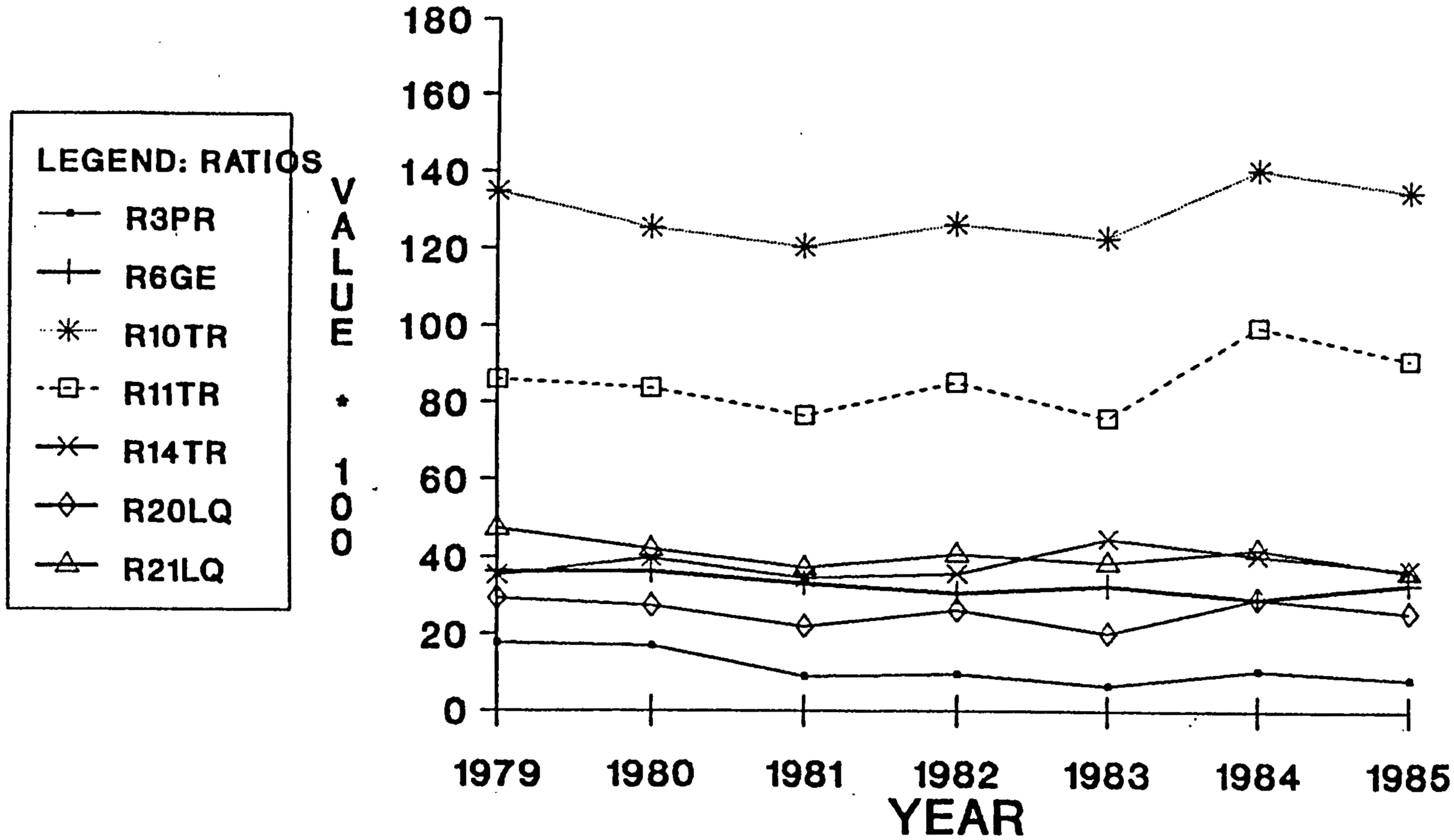


FIGURE 6.52
ZSCORES FOR COMPANY
RIVOLI CINEMAS

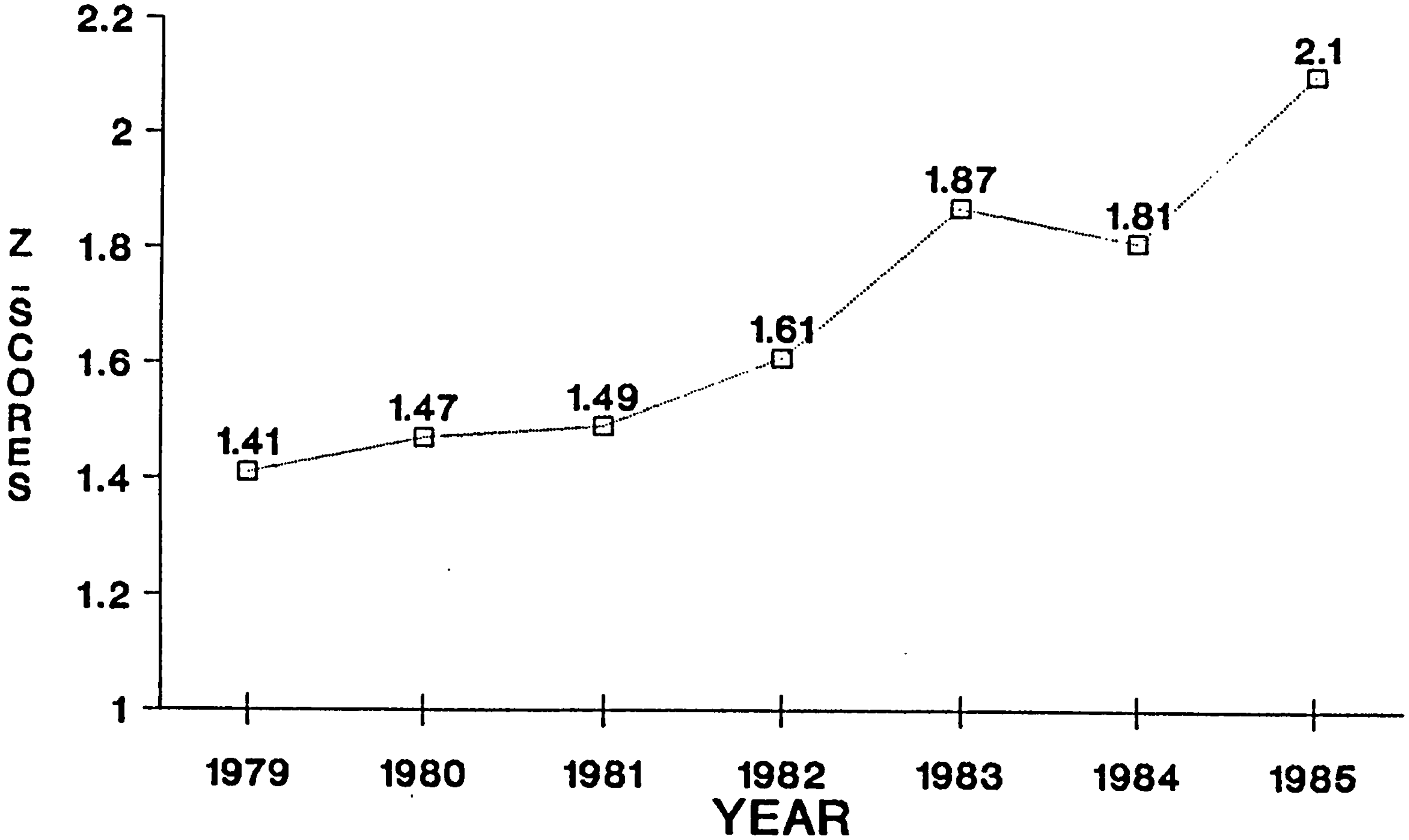


TABLE 6.32

VALUE OF RELEVANT FINANCIAL RATIOS *100 FOR

COMPANY RIVOLI CINEMAS

	YEARS						
RATIOS	1979	1980	1981	1982	1983	1984	1985
R3PR	12.87	18.88	20.27	22.14	24.50	22.01	31.61
R6GE	30.47	28.26	27.14	25.48	24.90	22.87	20.08
R10TR	35.42	38.33	42.45	44.18	50.51	45.66	51.14
R11TR	19.87	23.50	29.51	33.30	39.17	32.87	41.71
R14TR	6.43	5.65	5.13	3.64	1.61	2.39	3.13
R20LQ	30.12	39.46	42.38	43.74	44.11	40.95	55.88
R21LQ	12.67	13.24	14.05	17.96	26.88	19.76	30.76

FIGURE 6.53
RELEVANT FINANCIAL RATIOS FOR COMPANY RIVOLI CINEMAS

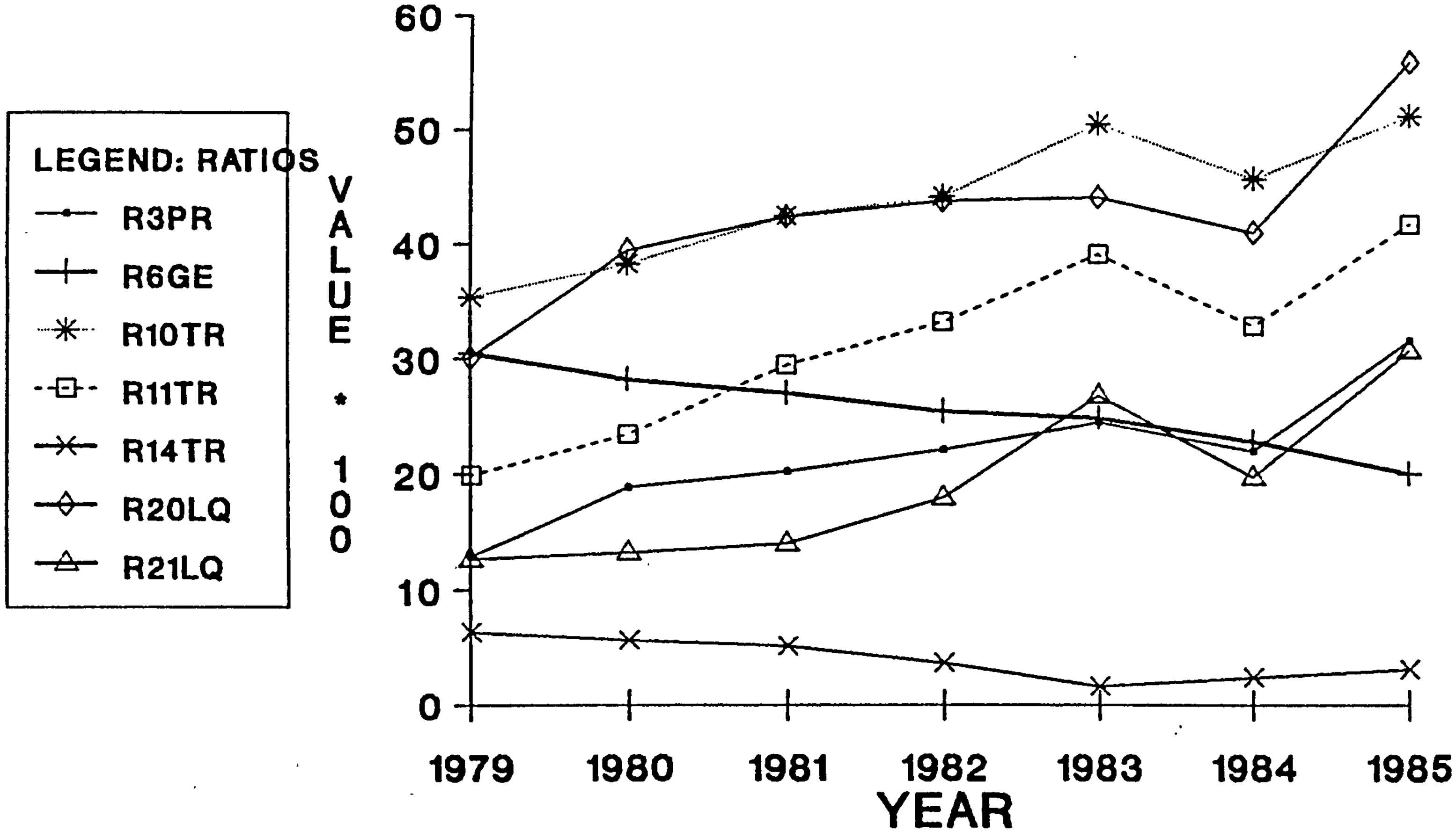


FIGURE 6.54
ZSCORES FOR COMPANY
WPP GROUP

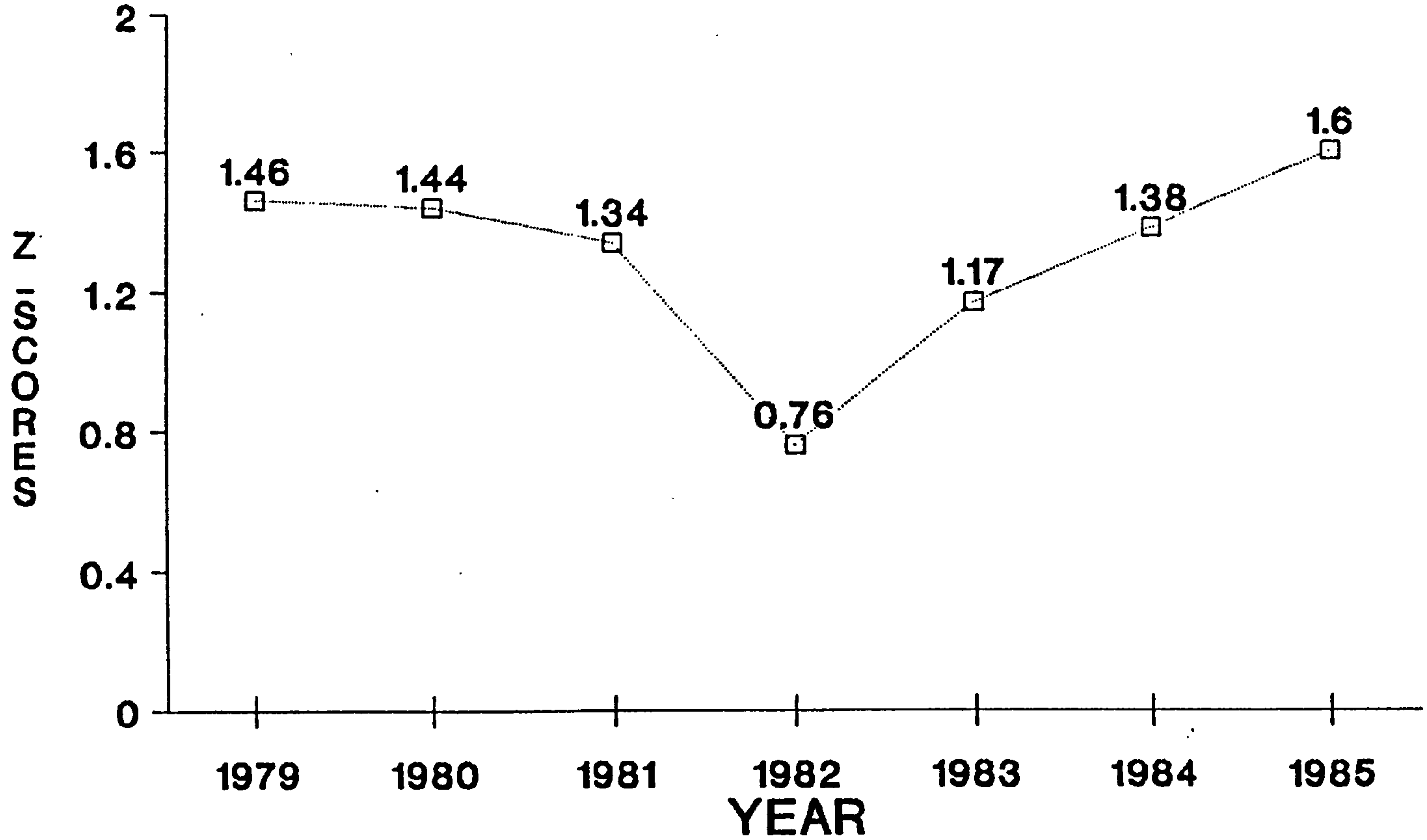


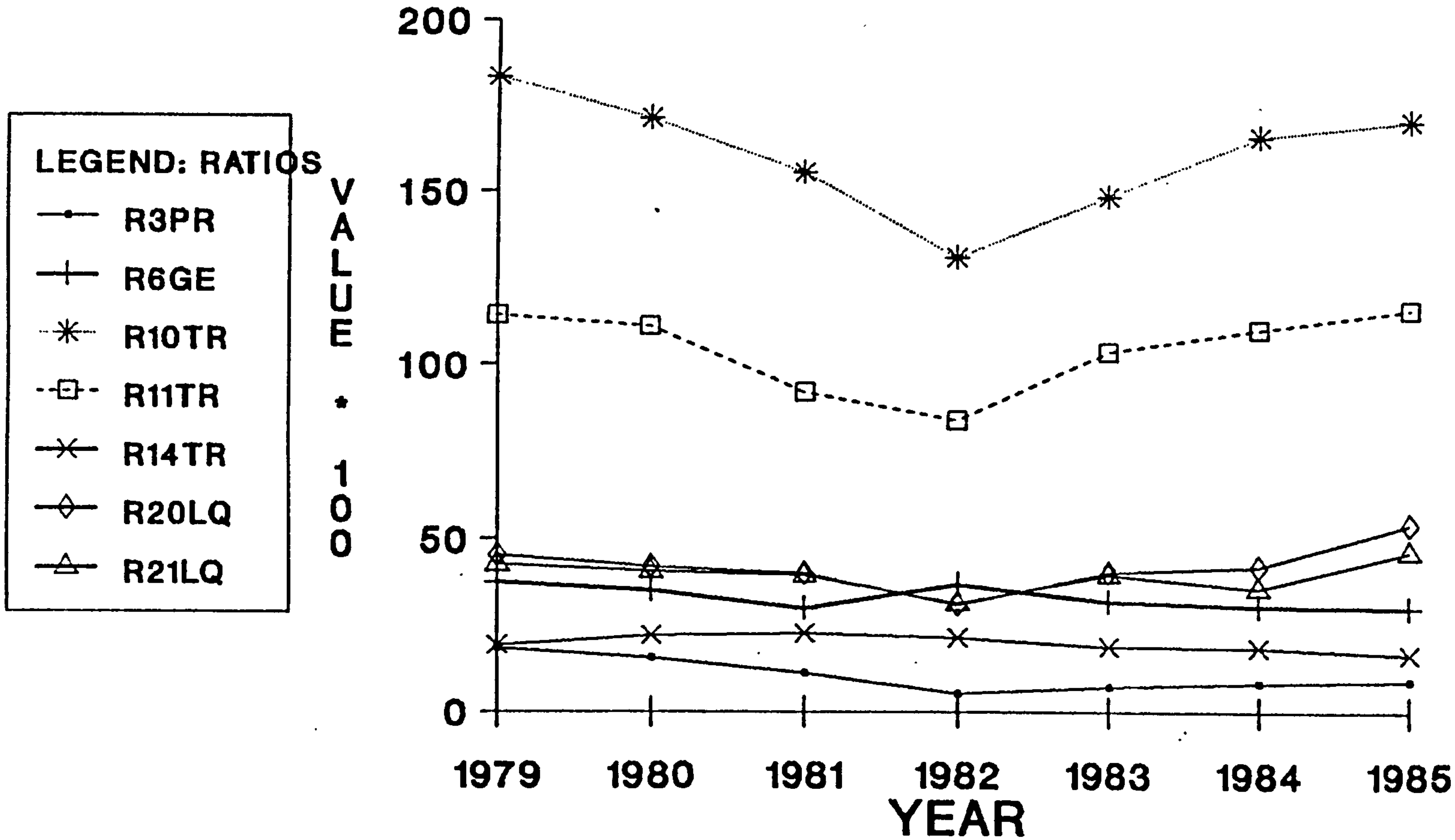
TABLE 6.33

VALUE OF RELEVANT FINANCIAL RATIOS *100 FOR

COMPANY WPP GROUP

	YEARS						
RATIOS	1979	1980	1981	1982	1983	1984	1985
R3PR	18.35	15.58	11.18	5.26	7.27	8.35	9.07
R6GE	37.61	35.04	29.88	36.98	31.93	30.56	30.11
R10TR	183.24	171.29	155.48	131.27	148.41	166.04	170.40
R11TR	114.32	111.28	92.05	84.21	103.72	110.30	116.00
R14TR	19.20	21.95	22.68	21.35	18.78	18.59	16.64
R20LQ	45.29	42.10	40.09	31.15	40.24	42.08	54.15
R21LQ	42.63	40.83	39.66	31.54	39.75	35.82	46.32

FIGURE 6.55
RELEVANT FINANCIAL RATIOS FOR
COMPANY WPP GROUP



CHAPTER SEVEN

SUMMARY AND CONCLUSIONS

This chapter contains a summary of the study, conclusions and some recommendations for future research.

7.1 SUMMARY:

The underlying premise of this study was that there exists a group of accounting and financial characteristics of small-medium companies, which, when identified and properly evaluated, are indicative of "success" or "failure". As cited in chapter three, most reported research studies have dealt with the development of statistical models to predict failure of large companies. Research suggests that these models are not directly applicable to the small companies.
The importance of small companies in an economy, the impact of their failures, and the lack of failure research with respect to this population, provided justification for this study.

Review of the relevant literature showed that ratio analysis can be an accurate and efficient method to signify possible failure of a company. Contemporary failure analysis reduced a large set of financial variables to a much smaller set of significant variables through the employment of various statistical procedures. However, all studies did not use the same types of financial variables. Differences in the selection of financial variables could be attributed to the different time periods investigated and to the various industries for which the data were collected.

Further, the predictive power of the statistical models appears to be dependent upon the choice of methodology utilized, as well as the type of companies, time period of the data, and the specific ratios and other financial indicators used. Table 3.1 presented a summary of some selected references along with categories of financial ratios used by the authors. The specific ratios were presented in table 3.2.

This study was restricted to a sample of companies selected from the Exstat tape provided by Extel Company Limited. Selection of financial ratios used in the analysis was based on four criteria:

1. Data availability permitting calculation of the financial ratios.
2. Their ability to predict failure in previous studies.
3. Their popularity in the literature, and
4. The development of a comprehensive set of ratios representing traditional categories of ratio analysis, such as capital turnover, profitability, gearing and liquidity.

Multiple discriminant analysis was employed to determine the "best" discriminant function. "Best" was determined according to classification ability of the function and interpretation of the variables. The analysis was performed in three stages. In stage one five discriminant functions were evaluated for each of five years prior to failure, whereas, in stage two the performance of those functions was tested over time. Finally stage three was concerned with a validation technique. Selection of the final model was based on the classification ability and interpretation of the variables.

7.2 CONCLUSIONS:

In view of the results presented within chapter six, examining the general characteristics of the failed and nonfailed companies (section 6.2), it was concluded that:

1. Assets of failed companies were not utilised efficiently since they maintained a higher percentage of fixed assets than the nonfailed companies.

2. Failed companies rely on short and long term borrowing as their major sources of finance, whereas the nonfailed companies maintained a higher percentage of equity compared to the failed companies.

A model based on linear discriminant analysis and published accountancy data has been developed to identify small and medium sized U.K. companies in danger of failure up to five years prior to failure.
The model distinguishes failed companies from nonfailed with an overall average accuracy of 88% , 87% , 78% , 71% , 78% for year one to five respectively prior to failure, when it was tested over time on data not used in its construction (see table 6.7).

The predictive accuracy of the model was also high in the validation sample, that is when tested on a sample drawn outside the period of study. In fact the model correctly identified 80% of the failed companies in year one and two before the failure event occurred. If the z-score trends are also used as an indication of failure, then the performance of the model on the validation sample is further improved.

The combination of financial ratios in the model covers the four major dimensions , that is, profitability, gearing, capital turnover and liquidity.

It was concluded in section (6.5.2), that univariate analysis of financial ratios does not appear to be a satisfactory approach and hence it is a poor substitute for the multivariate approach in identifying companies in danger of failure, whereas this traditional method of analysis generated useful information about the performance of the nonfailed companies.

Financial ratio analysis could be useful when a model, capable of providing early warning signals of impending failure, would allow a company to determine financial problems which if left unchecked would lead to failure in the near future. When a company can identify problems which indicate failure and initiate corrective actions, the credibility of the company will not be lost.

However, the model developed here with the constituent ratios representing each dimension of a company has shown to be a valid tool for predicting companies' health up to five years in advance. With such valid information, lenders, investors and credit underwriters should be able to identify those companies that are at risk of failure from the rest and a detailed examination before agreeing to give any financial help should be made.

7.3 RECOMMENDATIONS FOR FURTHER RESEARCH:

This study provided the researcher with several recommendations for future research in the area of small company failure analysis. Some are provided below:

1. Replication and extension to more recent data to allow comparison over different time periods.
2. The impact of inflation on input data is worthy of study, since certain ratios are expected to be affected more than the rest, because of unadjusted historical cost accounts.
3. The use of factor analysis to enhance variable selection is recommended to avoid the problem of information redundancy of financial ratios. It should be noted that, this procedure has been employed in predicting the failure of large companies.

Appendix A

Computation of the Discriminant Equation

Discriminant equation is defined as

$$Z = u_1X_1 + u_2X_2 + \ldots + u_pX_p \tag{1}$$

We are dealing with two groups, Group 1 and Group 2, so putting a small number representative of the group at the end,

$$Z_{i1} = u_1X_{i11} + u_2X_{i21} + \ldots + u_pX_{ip1} \tag{2}$$

$$Z_{i2} = u_1X_{i12} + u_2X_{i22} + \ldots + u_pX_{ip2} \tag{3}$$

represent the value of Z for the ith individual in each group.

The mean of the value of Z in each group is expressed as follows:

$$\bar{Z}_1 = \frac{\sum_{i=1}^{n_1} Z_{i1}}{n_1} = \frac{1}{n_1}\sum_{i=1}^{n_1}(u_1X_{i11} + u_2X_{i21} + \ldots + u_pX_{ip1})$$

$$= u_1\bar{X}_{11} + u_2\bar{X}_{21} + \ldots + u_p\bar{X}_{p1} \tag{4}$$

$$\bar{Z}_2 = u_1\bar{X}_{12} + u_2\bar{X}_{22} + \ldots + u_p\bar{X}_{p2} \tag{5}$$

If we let $d_j = \bar{X}_{j1} - \bar{X}_{j2}$

and if $D = \bar{Z}_1 - \bar{Z}_2$

then

$$D = u_1d_1 + \ldots + u_pd_p = u'd \tag{6}$$

where $u' = (u_1 u_2 \ldots u_p)$

$d' = (d_1 d_2 \ldots d_p)$

We now define $z_{i1} = Z_{i1} - \bar{Z}_1$

then the variance within each group will become

$$\sum_{i=1}^{n_1} z_{i1}^2 = u_1^2 \Sigma (X_{i11} - \bar{X}_{11})^2 + \ldots + u_p^2 \Sigma (X_{ip1} - \bar{X}_{p1})^2$$

$$+2u_1 u_2 \Sigma (X_{i11} - \bar{X}_{11})(X_{i21} - \bar{X}_{21}) + \ldots + 2u_{p-1} u_p \Sigma (X_{ip-11} - \bar{X}_{p-11})(X_{ip1} - \bar{X}_{p1})$$

$$= u_1^2 S_{111} + \ldots + u_p^2 S_{pp1} + 2u_1 u_2 S_{121} + \ldots + 2u_{p-1} u_p S_{p-1p1}$$

$$= u' S_1 u \tag{7}$$

$$\sum_{i=1}^{n_2} z_{i2}^2 = u' S_2 u \tag{8}$$

where $S_1 = \begin{bmatrix} S_{111} & \ldots & S_{1p1} \\ \vdots & & \vdots \\ S_{p11} & \ldots & S_{pp1} \end{bmatrix}$ $\qquad S_2 = \begin{bmatrix} S_{112} & \ldots & S_{1p2} \\ \vdots & & \vdots \\ S_{p12} & \ldots & S_{pp2} \end{bmatrix}$

in which $S_{jkm} = \sum_{i=1}^{n_m} (X_{ijm} - \bar{X}_{jm})(X_{ikm} - \bar{X}_{km})$

The sum of the variance of each group may now be expressed as

$$V = \sum_{i=1}^{n_1} z_{i1}^2 + \sum_{i=1}^{n_2} z_{i2}^2 = u' S_1 u + u' S_2 u = u'(S_1 + S_2)\ u$$

If we let $\quad W = S_1 + S_2$

then $\quad V = u' W u \qquad (9)$

The discriminant criterion is expressed as

$$\lambda = \frac{D^2}{V} = \frac{(ud)^2}{u'wu} \tag{10}$$

To determine the value of u which maximizes λ, we take the first derivative of (10) with respect to u and set it equal to zero.

$$\frac{\partial\lambda}{\partial u} = \frac{1}{V^2} \left| V\left(\frac{\partial D^2}{\partial u}\right) - D^2 \frac{\partial V}{\partial u} \right| = 0$$

so $$2\not{D}V \frac{\partial D}{\partial u} = D^2 \frac{\partial V}{\partial u} \tag{11}$$

whereas $$\frac{\partial D}{\partial u} = \frac{\partial (u'd)}{\partial u} = d$$

$$\frac{\partial V}{\partial u} = \frac{\partial (u'wu)}{\partial u} = 2wu$$

Hence from (11)

$$\frac{V}{D} d = wu$$

Assuming that the inverse of w exists,

$$u = \frac{V}{D} w^{-1} d \tag{12}$$

Since the multiplier $\frac{V}{D}$ will not affect the proportionality among the elements of u, it will be convenient to set it equal to one. Thus, we may state,

$$u = w^{-1} d \tag{13}$$

Now the values of u_1 to u_p in the discriminate equation (1) is obtained.

We now have to test whether the difference is statistically significant. F-test can be conducted with hypothesis;

$$H_o : \mu_1 = \mu_2$$

$$H_1 : \mu_1 \neq \mu_2$$

Table A.1 may be useful for the calculation of F-value.

Table A.1

Source	Sum of Squares	Degrees of Freedom	Mean Square	F
Between Groups	$SS_B = \frac{n_1 n_2}{n_1 + n_2} D^2$	p	$MS_B = \frac{SS_B}{p}$	$\frac{MS_B}{MS_W}$
Within Groups	$SS_W = D$	$n_1 + n_2 - p - 1$	$MS_W = \frac{SS_W}{n_1 - n_2 - p - 1}$	

(Lindeman 1980)

APPENDIX B

n \ α	.20	.10	.05	.01
5	.45	.51	.56	.67
10	.32	.37	.41	.49
15	.27	.30	.34	.40
20	.23	.26	.29	.36
25	.21	.24	.27	.32
30	.19	.22	.24	.29
35	.18	.20	.23	.27
40	.17	.19	.21	.25
45	.16	.18	.20	.24
50	.15	.17	.19	.23
Large Values	$\frac{1.07}{\sqrt{n}}$	$\frac{1.22}{\sqrt{n}}$	$\frac{1.36}{\sqrt{n}}$	$\frac{1.63}{\sqrt{n}}$

Critical values of D_α in the Kolmogorov-Smirnov Test

APPENDIX C

FINANCIAL RATIOS USED TO CONSTRUCT THE DISCRIMINANT MODELS

RETURN ON INVESTMENT OR PROFITABILITY RATIOS

R1PR	Net Income / Sale
R2PR	Net Income / Total Assets
R3PR	Net Income / Net Worth
R4PR	Earnings Before Interest And Tax / Total Assets
R5PR	Net Income / Total Liabilities

FINANCIAL LEVERAGE (GEARING) RATIOS

R6GE	Total Liabilities / Total Assets
R7GE	New Worth / Total Liabilities
R8GE	Net Worth / Total Assets
R9GE	Fixed Assets / Net Worth

CAPITAL TURNOVER AND ACTIVITY RATIOS

R10TR	Sales / Net Wort
R11TR	Sales / Total Assets
R12TR	Sales / Fixed Assets
R13TR	Working Capital / Sales
R14TR	Inventory / Sales

LIQUIDITY RATIOS

R15LQ	Current Assets / Current Liabilities
R16LQ	Quick Assets / Current Liabilities
R17LQ	Cash / Total Assets
R18LQ	Cash / Current Liabilities
R19LQ	Inventory / Current Assets
R20LQ	Quick Assets / Total Assets
R21LQ	Working Capital / Total Assets
R22LQ	Working Capital / Current Liabilities

APPENDIX D

THE TRANSFORMATIONS USED FOR THE FINANCIAL RATIOS

FINANCIAL RATIOS NUMBER	TRANSFORMATION
R1PR	NONE
R2PR	NONE
R3PR	NONE
R4PR	NONE
R5PR	NONE
R6GE	NONE
R7GE	SQR
R8GE	NONE
R9GE	NONE
R10TR	NONE
R11TR	NONE
R12TR	LOG
R13TR	NONE
R14TR	NONE
R15LQ	LOG
R16LQ	LOG
R17LQ	NONE
R18LQ	NONE
R19LQ	NONE
R20LQ	NONE
R21LQ	NONE
R22LQ	SQR

LOG = Logarith SQR = Square root

APPENDIX E

TERMINOLOGY AND DEFINITION OF THE COMPONENTS OF THE VARIABLES USED IN THIS STUDY

Cash : Cash and equivalent.

Current Assets : Cash plus other items that can be easily turned into cash or sold / consumed during the normal operating cycle, that is (cash + quoted investment + debtors + inventories).

Current Liabilities : Total of all liabilities due within a year from debt statement (bank loans and overdrafts + short term borrowing + creditors + payables + current taxation + proposed dividend).

Earnings Before Interest And Taxes : This is the profit earned by company before deduction of interest and taxes.

Fixed Assets : These are the assets of permanent nature held for use in the operation of a company (Total net property + net other fixed assets).

Net Income	: Profit after deduction of taxes and interest.
Net Worth	: This is same as shareholders fund or equity which comprises (preferred capital + ordinary capital + share premium account + reserves + government grants).
Quick Assets	: These are the most near-cash items of current assets (the same items of current assets excluding inventory.
Sale	: The volume of the business transacted in pounds for a specific year.
Inventory (stock)	: This is the sum of stocks of raw materials, finished goods and work in progress.
Total Assets	: These are fixed assets, intangible assets, associated companies, trade investments and current assets.
Total liabilities	: Short term and long term debt (total assets - shareholders fund).
Working Capital	: Current assets minus current liabilities.

APPENDIX F

LIST OF FAILED COMPANIES

	COMPANY NAME	NO. OF YEARS DATA AVAILABLE	DATE OF LAST REPORT	TOTAL ASSETS £
1	BRITTAIN GROUP LTD	4	1975.06.28	7028473.00
2	HIGHLIGHT SPORTS	4	1975.05.19	6206500.00
3	NAYLOR(T.& A.)	4	1975.03.29	2316638.00
4	MCNEILL GROUP	7	1977.12.31	9742000.00
5	SOUTHERN CONSTRUCTIONS(HLDGS)	8	1978.12.31	4752000.00
6	BURRELL & CO	9	1979.12.31	9997000.00
7	DOXFORD(M.L.)& CO.	4	1979.10.31	7559000.00
8	DYKES(J.)(HLDGS)	8	1979.01.31	3591000.00
9	BLACKMAN & CONRAD	9	1980.01.31	4957000.00
10	BRITISH ANZANI	9	1980.03.31	3544000.00
11	FINDLAY HARDWARE GROUP	5	1980.12.31	7740000.00
12	GARTONS PLC	6	1980.12.31	1038000.00
13	GOLDMAN(H.)GROUP	10	1980.10.31	1422000.00
14	NORVIC SECURITIES	10	1980.12.31	7383000.00
15	WHITELEY(B.S.& W.)	9	1980.03.31	6315000.00
16	YORKSHIRE FINE PLC	6	1980.12.31	2719000.00
17	AUSTIN(F.)(LEYTON)	10	1981.07.03	5805000.00
18	BASTIAN INTERNATIONAL PLC	11	1981.12.31	7808000.00
19	BERWICK TIMPO PLC	11	1981.12.31	8817000.00
20	CAWDAW INDUSTRIAL HLDGS	10	1981.03.31	7586000.00

cont'd

APPENDIX F (CONTINUED)

COMPANY NAME		NO. OF YEARS DATA AVAILABLE	DATE OF LAST REPORT	TOTAL ASSETS £
21	MELLINS PLC	7	1982.12.31	1444000.00
22	MELODY MILLS PLC	5	1982.04.03	5701000.00
23	MODERN ENGRS OF BRISTOL(HLDGS)PLC	7	1982.12.31	4578000.00
24	SOLUS GROUP	7	1982.06.30	5067000.00
25	STEPHEN(ALEXANDER)& SONS LTD	11	1982.03.31	912000.00
26	WILSHAW SECURITIES PLC	6	1982.07.31	1540000.00
27	ASSOCIATED TELECOMMUNICATIONS PLC	7	1983.01.31	1465000.00
28	BARGET PLC	8	1983.12.31	2863000.00
29	CANNOCK & CO	7	1983.01.29	3193000.00
30	DENNIS(JAMES H.)PLC	7	1983.03.31	3969000.00

APPENDIX G

LIST OF NONFAILED COMPANIES

	COMPANY NAME	NO. OF YEARS DATA AVAILABLE	DATE OF LAST REPORT	TOTAL ASSETS £
1	ARCOLECTRIC (HOLDINGS) PLC	10	1985.12.31	5817000.00
2	BAILEY (BEN) CONSTRUCTION PLC	9	1985.06.30	5373000.00
3	BENLOX HOLDINGS PLC	10	1985.12.31	9408000.00
4	BOOTH (JOHN) & SONS (BOLTON) PLC	9	1985.03.31	5633000.00
5	BRITISH BLDG & ENG APPLIANCES PLC	9	1985.03.31	2993000.00
6	BULGIN(A.F.)& CO PLC	15	1986.01.31	6356000.00
7	CHEMRING GROUP PLC	9	1985.09.30	7516000.00
8	CLYDE BLOWERS PLC	9	1985.08.31	3149000.00
9	COPSON(F.)PLC	9	1985.04.30	3395000.00
10	DENMANS ELECTRICAL PLC	9	1985.09.30	9268000.00
11	DEWHURST PLC	15	1985.09.30	3733000.00
12	FIFE INDMAR PLC	10	1985.12.31	8369000.00
13	GIBBS AND DANDY PLC	10	1985.12.31	8599000.00
14	HOWARD SHUTTERING (HOLDINGS) PLC	10	1985.04.30	8392000.00
15	THORPE (F.W.) PLC	9	1985.06.30	6000000.00
16	WESTERN SELECTION PLC	9	1985.09.30	8076000.00
17	WHITTINGTON ENGINEERING COMPANY PLC	10	1986.01.31	1811000.00

cont'd

APPENDIX G (CONTINUED)

	COMPANY NAME	NO. OF YEARS DATA AVAILABLE	DATE OF LAST REPORT	TOTAL ASSETS £
18	WHITWORTH ELECTRIC (HOLDINGS) PLC	9	1985.03.31	7650000.00
19	BOGOD-PELEPAH PLC	9	1985.03.31	3325000.00
20	BURMATEX PLC	9	1985.11.30	6227000.00
21	CELTIC HAVEN PLC	9	1985.03.31	1896000.00
22	CLAYTON, SON & CO (HOLDINGS) PLC	15	1985.12.31	7294000.00
23	DWEK GROUP PLC	10	1985.12.31	6204000.00
24	FLEXELLO CASTORS & WHEELS PLC	9	1985.09.30	8020000.00
25	HAMPSON INDUSTRIES PLC	14	1985.03.31	9959000.00
26	HAY (NORMAN) PLC	10	1985.12.31	6232000.00
27	LYON & LYON PLC	15	1985.12.31	9054000.00
28	MACKAY (HUGH) PLC	15	1985.12.31	9078000.00
29	ROCK PLC	15	1985.12.31	3765000.00
30	SLINGSBY (H.C.) PLC	10	1985.12.31	2932000.00
31	SOMIC PLC	10	1986.03.31	2874000.00
32	STONEHILL HOLDINGS PLC	14	1985.03.31	9619000.00
33	SYMONDS ENGINEERING PLC	10	1986.03.31	2702000.00
34	TEX HOLDINGS PLC	9	1985.03.31	4161000.00
35	TOOTHILL (R.W.) PLC	10	1986.03.31	2149000.00
36	WALKER (THOMAS) PLC	9	1985.06.30	1919000.00

cont'd

APPENDIX G (CONTINUED)

	COMPANY NAME	NO. OF YEARS DATA AVAILABLE	DATE OF LAST REPORT	TOTAL ASSETS £
37	WIDNEY PLC	15	1985.09.30	4055000.00
38	WOOD(ARTHUR)& SON (LONGPORT) PLC	10	1985.12.31	2396000.00
39	ALBION PLC	10	1985.09.30	3574000.00
40	AMBER DAY HOLDINGS PLC	14	1985.05.25	4164000.00
41	ATKINS BROTHERS (HOSIERY) PLC	15	1986.03.31	9995360.00
42	BEALES(JOHN)PLC	14	1985.05.31	8420000.00
43	BREMNER PLC	15	1986.01.31	5025000.00
44	DAVENPORT KNITWEAR PLC	10	1985.12.31	6151000.00
45	DELANEY GROUP PLC	10	1985.12.31	6691000.00
46	DELYN PACKAGING PLC	10	1986.02.02	4311000.00
47	ELYS (WIMBLEDON) PLC	10	1986.02.01	8133000.00
48	EXECUTEX CLOTHES PLC	10	1985.12.31	2319000.00
49	FINLAY PACKAGING PLC	10	1985.12.31	5901000.00
50	FORMINSTER PLC	10	1985.04.30	7628000.00
51	LANCA PLC	10	1985.12.31	2071000.00
52	LINCROFT KILGOUR GROUP PLC(THE)	15	1985.09.30	7386000.00

cont'd

APPENDIX G (CONTINUED)

	COMPANY NAME	NO. OF YEARS DATA AVAILABLE	DATE OF LAST REPORT	TOTAL ASSETS £
53	SOMMERVILLE (WILLIAM) & SON PLC	9	1985.05.31	3880000.00
54	STAVERT ZIGOMALA PLC	9	1985.03.31	473000.00
55	TOWLES PLC	15	1986.02.28	8787000.00
56	TRANWOOD GROUP PLC	10	1986.01.31	3562000.00
57	UNIGROUP PLC	15	1985.04.30	2245000.00
58	WALKER & STAFF HOLDINGS PLC	10	1986.03.31	3062000.00
59	BRITISH BENZOL PLC	12	1986.03.31	9850000.00
60	CONTINUOUS STATIONERY PLC	10	1986.03.31	2043000.00
61	DINKIE HEEL PLC	10	1985.12.31	2344000.00
62	EARLY S OF WITNEY PLC	15	1986.02.01	6236000.00
63	FII GROUP PLC	9	1985.05.31	9062000.00
64	FUTURA HOLDINGS PLC	10	1985.12.28	3362000.00
65	HEADLAM, SIMS & COGGINS PLC	10	1986.01.31	3821000.00
66	JEROME (S.) & SONS (HOLDINGS) PLC	15	1985.12.31	8645000.00
67	JOURDAN (THOMAS) PLC	10	1985.12.28	7260000.00
68	KYNOCH(G.& G.)PLC	9	1985.08.31	3424000.00
69	NEWBOLD & BURTON HOLDINGS PLC	15	1985.12.31	4003000.00

cont'd

APPENDIX G (CONTINUED)

	COMPANY NAME	NO. OF YEARS DATA AVAILABLE	DATE OF LAST REPORT	TOTAL ASSETS £
70	PRESTWICH HOLDINGS PLC	9	1985.06.30	9745000.00
71	RICHARDS PLC	15	1985.09.30	8849000.00
72	SANDERSON MURRAY & ELDER (HLDGS) PLC	14	1985.06.30	2827000.00
73	SPEAR (J.W.) & SONS PLC	11	1985.12.31	9357000.00
74	TEXTURED JERSEY PLC	9	1985.04.30	9933000.00
75	TOYE & CO PLC	10	1985.12.31	5333000.00
76	WILKES (JAMES) PLC	15	1985.12.31	5674000.00
77	YOUNG (H.) HOLDINGS PLC	9	1985.07.27	7723000.00
78	SCANRO HOLDINGS PLC	9	1985.12.31	3379000.00
79	SWAN (JOHN) & SONS PLC	10	1986.04.30	2205000.00
80	WADE POTTERIES PLC	14	1985.07.31	9619000.00

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