ECONOMIC THEORY AND MERGER BEHAVIOUR

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CHAPTER 4

TESTING OF HYPOTHESES CONCERNING THE MANAGERIAL FIRM

UNIVARIATE ANALYSIS

4.0. AIM OF THE CHAPTER

The argument of the preceding chapter has been that in order to understand merger activity it is necessary to be able to interpret the evidence in relation to a larger network of theories. The revised theory of the firm (what has been designated as the "managerial firm"), has been proposed to provide this context in order to permit judgement of the significance of the empirical evidence. The tactic is a deliberate one, since it relies on the Lakatos theory of how progress in the growth of knowledge is made, and attempts to use his conjectures as the basis for a normative set of rules to assist in the growth of that knowledge. It arises also from a judgement that an aspect of behaviour can only be understood if one can recognise the motives behind that behaviour, and one cannot make sensible the motivation unless one understands the larger framework of drives and ambitions which the larger entity exhibits.

The work of Marris was seized upon as representing not only a well articulated theory of the characteristics which make up the managerial view of the firm, but also because it makes explicit reference to a theory of why takeovers occur. Marris is also particularly interesting because his writing exemplifies the pronouncement of Lakatos that scientific progress is made by way of contrasting the implications of competing research programmes :

> "The history of science has been, and should be, a history of competing research programmes (or, if you wish, 'paradigms'), the sooner the competition starts the better for progress." (Lakatos. Page 155, 121/1970).

From this analysis was extracted several hypotheses. The crucial assumption of the existence of firms dominated by the interests of a professional managerial group, which assumption Lakatos would refer to as the "hard core" but which has been renamed in this thesis the "Metaphysical Hypothesis" is the central issue. It is not open to refutation, but is open to being undermined if its supporting hypotheses are not able to fend off falsification attempts and if it ceases to predict "novel facts". The subsidiary hypotheses with predictions capable of being observationally tested were then established, being divided into auxiliary and direct hypotheses.

It is the purpose of this chapter to describe the use of statistical methods to test these hypotheses. Since the chapter limits itself to the findings to be derived from univariate analysis, the virtues and weaknesses of this approach to statistical testing are commented upon. The research strategies adopted are then explicitly detailed.

In order to examine the hypotheses, the characteristics of the Consumer Durable/Non-Durable firms, as revealed within the sample, are stated and inferences drawn from the profiles that emerge concerning companies that continued throughout the period of the study and also the characteristics of those sample companies that failed, either by reason of takeover or by going into receivership. The significant features of the second sample of acquiring, acquired and neutral firms are then revealed and analysed in relation to the propositions concerning the behaviour of firms. Finally, overall conclusions are drawn concerning the hypotheses.

4.1. METHODOLOGY

The issues of methodology concern the methods employed and the justification of their use. What counts as proof or verification? What are the limitations of these methods with respect to the data being analysed? Chapter 2 was largely devoted to explaining the impossibility of confirming a theory and then to examining the multiple difficulties involved in the process of seeking to disconfirm a theory. The Lakatos view that no theory ever stands alone but belongs to a network of supporting theories, and that there are no "crucial experiments", was extensively explored in that chapter. A theory does not fall to a single attack, but is crumbled away by the work of a succession of researchers. It is the primary task of the final chapter of this thesis to relate the findings derived from univariate analysis in this chapter and multivariate analysis in Chapter 5 to the evidence from other research studies in this field, in order to provide an opportunity for judgement as to how well the theory is being sustained or otherwise by the various investigations.

Fundamental to the understanding of the research strategy employed is the Lakatos hypothesis that a research programme is founded on a bedrock assumption which in itself is not open to challenge by observation and from which may be deduced supporting hypotheses which can be the subject of enquiry. The crucial proposition which underlies Marris's supposition concerning the causes of merger is the existence of forms of behaviour which can be encapsulated in the concept of the "managerial firm". Managerial motivation is not observable but consequences flow from the motivation.

The consequence that firms with low levels of control over managers, because of widely dispersed share ownership, indulge in policies of excess growth (i.e. not justified by the returns available) is not directly open to analysis. This is because sufficient information is not generally available to determine how efficiently growth has been pursued. The question is therefore raised indirectly.

a) If managerial behaviour is a widespread phenomenon, then examination of high growth companies should yield indication of this, and the converse should be true of companies making high returns or increasing shareholder wealth at an above average rate.

b) Alternatively, if firms that are the victims of takeovers are assumed to fail because of adherence to strategies of unprofitable growth, then such firms should demonstrate the expected behavioural profile of a managerial firm.

4.1.1. Statistical Methodology

In the circumstances of the social sciences, where fixed determinate relationships tend neither to exist by themselves over long periods of time nor can be revealed by means of controlled laboratory techniques, the use of statistical methods to examine data is generally unavoidable. Statistics provide three useful services in carrying out investigations. First, they enable the variables of interest to be described using measures of centrality and also of dispersion. Secondly, they supply information on the stability (or its converse, the variability) of given characteristics under varying situations. Thirdly, they enable tests of inductive inference to be carried out by testing whether the values of a given variable could have arisen by chance from a population of values which are either known or can be deduced.

All three methods are employed in this chapter. In the next chapter, the methodology is enlarged to include multivariate analysis which allows for the effect of several variables to be related simultaneously to a dependent variable (multiple regression) or several dependent variables (discriminant analysis). In the social sciences, where a relationship (expressed by a parameter) or a characteristic (demonstrated by use of a variable) are affected by a multitude of causes, multivariate analysis must be considered the normal form of investigative instrument, but univariate analysis has a particular strength which is

worth exploiting. Univariate analysis is valuable in demonstrating "gross" effects, that is to say effects which are of such magnitude that they are able to transcend the shifting pattern of causes and circumstances surrounding them and declare their existence. Of course, we can never be sure that the variable is not acting as a proxy for another variable not included in our theory, nor that the appearance of a simple relationship is really masking a more complicated scheme of associations, but nevertheless if the "gross effect" conforms to the predictions of the theory, then some measure of confirmation of the theory is obtained. It is for this reason that univariate analysis was used as the first analytical instrument.

4.1.2. Research Design

The decision to employ methods of statistical analysis using univariate methods, outlined in the preceding section, in no way solves the issue of the design of the research. It is necessary to detail how the methods available for statistical analysis were utilised in investigating the hypotheses set out in Chapter 3.

In Section 2.2. of Chapter 2 a description of the hypothetico-deductive method was given which is the fundamental strategy underlying the analysis of the data. By this method a hypothesis, essentially tentative in nature, is proposed. Certain logical consequences are derived from the hypothesis and these implications are compared with observations. The logical form of the analysis is :

If P then Q

where P is the proposition and Q is the observed consequence. We know from the theory of deductive logic that if Q is true then P may either be true or false, but that if Q is false then P cannot be true. It is this theorem which leads to the Popperian dictum that a hypothesis may be successfully disconfirmed but never irrefutably established, and therefore to the provisional nature of scientific knowledge.

The simplicity of the P/Q form conceals the fact that there are a number of initial conditions which must be assumed to hold (i.e. the famous "ceteris paribus" clause of economic theory) and various auxiliary hypotheses are involved which are granted a truth status which they may not warrant. If the consequent turns out to be false, it does not follow that the antecedent is also false; an initial condition may not be present or an auxiliary hypothesis assumed to be valid may not be so. For example, the central hypothesis of this thesis is that in firms with a widely dispersed ownership of shares "managerial" forms of behaviour will be found to exist. The observed behaviour may not conform to this expectation if :

a) the Government is not democratic in form and therefore does not limit its intervention in the affairs of industry (i.e. an initial condition is violated);

b) the proposition that a firm may be presumed to be a rational and unified decision taking unit is not valid (i.e. an auxiliary hypothesis is false).

In the physical sciences the associated factors may be controlled at known levels but in the social sciences the multiplicity of factors that may be related

to the outcome and the inability to exercise control over the situation requires other methods. These are that the hypothesis is investigated over a wide variety of situations (i.e. sampling) and related co-variation between factors is sought (i.e. correlation and regression) as well as outcomes which could only occur by chance with a low probability (i.e. tests of statistical significance).

In the natural sciences one normally finds a temporal sequence relating P and Q. P is done first and then the consequent Q occurs at a later inverval in time. Because social organisations display organic forms of development, it is generally impossible to discover the sequential form of relationship; therefore it is necessary to modify the "if P then Q" formulation to:

> A class of events P will be
> invariably associated with a
> class of events Q.

In the investigations of this and the subsequent chapter, it is intended to demonstrate that a category of firm which can be defined as "managerially controlled" is invariably associated with certain forms of behaviour with respect to growth, profit record, propensity to be taken over, etc.

It will be noted that the proposition to be examined can be satisfactorily established by means of prediction. Prediction is a useful means of providing corroboration for a hypothesis and is in fact used in the discrimination analyses and certain of the multiple regressions developed in Chapter 5, but prediction suffers from the flaw that P may in fact be associated with Q because both are associated with another factor Z not brought into the analysis. We cannot entirely discount the existence of a Z factor not specifically identified, but we can strengthen the conclusion that P and Q are associated because P causes Q to happen if we can show that the existence of P is not only a necessary condition for the existence of Q but also a sufficient condition.

A "necessary" condition is distinguished by the circumstance that an event A cannot occur without the presence of an event B. The tables of simple correlations for key variables which follow for the categories of continuing companies (the Consumer Durable/Non-Durable Sample), victim, predator and neutral firms (the Comparison Sample) attempt to establish necessary connections. A "sufficient" cause is recognised when it can be shown that when event A occurs an event B must inevitably happen, but when event A does not manifest itself

then event B also fails to put in an appearance. The search for "sufficient" conditions results in the tables which follow, contrasting the level of chosen structural and behavioural variables between continuing companies and victim or failed firms (the Consumer Durable/Non-Durable Sample) and between predators, victims and neutrals (the Comparison Sample).

The difficulty with this form of reasoning in the social sciences is that A may be a necessary but not sufficient cause of B, or that A may be a sufficient but not necessary cause of B. Only if we can establish that A is both necessary and sufficient for the event B to take place can we accept the relationship of cause and effect as mutually proved. However, in studying social situations there is often a multiplicity of factors at work and the association is rarely on a one-to-one basis. Thus it is a sufficient condition for growth to have surplus capital available, but not necessary since funds may be raised on the capital market. It is necessary in order to grow to have access to capital funds, but not sufficient since the management may consider that the investment opportunities available would not justify further investment by the firm.

The research design may be summarised as the use of statistical tests of association and significance to identify necessary and sufficient relationshps between

categories of firms which are deemed to be managerially dominated and levels of variables which on the basis of the theory of the managerial firm we would expect to exhibit managerial forms of behaviour.

Although the discovery of necessary and sufficient conditions indicates the presence of a complete causal system, we can still not rule out the possibility of another variable Z existing which is affecting the relationships we are investigating. Therefore the corroboration of the theory must remain provisional and subject to the possibility of later amendment.

4.1.3. The Hypothesis in relation to the Research Design

The description of the managerial firm in the preceding chapter indicates that its fundamental feature is that control of the firm is widely dispersed and thus offers the management group in control of the firm the opportunity to run the firm in their own, rather than their shareholders' interests. It is hypothesised that managerial interests will result in policies aimed at growth maximisation, subject to security constraints, and that this will produce certain structural and behavioural characteristics of the firm's policies which can be identified by the theory and which can be operationally defined. The belief in the existence of such characteristics is further strengthened if we assume, as Marris does, that these characteristics are the result of long term policy decisions and are not therefore subject to abrupt alterations of managerial strategy, although they will reflect variable outcomes due to environmental factors.

If we consider the hypotheses D1 to D7 stated in Chapter 3 of the thesis, we may derive from them a description of the features marking a firm that has been acquired or that is likely to be acquired. Since such a firm is assumed to represent an extreme example (extreme in the sense that it has failed to balance successfully the desire for growth and its need to maintain adequate

supplies of capital and maintain adequate satisfaction amongst its shareholders) of a managerial firm, these characteristics collectively present a profile of the managerial firm. This profile comprises the following traits :-

a) High rates of growth should be coupled with low rates of profit.

b) The valuation ratio should be low and below that obtaining in firms whose continued existence is not threatened by takeover.

c) There should be a tendency for gearing ratios to be high and liquidity ratios should be low.

d) There should be evidence of a higher than average retention ratio or an above average rate of growth in the supply of external funds or some combination of the two.

e) Profit margins can be expected to be depressed.

f) The growth of shareholder wealth should be found to be restricted in comparison with non-victim firms.

If statistical examination of the evidence can show this profile to be a realistic one, and the differences to possess statistical significance, then confidence in the Marris theory and the assumed nature of managerial firms will be increased. The absence of such characteristics will cast doubt upon the propositions.

Support will be engendered for the opposing theory of the profit maximising firm if the above descriptive features are altered to read in a contradictory manner. The one exception to this is that since Marris postulates the existence of managerial firms who have been able to maintain high rates of growth coupled with high rates of return because of their ability to use modern organisational techniques, and therefore although firms under owner control (i.e. with a large proportion of equity in the hands of the owners) should be expected to exhibit profit maximising behaviour, we might also expect that some firms lacking owner control may nevertheless show profit maximising characteristics.(1) Marris's theory may be taken to imply that acquiring firms will fall into the profit maximising category. The evidence for this assertion is that Marris believes that firms with low valuation ratios will be acquired by firms who can make better use of the assets:

> "The market valuation ratio is determined by the policy of the existing management. The raider, also, has a valuation ratio for firm 'i', but this is based on the policy he would pursue in 'i' if his raid was successful. His valuation ratio is the maximum price he would pay for a share, divided by the existing book value of assets behind each share. We then assume that firm 'i' is likely to be raided if the valuation ratio of the

(1) More accurately, firms able to use modern management techniques in the manner posited will show profit maximising and growth maximising behaviour since they have solved the problem of how to balance the two rates in harmony.

raider whose ratio for 'i' is higher than that of any other possible raider is also higher than the market valuation ratio for 'i'."

(Page 31, Marris, 145/1967).

We can safely assume that this better use of assets amounts to policies that will be closer to the profit maximising rather than the growth maximising rate. This view concerning the characteristics of acquiring firms will also be tested.

From the evidence presented in Chapter 1, (Table 1.20), it can be seen that with respect to the Consumer Durable/ Non-Durable sample, there is a significant difference (at the 1% level) between the incidence of takeover and failure of firms between the different industrial and commercial categories. The proportion of the total number of firms in each category that were acquired varied from 48% of those companies engaged in Hotel and Catering to a low of 17% in the Toys and Games category. The percentage of failing firms per category ranges from a peak of 12.5% (Mail Order) to nil in the case of Ratio and TV Rentals and Hotels and Catering. It might therefore be thought to be preferable to examine the data only in terms of industrial/commercial category, but this course of action was rejected. The sample had already been restricted to consumers, so guaranteeing a certain amount

of homogeneity[2], (the predator/victim/neutral sample was slightly wider since it also comprised capital goods manufacture), and equally the aim was to test a general theory not to describe the specific historical and technological events that led to an ebb and flow in the level of takeovers. It is evident from the variety of case studies on mergers (for example Hawkins and Pass (90/1979) and Walshe (216/1974) to quote but two of many examples) that it is possible to develop adequate explanations of why takeover activity intensified in a particular industry over a given time span; what is lacking is an overall theory of mergers.

Although it is recognised that changing economic circumstances will affect firms in different ways and in different temporal order, it was considered legitimate to pool the experience of a number of years, since the aim of the research was to discover relationships sufficiently robust to manifest themselves in a wide variety of circumstance. Table 1.16 in Chapter 1 confirms that the sample period covered both high and low levels of merger activity.

In relation to the research strategy outlined, the purpose of the Predator/Victim/Neutral sample should be obvious. It was taken in order to provide contrasts between victim firms and other types of firms in order to ascertain whether the predicted profiles were revealed by the investigation.

(2) If Property Companies had been included in the sample, it would have been necessary to allow for the fact that gearing ratios would have been substantially higher because of the security afforded by the stock of property to lenders. Similarly, the effect on Commodity Traders of fluctuations in the exchange rate would have required a correction.

The purpose behind the drawing of the Consumer Durable/ Non-Durable Sample needs some explanation. It has already been pointed out in Chapter 1 that it was intended to derive from a fairly large sample (slightly less than half of the total number of independent companies quoted on the Stock Exchange over the period) some conception of the extent and variety of merger activity amongst quoted firms. Does merger activity tend to be restricted in any short time period to particular areas of the market? Are there marked contrasts between the intensity of the activity with regard to industrial categories? What proportion of firms are affected by takeover within a decade, or to put the matter another way, when we refer to high and low levels of activity over the period, does high mean 10% or 50% of the firms within the sample? It is also true that some contrasts can be drawn between victims and continuing companies (including those that were heavily engaged in taking over other firms), although this evidence was restricted by the fact that since victim firms vanished from the sample before completing the term of the sample period, some variables such as growth rate over the period, increase in shareholder wealth, etc., could not be determined in a way that would provide a fair comparison with those companies who struggled through the allotted span of years. The major purpose, however, behind this sample was to test for evidence of growth maximising

behaviour, even in companies that survived the period. Whether a firm becomes a victim to a takeover bid or not involves elements of chance, but independently of this eventuality, if Marris's view of firms with wide share ownership is correct, then growth maximising characteristics should exist on a wide scale amongst a large number of firms, even those who had the good fortune not to be acquired. Essentially, therefore, the view was taken that a victim firm is just the extreme end of a continuum and the sample was taken with a view to confirming the existence of such a continuum, and to establish that victim firms were not "sui generis".

Two particular techniques were used to provide an opportunity for strong contrasts to become apparent. The variables represent characteristics of firms with respect to strategic policy decisions (except possibly in the case of the ownership proportion measure), but if they are taken as dependent variables then they represent a sample of firms categorised according to the range of values of the dependent variable. If, for example, we select the growth variable, and pick out the subset of growth values which are greater than average, then we treat the resulting group of firms as representing the "high growth firms" and examine the other variables in order to ascertain whether firms which have grown at fast rates (and may therefore be assumed to have adopted growth maximising policies) exhibit the profile that the Marris theory would lead us to expect. By using the above average

ranges of size, growth, profitability and high takeover activity, it seems reasonable to believe that we would afford the desired cluster of characteristics the maximum change to reveal themselves. This technique is adopted with respect to the Consumer Durable/Non-Durable sample.

The other means of creating the possibility of sharp contrasts was adopted in relation to the Predator/Victim/Neutral sample. The neutral sample were picked out on the basis that over a six year period (although only the first five years of accounts were analysed) they neither submitted to a takeover bid nor did they engaged in any takeover raids. Since the qualifications for neutrality were strictly observed, this means that not only did they not acquire any quoted company, but also that they made no conquests among the smaller private firms which form the staple diet of most merger activity. These "neutral" enterprises were then compared with firms either acquiring or acquired in the target years of 1977 and 1978. It was assumed that such firms would be of similar size to the victim group (this was confirmed on analysis of the data), and it could be expected that these companies would have restricted their growth aspirations and show a better profit performance (and offer a better service to shareholders seeking increases in wealth) than victim firms. The contrast between victim and neutral companies should offer the best chance of finding what was unique in the make-up of victim firms. It might be thought that choosing

firms with no interest in acquiring other businesses might have produced a collection of enterprises of a particularly sluggish nature, but this was not found to be so in practice. The comparison between neutral and predator companies would also provide data on the growth rates of companies growing entirely by internal investment and those who were using takeover as a medium of increase.

The next section (4.2.) considers the variables used in the statistical analysis with the purpose of providing an explanation of the reasons for selecting each variable and its relationship to the profile of the managerial firm.

Section 4.3. is devoted to the analysis of data from the two samples on a univariate basis. In order to aid understanding of the purpose of each phase of the analysis and the inter-relationship between the findings, a rationale for the total framework of the analysis is explicitly set out in tabular form (Table 4.1).

TABLE 4.1 FRAMEWORK OF UNIVARIATE ANALYSIS

SECTION	PURPOSE	STATISTICAL METHODS EMPLOYED	TABLE REFERENCE NUMBERS
4.3.1.	Preliminary Analysis:		
	a) Statistical Distribution of Variables - a normal distribution would suggest that the firms were subject to a large number of random influences. A skew distribution would indicate that specific factors were involved with respect to a sub-set of the firms.	i) Frequency Distributions. ii) Measures of: Mean Variation Kurtosis Skewness.	4.2 to 4.7 4.8 to 4.14
	b) The influence of industrial category on the variables - to answer the question are there general behavioural laws governing the level of the variable or is the variable influenced by factors specific to an industrial category.	i) Measures of: Mean Variation. ii) Non-parametric Analysis of Variance. iii) Parametric Analysis of Variance. iv) 't' Test.	4.14 to 4.19
Note: The preliminary analysis is limited to the Consumer Durable/Non-Durable Sample since it is an "ex ante" sample. The Comparison Sample was drawn on a "post hoc" basis.			
4.3.2.	Tests of Association (the necessary conditions). To examine the variables making up the profile of the managerial firm and demonstrate how essential high or low levels of such variables are to defining the managerial nature of the firm.	i) Correlation Analysis (including descriptive statistics on firms with High Values for selected variables)	4.20 to 4.30
4.3.3.	Tests of Difference (the 'sufficient' conditions). To examine a sub-set of firms assumed to be strongly 'managerial' in character (i.e. the victim firms) and determine if the variable levels differ significantly from other types of company.	i) Parametric Analysis of Variance. ii) 't' test. iii) Non-Parametric Correlation.	4.31 to 4.35

4.2. The Significance of the Analysed Variables

4.2.1. Consumer Durable/Non-Durable Sample. An Explanation of the Significance of the Analysed Variables

1. Industrial Category

This variable divides the firms into those engaged in various types of business according to the classification scheme of the Stock Exchange Year Book. Its purpose is to investigate whether the type of industrial activity is related to the incidence of takeover and failure, and also to discover if there were significant differences between other variables when the category of business was taken into account.

2. Size

This is the value of net assets as reported in the 1970 accounts. Although Marris does not take the size of a company into consideration in his theory (apart, of course, from specifying that it must be a quoted company which has certain size implications because there are limitations on the minimum value of its market capitalisation). Nevertheless, a great deal of previous research has shown that size has an important influence on several of the key variables used in this study. More specifically, there has been universal acknowledgement that predators are normally larger than victims and this influence needed to be taken

into account. It also seemed worthwhile to use this variable to check whether there was any evidence that the lust for growth was in any way blunted as larger and larger size was attained.

3. Growth Rate

This is calculated as a compound rate between the net asset value of a company as declared in 1970 and its final net asset value in 1978. The net asset value is being used as a proxy for the status, power and prestige of the management team and the growth of net assets as a guide to the measure of success that the senior management of an enterprise achieved in furthering its own aspirations. Numbers employed might have been used instead of net assets, but suffers from the difficulty that it underestimates the changes which arise in a capital intensive industry. Turnover is another candidate for this measure, but is less stable than the net asset parameter being affected by sudden fluctuations in market fortunes.

4. Control

The percentage of total voting capital held by the Directors of a company in 1970. One may own a considerable percentage of the shares of a public company without necessarily demanding a

seat on the Board of Directors, but it is the normal practice in order to safeguard the investment. Section 16 of the Companies Act 1967 requires that the holdings of Directors in the debentures and shares of the company must be included in the contents of the "Directors Report" and thus ensures an easy way of discovering the extent to which the owners of the company were coterminous with the senior management of the company. If it could be shown that the owner controlled firms were broadly similar to the managerial firms with respect to the growth/ profitability trade-off, and equally willing to run the risk of exposure to a takeover bid, then one of the essential underpinnings of the managerial theory of the firm would be refuted.

5. Takeover Index

This was calculated by considering the number of takeovers which a continuing company successfully completed during the nine year period. The takeovers eligible for inclusion in this index included not only quoted companies but also unquoted companies (normally private companies) and companies located overseas. The value (in terms of the price paid) for a quoted company acquisition (based on a sample of takeovers in

1973 and 1974) was 14.5 times greater on average than for an unquoted company, and 2 times greater on average than for a foreign company; therefore the index was a weighted aggregate of each type.

The aim behind this index was to gain some insight into the relationship between the rate of growth of a company and the intensity of its acquisition behaviour, and also to determine whether takeover activity was an intensive pursuit of a minority of companies (i.e. to detect the presence of "raiders") or a more widespread form of growth common to most companies, or whether the extent of takeover activity varied in rate according to industrial categories.

6. Shareholder Wealth Index

This is measured by the internal rate of return which is based on a calculation of the interest rate which equates the present value of the expected future cash flows from holding a share (i.e. dividends plus capital gain on sale) to the initial cost of the share. It is assumed that £1,000 of shares are bought in the company in 1970 and sold in 1978 (at the average price for each of these years). Various adjustments are made to account for scrip issues and rights issues

(for details see Appendix A). The discount rate arrived at by this method is used as a measure of the growth of wealth of the shareholders of that particular company.

By this yardstick, one can estimate the relationship between the increase in wealth of a company's shareholders and the relative merits of growth by internal means and growth incorporating active takeover strategies. One can also test for evidence that high levels of growth were attained at the expense of shareholder welfare.

7. Rate of Return

Calculated as the average pre-tax profits earned from 1970 to 1978 inclusive, expressed as a percentage of the value of net assets as shown in the 1970 accounts.

This estimate is then used as the guide to the profit performance of continuing companies in order to compare with their growth rate and their propensity to use acquisitions as a means of growth.

8. Age

This is the number of years since the company was registered as a public company, up to 1978 in the case of continuing companies and the year of failure in the case of taken-over firms and

firms that ceased trading by reason of insolvency.

It is fully recognised that this is an imperfect measure of a company's age, since firms often operate for many years as private companies before converting to public companies; also companies that reorganise, if that reorganisation is extensive, may register as a new entity. Nevertheless, the act of incorporating as a public company with the right to solicit shares from the general public represents a significant change in a company's status.

From assessment of age at the time of being acquired or of company failure, it is possible to discern whether the risks of being acquired have any relationship to the youthfulness of the enterprise.

4.2.2. Predator, Victim, Neutral Sample. An Explanation of the Significance of the Analysed Variables

1. Size

This is measured as the net asset value as recorded in the company accounts for each of five years and recorded as an average of the aggregate values.

This estimate permits comparisons to be drawn between the size of predators, victims and neutrals. It allows testing of the effect of size on growth and profit rates and exploration of whether size affects the methods by which capital is raised for investments.

2. Growth Rate

This calculation is carried out in a similar manner to the same variable in the Consumer Durable/Non-Durable sample, except that the period involved is 5 years.

The growth rate can be compared with the profit rate and the hypothesis of an inverse relationship as proposed by the theory of the managerial firm can be ascertained.

3. Retention Ratio

The ratio of net profits after tax and dividends which is available to re-invest in the business, divided by profit after tax and reported as an average over 5 years.

Marris's theory proposes that managerial firms which seek growth at the expense of a reduced rate of profit will seek to avoid the scrutiny of shareholders by retaining funds in preference to paying out large dividends to

shareholders and then raising new capital. Since, however, growth orientated firms will require a high rate of capital supply, there should be a tendency for such firms to have high retention ratios.

4. Gross Retention Ratio

This is worked out as for the retention ratio (in 3 above) with the exception that the numerator is increased by the amount provided for depreciation in each of the years of the period.

The change to the variable was made in order to ascertain whether it provides a better measure of the funds available internally for investment (as argued by Wood (231/1975)). Its purpose in the testing process is substantially the same as the retention ratio reported in 3 above.

It is acknowledged that the depreciation shown in accounts is a notional figure arrived at by accountants in order to provide a guide to the amount of capital used up in operating the business and that the capital allowances permitted by the Government to allow acceleration in the recovery of investment outlays is the actual source of funds available for re-investment. Nevertheless, since the depreciation reported

and the allowances for taxation purposes are expected to average out over a period, it was assumed that the depreciation measure based on a 5 year average would provide a guide to the general magnitude of funds available without resort to more complex calculations. Where a firm continues to invest heavily over a period, this will not be a correct assumption, and will certainly underestimate the capital available to growth companies from this internal source.

5. Directorial Control

This is a similar quantification of the proportion of control over voting shares held by members of the Board of Directors to that stated in respect of the same variable for the Consumer Durable/Non-Durable sample, except that the year for which this was assessed was either 1977 or 1978, that is, the year preceding takeover in the case of predators and victims, and a pro rata choice of year with respect to neutrals.

The variable can be used to test the hypothesis that the managerial firm has a high preference for growth and the owner firm is more inclined to strive to achieve a high profit rate.

6. Profit Rate

The variable is calculated as a five year average of net profit after tax, divided by a five year average of capital employed.

The profit rate is an important policy variable in the Marris theory. Although the profit rate can never be a wholly predictable outcome, the essence of the Marris theory is that the growth of demand is manipulated by the managerial firm to achieve a balance of profits and growth which produce satisfactory outcomes in terms of the increase in assets balanced against the capital supply required for this increase. To this purpose, a five year average should reveal the policy level of profits and show whether the theory has substance in the case of victim firms and also whether predators and neutrals indicate any inclination to set a higher level of profit rate in contrast to the growth rate.

7. Gearing

The parameter is derived by averaging the five year level of long term debt to the five year average of capital employed.

The two main sources of external funds are debt and new equity. Marris assumes that the

gearing ratio will be set in order to preserve the security of the senior management group (since fluctuating profits can imperil the existence of a company whose interest payments are fixed at a high level) and at the same time provide as high a level as can be attained (granted the security constraint) of supply of long term funds.

British companies have generally made less use of fixed interest finance than is common in other countries. During the 1970s the relative importance of long term loans declined rapidly in importance. The amount of capital raised by this means fell catastrophically from 1972 to 1973 and became negative (i.e. payback dominated new issues) in the financial crisis of 1974. The Midland Bank Review of Spring 1978 showed that Loan Capital (excluding preference shares which have declined as a financial instrument since the introduction of Corporation Tax in 1965) fell from a peak of 80% of total capital issues in 1970 to 10% by 1977. The contrast is with the period 1967 to 1973 when fixed interest securities were the predominant source of new capital.

This decline in company gearing led to the thesis that Government funding demands were "crowding out" the private sector (see written

evidence of Pepper, Thomas and Wood to the Wilson Committee, Volume 7 - "Evidence on Financing of Industry and Trade" (8b /1978). The argument is that Government through its control of interest rates is able to outbid the company sector; taxation laws also favoured Government securities since after a year's possession they were free from capital gains tax on sale. An alternative view suggests that at a time of high inflation, companies were unwilling to engage in long term borrowing at high interest rates because of growing uncertainty and liquidity problems.

It should be noted that bank borrowing has rapidly increased over the period, as has the use of other forms of short term financing, such as leasing.

8. External Funds

This construct is designed to measure the reliance of the firm on external sources of funds. The increase in capital over the five year period, whether from the issue of ordinary and preference shares, debentures and long term loans (reduced by the value of any redemption of shares or loans) expressed as a proportion of net assets at the beginning of the period.

The value of the increase in capital was taken as the price at the time of issue.

As a simplication in the Marris theory, all additional funds are assumed to be derived from retentions. In practice, we would expect that a growth firm might well have a high retention ratio in order to avoid submitting its projected investments to the judgement of the

market. This variable provides the information to test whether or not a greater reliance is placed on external funding than anticipated in terms of the theory.

9. The Valuation Ratio

This is defined as the market value of the company reckoned by multiplying the number of equity shares (i.e. all classes) in existence by their average prices during a year divided by the book value of net assets.

This index plays a central role in the Marris theory, since it is in effect the market view of the present value of the company's earning potential, divided by the book value of the assets required to earn that prospective cash flow. The fact that the book value is widely recognised to be an imperfect measure of the current value of the assets, and especially so in a period subject to high rates of inflation, does lead to some reservations about the usefulness of this statistic. The fact that the market will, over time, learn to anticipate the effects of inflation may be expected to improve the forecast of future earnings expressed in the market valuation of the company but the "book value" may be, in some circumstances, kept deliberately depressed in order to provide optimistic rate of return figures.

Three forms of the ratio are subject to test:

i) The average valuation ratio over the 5 years preceding merger.

ii) The percentage change in the valuation ratio between the fifth and the first year preceding merger.

iii) The calculated valuation ratio in the year preceding merger.

(N.B. The valuation ratios of neutral firms are assessed over a corresponding range of years).

In testing three forms of the valuation ratio, no specific virtue is accorded to any one version. In strict reference to Marris, the level of the valuation ratio in the penultimate year preceding the year of merger would be the essential signal to the market that a proper return on assets is not being made and therefore increase the risk of a takeover bid. However, it is perfectly possible that the market ignores the valuation of a single year which may only record some fluctuating incident and relies on the average of a longer series of reports, or that equally it is the change of the valuation ratio in either an upward or downward direction that excites interest.

10. Shareholder Wealth Index

This index is the same as that used with the Consumer Durable/Non-Durable sample, being based on the increase or decrease in the fortune of a shareholder who holds £1,000 of equity shares in a company over the five years preceding merger (with a corresponding 5 year calculation for the neutral group).

The Marris theory of takeover asserts that the senior managers of an enterprise sacrifice profit to growth and it can therefore immediately be hypothesised that the wealth of the shareholders will suffer correspondingly. We would therefore expect to find that the wealth of shareholders would show a smaller increase in the case of victim firms than in the case of firms which had maintained a more prudent relationship between the profitability/growth trade-off.

11. Profit Margin

This is a ratio based on a five year average of trading profit (excluding income derived from non-trading sources such as loans, investments and regional development grants), divided by a five year average of the value of turnover (which is equivalent to the sales revenue received).

The five years refers to the years preceding the takeover situation in the instance of predator and victim firms. The statistic is an approximate calculator of the amount of profit markup per £1 value of goods and services sold by the firm.

The theory proposed that a growth rate beyond a certain level will only be secured at the cost of reduced profit margins due to a wide variety of reasons, including:-

a) to ensure increased market penetration, the unit cost of marketing and advertising must rise;

b) increased sales in a static market will involve reaching customers whose marginal valuation of the product will be steadily decreasing and therefore require a lowering of the price of the product;

c) increased sales in a static market will involve an intensification of competition with other existing enterprises in the market;

d) in order to gain access to a wider range of markets, increased research and development expenditure will be required;

e) an increase in the number of markets being attacked will put pressures on the ability

of the management team to deal with the consequent diversity which will lead to a higher number of product innovations proving to be unsuccessful.

Firms which have sought to attain high growth rates should therefore exhibit a tendency towards reduced profit margins. If the cause of takeover is the pursuit of unprofitable growth, then victim firms should demonstrate this phenomenon in their profit margins.

12. Liquidity

This is assessed as liquid current assets (trade debts, cash, bank balances but excluding stocks), less current liabilities (overdrafts, creditors, current taxation and proposed dividend). It is basically the excess of the liquid proportion of working capital employed over the short term liabilities, showing the amount of cash or near-cash assets which the firm has resolved to fund using long term capital as a prudent measure to ensure that it can deal with fluctuations in the demands for working capital. Stocks are excluded since, although ultimately a source of funds when sold, they are difficult to realise quickly, and moreover during a time of high inflation (such as occurred during the sample

period) they tend to be an inadequate measure of the cost of continuing in business.

This calculation of surplus working capital was averaged over the five years preceding takeover (with a corresponding run of years covered for neutral firms) and was divided by a five year average of total shareholders' funds over the same time span.

The variable indicates therefore the proportion of shareholders' funds invested in liquid forms of working capital.

Marris has suggested that the level of excess liquid funds is a guide to the desire of the firm for a given level of security. Such liquid funds are not being used to earn an immediate return and therefore should be held at a low level, but this level must also take into account the fluctuations in demands for working capital. If the firm, although perfectly able to meet creditor demands on the basis of its total assets, is nevertheless unable to meet immediate demands for payments for goods, services, wages, materials, etc., then it may be forced into unnecessary liquidation.

The variable should afford information on whether victim firms display a lack of caution

by not holding sufficient liquid funds available to deal with contingencies. The measure has no particular relationship to the problems of financing high rates of growth since any firm (with low as well as high growth rates) could miscalculate the amounts of instant cash it required for emergencies, we would however expect the effect of growth to cause more unforeseeable changes in working capital needs, and there is some probability that firms aiming for high growth may be more prone to finding themselves with inadequate instant reserves.

4.3. STATISTICAL ANALYSIS

4.3.1. PRELIMINARY ANALYSIS

The first task is to consider the distribution of certain key variables in the Consumer Durable/Non-Durable Sample.(3) This should cast light on the issue of whether such variables are the product of numerous small random circumstances (which would be implied by a normal distribution) or if there are large differences between firms which would suggest the presence of specific causal factors.

Secondly, the generality of the theory of the managerial firm was subject to scrutiny by investigating the effect of industrial category on the level of the variables.

At issue here is the extent to which the growth and profitability of firms are constrained by the industrial context in which they operate, or whether they can escape the effect of product decline by diversification. Linked with this is the question of the existence of a "life cycle" effect with respect to a family of related products. (which is assumed to define the boundaries of an industrial category). The "life cycle" assumption is explored briefly prior to the termination of this preliminary analysis.

(3) Only the Consumer Durable/Non-Durable Goods Sample can be subject to these prior enquiries since it represents a sample taken without reference to the extent of takeover or any other manifestation of of managerial behaviour. The Comparison Sample, on the other hand, was selected on the criteria that certain activity had taken place in defining the types of firms.

4.3.1.(1) The Distribution of Key Variables

The first task undertaken was to examine the distribution of the six key variables in relation to the 501 companies which survived the period 1970 to 1978. The key variables were:-

SIZE - measured by value of net assets in 1970.

GROWTH RATE - measured as compound growth rate of net asset value between 1970 and 1978.

CONTROL - measured by the percentage of total voting capital held by Directors in 1970.

TAKEOVER INDEX - total number of takeovers successfully completed between 1970 and 1978 weighed by the proportions 1 : 0.069 : 0.49 for victims who were quoted firms, unquoted firms and foreign firms respectively.

SHAREHOLDER WEALTH INDEX - measured by the discount rate which equalises a £1,000 investment in the shares of the company and the time value of dividends received and capital gain made (or lost) on sale of shares, over the period 1970 to 1978.

RATE OF RETURN - measured as the average pre-tax profits reported for 1970 to 1978 as a percentage of net asset value in 1970.

The purpose of inspecting the distribution of each variable was to determine whether most firms were grouped around an average value with a diminishing number of firms having lower and higher values as one moved further from the average,[4] or whether the distributions were skewed with the majority of firms at one end or other of the range. It was found that dividing the value of the range of each variable into 5 equal parts and showing the result in tabular form revealed the distribution clearly, and this is done in Tables 4.2, 4.3, 4.4, 4.5, 4.6 and 4.7.

From the tables (4.2 to 4.7) the distribution of the key variables, with the exception of the growth and control variables, are seen to be positively skewed, i.e. the majority of firms exhibit a low value of the variable in comparison with the total range of values and the distribution has a long tail in the direction of higher values with few firms attaining these levels. The variables describing net asset size in 1970, and the index measuring the number of acquisitions made during the period, showed the most marked skewness. Less than 6% of firms lay outside the lowest band of net asset size(£94,000 to £97.6 million), this grossly unequal distribution of firm size is well known to exist, since the mean size value for continuing companies was £16.97 million, it is evident that the sample contained many firms of moderate size. Direct examination of the data showed that 80% of the total number of continuing companies had a net asset size in 1970 of less than £10 million.

(4) This is the form of a normal distribution with its characteristic bell-shape.

The record of acquisitions reveals the same concentration at the lower end of the range. Only 11% of the firms lay outside the lowest range, 55.6% of the firms making no takeovers at all. Since the average level of the takeover index was 0.56, and since the takeover of a quoted company carried the weight of unity in the index, one may conclude that these acquisitions were mainly composed of small private firms, which is known to be the case and was observed and commented on in Chapter 1.

The rate of return and shareholder wealth measures have modal values in the twentieth to fortieth percentile (i.e. the second range) but still reveal fairly strong positive skewness. Over 15% of shareholders experienced negative rates of wealth growth over the sample years, which probably reflects the difficult economic conditions facing companies. Even the 60% or so of companies whose shareholders made a positive increase in wealth of up to 16% per annum were making little headway against an average rate of inflation (as measured by the retail price index) of 12.5%.

The rate of return figures are liable to misinterpretation in two respects. First, the large negative portion of the lowest range represents a distortion produced by one extreme value from Walter Wragg (Motor Distributors) (whose name was changed to Pennine Motor Group during 1970). As is explained by the note to the Table, in fact only 7 companies showed a negative value

for rate of return. The second distortion arises from the effect of inflation. The average pre-tax profits were measured in terms of the money values of each year, but divided by a net asset value fixed in the value of the 1970 pound. Since, on the basis of figures calculated from the Lloyd's Bank Review (16/1979) the value of the purchasing power of the £ is reckoned to have fallen by two-thirds over the years 1968 to 1978, it would appear to be a reasonable assumption that in real terms the rate of return quoted should be reduced by about 50%. If this is done, then in terms of the inflation estimate mentioned in the last paragraph, about 40% of firms had real rates of return which failed to keep pace with inflation (i.e. their return was negative).

The measure of ownership control, while still displaying positive skewness, shows two peaks (the second in the range 38.9% to 58.2%, being only a third of the size of the peak in the lowest class). What this seems to indicate is that whereas many companies (i.e. 54%) had only moderate voting power (in fact 52.6% of companies had less than 10%) held in the hands of the Directors, there is some evidence that a sizeable number of firms (34% if one aggregates the last three classes) had a Board of Directors which had significant control over their companies.

The distribution reflecting the growth of net assets over the period is possibly the most interesting of all. First, it must be conceded that since the measures were based on the size of net assets measured in current money terms in 1970 and 1978,

inflation would have led to an over-estimate of the growth rate of net assets expressed in real terms. If one accepts the reasoning underpinning the previous comments on the rate of return, then the real rate of growth would probably be reduced to one-third of that shown. The factor is one-third (rather than the half which was suggested in regard to the rate of return), since this assessment was made with regard to the extreme ends of the period (i.e. 1970 and 1978) and not an average of the number of years between 1970 and 1978. The striking reflection arising from consideration of the growth distribution is that it approaches nearer to the bell-shaped distribution of the normal curve, although with some trace of skewness. This could be interpreted as a confirmation of the Gibrat theorem that growth rates represent a stochastic process in which growth rates are independent of size (see Simon and Bonini - 194/1958, and Quandt - 177/1966). If one compares the distribution of growth with the configuration of other variables such as rate of return and the shareholder wealth index, where one would have anticipated some relationship between the pattern of the distributions to exist, there is no evidence of such a relationship.

Table 4.8 also provides confirmation concerning the possible random nature of the growth process. The Table sets out the mean and standard deviation of each of the selected variables over the total sample. It also provides some additional evidence on the shape of the distributions by indicating levels of Kurtosis

(i.e. peakedness and skewness). The figures serve to confirm the interpretations already made. All the distributions are positively skewed, with size being outstandingly unevenly distributed and growth and control nearer to a "normal curve" shape. It one applies the previously mentioned inflation factors to the growth, shareholder wealth and returns rates (i.e. reduce by 50% in the case of the last two and 70% for the growth rate), it can be seen that the growth rates and the increase in shareholder wealth on average were reduced to about 4% in real terms, the average real rate of return would have remained in double figures (about 18.9%). The coefficient variation (i.e. standard deviation divided by mean) is used to reduce the distributions to a common size measure and compare their variability in a standard form. The size distribution is seen to be the most variable; the growth process is seen to have the least variability, which fact must strengthen the view that growth is a product of random processes, or at least that the commitment to growth within the population at large is a widespread phenomenon.

4.3.1.(2) The Influence of Category of Companies on the Key Variables

The next step was to consider the evidence for the assertion that the key variables - Size, Growth, Control, Takeover Index, Shareholder Wealth Index and Rate of Return - were not vitally affected by the industrial category to which they belong. If there were to be significant differences (in a statistical sense)

between the levels of these variables for different production technologies and different markets, as expressed in their category grouping, then this would suggest that there were factors operating specific to the industries involved. The theory of the managerial firm as expounded implies that the demand-growth curve can be developed at a pace which is the policy of the management group. Industrial categories are not expected to count for much, since a firm locked into a given market situation can be in a position to secure its own future by diversifying its products or markets (even though this may be at the expense of its rate of profit). Granted that the sample selected being based on goods and services designed for the consumer is reasonably homogenous, then we would anticipate that the level of variables measuring growth and rate of return would tend to be randomly scattered among the industries. It is not fatal to the theory if growth rates and profit rates do differ significantly between industries, since it may be that there is a strong inverse correlation between high rates of growth and rates of return within certain industries; some industries may be of a "sleepy" nature, making low levels of growth and profit, and other industries may be showing high returns to capital and more moderate growth development. But the implication of this is that certain types of industry attract growth orientated management, perhaps industries with a new technological opportunity to exploit or perhaps younger industries with a cohort of younger managers

working within in. This is not entirely the vision that Marris present, however, since he argues:

> "In fact, most of our theorems can be obtained from a single assumption about recruitment, to wit that whenever and wherever a vacancy occurs, the probability of it being filled by internal promotion increases with the level at which it occurs..... If the reader will visualise the population of firms as a set of disembodied pyramid tops, then he will see with transfers inhibited, management members can improve their position only by expansion, which as it were pushes them up from below."
>
> (Page 103, Marris, 145/1967).

the reason being that:

> "The pull of the management in an individual company greatly exceeds the sum of the values of the individual's qualifications on the open market. The management is a team which has been built up over a period of time and has acquired unique ability to operate a particular business."
>
> (Ibid.)

What is at issue here is the generality of the theory. A further fragment of evidence may be recalled from Table 1.20 in Chapter 1, where it was shown by means of a Chi Squared Test

that the incidence of failure (either by takeover or insolvency) did significantly differ between industries, whereas for the reasons advanced above, we might have expected to find greater randomness as to the probability of failure with respect to industrial category.

The calculated means value for each industrial grouping is set out in Tables 4.9 to 4.14. In order to permit some comparison to take place in similar units of size, as well as quoting the mean for each variable in each category, a coefficient of variation has also been calculated. It is possible to gain some visual impression of the variability within and between categories, but in order to measure this variation more precisely, an analysis of variance was carried out.

The standard analysis of variance tests for continuous data requires assumptions of:

a) the normal distribution of each variable;

b) a variance of roughly similar size for each sample variable;

c) the error (or disturbance) term for any observation is assumed to be independent of the error term for any other observation.

Since the distribution of the variables were not normal, and that it was unlikely that the error terms were independent on observations drawn from separate categories (because of the similarity of economic effects such as inflation, business conditions, interest rate levels, etc., on the observations),

it was assumed, without further testing of the homogeneity of variance issue, that in view of the small numbers in some industrial groups, a non-parametric test should be used to discover if there were significant differences between the mean values of each category for each variable.

A Kruskal-Wallis"analysis of variance" by ranks which does not depend upon the previously stated assumptions was therefore carried out. The test is used for a one-way analysis of variance (i.e. only one factor - categories - is employed in dividing up the sample data). The test is known to be particularly effective. A check on the results, an analysis of variance test using continuous data, was effected; it was found that though there was some discrepancy in the actual levels of significance realised, using the 5% level of statistical significance, the tests produced similar results as the Kruskal-Wallis test.(5) The results of the test are set down in Table 4.15.

In order to deal with difficulties in the Kruskal-Wallis test concerning tied ranks, the 224 firms which made no takeovers and the 239 firms with control levels below 10% were excluded, so both these variables were tested on reduced samples.

The difference in the average size between categories was found to be highly significant at the 0.1% level. The index measuring the growth of shareholder wealth and the rate of return variable showed significance between categories at the 1% level. Growth and control had a 5% level of significance. These results

(5) Details of the test can be found in Kruskal and Wallis (116/1952).

suggest a life cycle theory of firms working within industrial categories and tending to stay more securely within its industrial boundaries than theories of the multi-product firm would lead us to believe, but it will be recalled that the "Holding Company" category of firms in the Stock Exchange Year Book was specifically excluded, thus eliminating from the anlaysis large conglomerate type firms. The life cycle theory presumes that new technologies, products or markets arise, firms (possibly largely private ones or quoted ones with large elements of ownership control still extant) enter the industry, grow quickly as a new group of customers arises and later suffers decline as competition increases and as more and more firms gather (the rate of profit falling to average levels compared with other static industries) and the increase in customer extension comes to a halt. The picture displayed in Table 4.15 is compatible with a situation where new opportunities are being developed in some categories, bringing fast growth and high rates of return and shareholder wealth increments. Eventually, such markets ossify, and we are left with an industrial class where large managerially controlled firms possessing market power now dominate, and where barriers to entry protect the existing market.

One striking result, however, is that the amount of takeover activity between categories is not significantly different. The inference from this must be that takeover is a normal form of investment activity which all industrial groups (at least within

this sample) apply in equal measure. Since we know from Chapter 1 that such activity varied over the time period in a similar way to the intensity of merger activity in the economy as a whole, this strengthens the tentative conclusion made in Chapter 1 that there are some economic circumstances which favour takeover as a method of increasing assets to internal investment growth. It will be recalled that in that chapter the increase in share price which reduced the cost of making a bid might represent such favourable circumstances. It should be noted that if mergers were an essential component of faster growth rates, then we would have expected inter-industry differences of growth and the takeover index to be either both statistically significant or statistically non-significant, the divergence in result implies a lack of closeness in the relationship.

4.3.1.(3) The Life Cycle Hypothesis

In Chapter 1 it was established that the probability of becoming a victim was different between industries. This might prompt the conclusion that predatory activity (randomly distributed between industries) nevertheless concentrates on certain industrial classes for purposes of making bids. The supposition is not entirely warranted; the index of takeover activity used relates to bids for both quoted and unquoted firms, whereas the count of victims being drawn from the sample is exclusively composed of quoted companies. If we adhere to the life cycle

hypothesis, then the acquisition of quoted firms is more probably different between categories because the rate of return/shareholder wealth growth is different between categories. Whether the characteristic of a victim is one of low return (which is compatible with the Marris hypothesis) or high return (which is not) is the subject of a later part of this chapter.

The life cycle hypothesis was further pursued by asking two questions. Is there any evidence that an industrial class of companies tends to differ in terms of the ages of its constituent members from other classes of companies? Does the age at which firms become victims differ significantly from the ages of companies which continue to exist? If the latter point is established, then it is possible that the age of companies within an industry is related to the possibility of being a victim, and that the merger process may be associated with the declining phase of the life cycle when companies either leave an industry of their own accord or are taken over in an attempt to remove companies compulsorily and to consolidate the remaining number of firms as the static market is then shared out amongst the survivors to produce a situation of oligopoly.

The age of companies was calculated on the basis of years since first public registration. This is not the same (as is pointed out in the appendix) as years since first coming into existence, since most companies spend many years holding tne status of private companies before securing registration as public

companies and equally companies subject to merger or reorganisation may re-register themselves as a new public entity.

Because firms that failed (either through takeover or by being liquidated) did not complete the 9 year sample period, it was not possible to compute several of the variables which were measured for the period, such as rate of return, growth and amount of takeover activity. But since both continuing and victim companies were measured with respect to size and control on data drawn from the 1970 accounts and by assuming that age since public registration should be calculated up to 1978 or the year of failure (whichever came earlier), it was possible to use these three measures in order to increase sample size to a total of 859 firms (i.e. continuing companies plus failed companies). On the basis of the increase in sample size, it was judged possible to utilise the analysis of variance technique as for continuous data. In Table 4.16 is set out a test of whether the industrial groups differed markedly with respect to the size of firms, the amount of diector control and age since registration to failure or 1978.

The differences between categories all proved highly significant at the 0.1% level, which provides tentative support for the proposition that there is a life cycle factor at work and that there are "young" and "old" industrial categories, since the average age as public companies did differ between groups. (The significance of the size and control variables confirming these

findings, already shown in Table 4.15). Having established the first part of the proposition regarding the probable existence of life cycles, it was now possible to explore the second supposition that merger activity is associated with the maturity and decay of that cycle.

In order to accomplish this, a second analysis of variance was carried out with the results shown in Table 4.16. This was not an analysis by category but compared the continuing and failed companies with respect to the size, control percentage and age of the two groups of firms. Although the differences in size and control still revealed themselves as being statistically significant, the age variable proved not to be so. This appeared unfavourable to the second stage of the reasoning which sought to associate the decline in firm numbers either by failure or takeover to the later stages of the life cycle, since if the age of continuing and victim companies were on average approximately equal, it was difficult to support the conclusion that at later stages in the development of a technology or market a consolidation took place by the elimination of the less competitively able firms. From such a scenario one would have expected continuing firms to have shown in the earlier and later times areas of young and old, and for victim firms to have vanished in some central period between the two age extremes.

Up to this point, the failure group of companies has been taken as the sum of those companies vanishing from the record

either because they were taken over or because they went into receivership. There is an implied inference in this analysis that victim companies and insolvent companies are basically of the same nature, only differing insofar as their means of elimination was different. This is not necessarily a corollary of the Marris view of mergers, although there is some possibility of the two types of failure being related to a faulty judgement regarding the growth/profitability trade-off. The victim companies (i.e. companies who were taken over) were therefore separately identified and by means of a two-tail "t" test the difference in mean values for size, control and age were examined. The results are reported in Table 4.18. The same pattern of results already made plain in Table 4.17 were again evident; that is size and control were of significantly different values between continuing companies and victim companies, whereas the age variable was similar. It can be seen that the size of continuing quoted companies was on average three times larger than quoted companies which became victims (echoing the research finding of Singh (198/1971) that the best protection against the risk of takeover is to have large size). The average difference between the extent of owner control for continuing and victim firms was less marked but sufficient to indicate that it was managerial type companies which are most likely to be taken over. The age result is somewhat more puzzling because what it seems to say at first sight is that on average firms will exist for about 35 years before going out of existence.

This did not really appear to be very likely. One fact to be noted about the age since public registration measurement is that the start date is variable. This does not disturb the conclusion that the average age of victims was 35.76 years and that the average age of companies which persisted was 35.42 years, but it does suggest another interpretation. Assume that throughout the life cycle of an industrial group there is a fairly constant probability of being subjugated by a takeover offer. Then industrial classes with a low average age of firms would have a correspondingly low average age for victims; classes comprising a high average age of firm would demonstrate a high age for its victim category. That this is the more probable hypothesis is established in Table 4.19, where, by using a Spearman test for the Rank Correlation Coefficient, a correlation value of 0.45 was determined with a 1% level of significance from a table which shows for each industrial/commercial category the age of its continuing companies to 1978 and its victims to the year of demise.

A further possibility was explored that as firm classes grew in age the number of companies within the class declined as evidence of consolidation activity. A completely contradictory result was found (using a Spearman rank correlation test) with a very high positive correlation between the average age of firms in a category and the number of firms in a category ($r = 0.8615$) with a high level of significance (0.1%). As a company category ages, the number of quoted firms within its boundaries increases.

4.3.1.(4) Summary of Findings from the Preliminary Analysis

The main findings based on univariate analysis are :-

a) The three variables showing the least skewness are growth, control and increase in shareholder wealth. Since the Consumer Durable/Non-Durable Goods sample was examined to determine whether managerial behaviour is a widespread phenomenon or restricted to a sub-set of firms, we may infer that, if such behaviour exists, it is approximately evenly distributed throughout the population as a whole.

b) There are significant differences between industrial categories with respect to all variables (save the takeover index). This suggests that the specific factors in a given market are important in determining profit and growth rates, and that the ability of the firms to cross categories in the search for faster growth or higher profit is less than Marris's description of the multi-product firm seeking high growth would have led us to believe. The fact that the amount of merger activity is similar over all categories leads to the deduction that takeover activity is a variant of normal investment policy.

c) There is some evidence for the existence of a life cycle hypothesis for industrial categories, but there is no evidence for the view that the number of quoted companies diminishes as the category ages, through a consolidation process.

4.3.1.(5) Data Analysis

The analysis of data on which are based the interpretations set out in the preceding pages is set out in tabular form in Tables 4.2 to 4.19 which follow.

TABLE 4.2

CONSUMER DURABLE/NON-DURABLE SAMPLE

CONTINUING COMPANIES (1970-1978)

FREQUENCY DISTRIBUTION OF KEY VARIABLES

(The frequencies were derived by dividing the total range of the variables into 5 equal parts)

SIZE

RANGE £000	ABSOLUTE FREQUENCY	RELATIVE FREQUENCY	CUMULATIVE FREQUENCY
94 to 97,629	474	94.6%	94.6%
97,630 to 195,299	16	3.2%	97.8%
195,300 to 292,888	5	1.0%	98.8%
292,889 to 390,518	3	0.6%	99.4%
390,519 to 488,241	3	0.6%	100%

TOTAL SAMPLE = 501

TABLE 4.3. CONSUMER DURABLE/NON-DURABLE SAMPLE

CONTINUING COMPANIES (1970-1978)

FREQUENCY DISTRIBUTION OF KEY VARIABLES

(The frequencies were derived by dividing the total range of the variables into 5 equal parts)

GROWTH +

RANGE PER CENT	ABSOLUTE FREQUENCY	RELATIVE FREQUENCY	CUMULATIVE FREQUENCY
- 14.2 to - 1.18	12	2.4%	2.4%
- 1.19 to + 11.84	49	9.8%	12.2%
11.85 to 24.86	230	45.9%	58.1%
24.87 to 37.88	198	39.5%	97.6%
37.89 to 50.9	12	2.4%	100%

TOTAL SAMPLE = 501

+ See text for comment on the effect of inflation on these rates of growth.

TABLE 4.4

CONSUMER DURABLE/NON-DURABLE SAMPLE

CONTINUING COMPANIES (1970-1978)

FREQUENCY DISTRIBUTION OF KEY VARIABLES

(The frequencies were derived by dividing the total range of the variables into 5 equal parts)

CONTROL

RANGE PER CENT	ABSOLUTE FREQUENCY	RELATIVE FREQUENCY	CUMULATIVE FREQUENCY
Zero to 19.4	273	54.5%	54.5%
19.5 to 38.8	58	11.6%	66.1%
38.9 to 58.2	91	18.2%	84.2%
58.3 to 77.6	77	15.4%	99.6%
77.7 to 97.0	2	0.4%	100%

TOTAL SAMPLE = 501

TABLE 4.5

CONSUMER DURABLE/NON-DURABLE SAMPLE

CONTINUING COMPANIES (1970-1978)

FREQUENCY DISTRIBUTION OF KEY VARIABLES

(The frequencies were derived by dividing the total range of the variables into 5 equal parts)

PRE-TAX RATE OF RETURN +

RANGE PER CENT	ABSOLUTE FREQUENCY	RELATIVE FREQUENCY	CUMULATIVE FREQUENCY
- 65.9 to 24.5 *	218	43.5%	43.5%
24.6 to 114.9	265	52.9%	96.4%
115.0 to 205.3	11	2.2%	98.6%
205.3 to 295.7	5	1.0%	99.6%
295.7 to 386.0	2	0.4%	100%

TOTAL SAMPLE = 501

+ See text for comment concerning the effect of inflation on these measures.

* Note: In first band only 7 returns were negative, and of these only one (- 65.9) was less than 11%.

TABLE 4.6

CONSUMER DURABLE/NON-DURABLE SAMPLE

CONTINUING COMPANIES (1970-1978)

FREQUENCY DISTRIBUTION OF KEY VARIABLES

(The frequencies were derived by dividing the total range of the variables into 5 equal parts)

TAKEOVER INDEX

RANGE PER CENT	ABSOLUTE FREQUENCY	RELATIVE FREQUENCY	CUMULATIVE FREQUENCY
Zero to 1.72	446	89.0%	89.0%
1.73 to 3.44	38	7.6%	96.6%
3.45 to 5.16	11	2.2%	98.8%
5.17 to 6.88	3	0.6%	99.4%
6.89 to 8.6	3	0.6%	100%

TOTAL SAMPLE = 501

TABLE 4.7

CONSUMER DURABLE/NON-DURABLE SAMPLE

CONTINUING COMPANIES (1970-1978)

FREQUENCY DISTRIBUTION OF KEY VARIABLES

(The frequencies were derived by dividing the total range of the variables into 5 equal parts)

SHAREHOLDER WEALTH INDEX

RANGE PER CENT	ABSOLUTE FREQUENCY	RELATIVE FREQUENCY	CUMULATIVE FREQUENCY
- 18.1 to - 0.9	73	14.6%	14.6%
- 1.0 to + 16.3	334	66.7%	81.3%
16.4 to 33.5	83	16.6%	97.9%
33.6 to. 50.7	9	1.8%	99.7%
50.8 to 67.9	2	0.4%	100%

TOTAL SAMPLE = 501

CONSUMER DURABLE/NON-DURABLE SAMPLE

TABLE 4.8

CONTINUING COMPANIES (1970-1978)

KEY VARIABLES

	MEAN	STANDARD DEVIATION	STANDARD ERROR	COEFFICIENT OF VARIATION	(a) KURTOSIS	(b) SKEWNESS
SIZE	£16,968,687	£53,860,162	£2,406,295	3.17	34.3	5.5
GROWTH	14.6%	9.4%	0.4%	0.64	2.0	0.9
CONTROL	23.2	26.7%	1.2%	1.15	- 1.3	0.5
TAKEOVER INDEX	0.56	1.2	0.05	2.08	14.6	3.4
SHAREHOLDER WEALTH INDEX	8.8%	10.4%	0.47%	1.18	4.0	1.0
PRE-TAX RATE OF RETURN	37.8%	39.5%	1.8%	1.05	21.2	3.7

(a) KURTOSIS - Positive values are more peaked than occurs with the normal curve.
Negative values are flatter than occurs with the normal curve.

(b) SKEWNESS - Positive values indicate positive skewness.
Negative values indicate negative skewness.

The normal curve has a value of 0 with respect to kurtosis and skewness.

TABLE 4.9

CONSUMER DURABLE/NON-DURABLE SAMPLE

CONTINUING COMPANIES (1970-1978)

AVERAGE SIZE (£000,000) BY CATEGORY

INDUSTRIAL/COMMERCIAL GROUP	MEAN	STANDARD DEVIATION	COEFFICIENT OF VARIATION	NUMBER OF COMPANIES IN CATEGORY
Light Electronics / Radio / TV	25.4	51.1	2.0	22
Radio and TV Rental	7.8	3.6	0.5	3
Floor Covering	5.1	5.9	1.2	15
Furniture and Bedding	1.1	1.0	0.9	18
Household Appliances	3.4	2.7	0.8	7
Kitchen and Tableware	1.4	2.1	1.5	9
Motor Components	18.0	29.8	1.7	15
Motor Distribution	4.7	5.9	1.3	29
Motor Vehicles	2.1	2.3	1.1	9
Breweries	38.5	79.5	2.1	23
Wines and Spirits	42.7	110.8	2.6	8
Hotels and Caterers	12.3	22.8	1.8	15
Leisure	9.2	26.1	2.8	29
General Food Manufacturing	36.5	73.8	2.0	25
Milling and Flour Confectionery	72.7	92.9	1.3	5
Food Retailing	12.2	27.2	2.2	19
Newspapers and Periodicals	9.9	11.1	1.1	8
Publishing and Printing	4.9	9.7	2.0	27
Packaging and Paper	31.0	73.6	2.4	29

TABLE 4.9 (continued) CONSUMER DURABLE/NON-DURABLE SAMPLE

CONTINUING COMPANIES (1970-1978)

AVERAGE SIZE (£000,000) BY CATEGORY (Continued)

INDUSTRIAL/COMMERCIAL GROUP	MEAN	STANDARD DEVIATION	COEFFICIENT OF VARIATION	NUMBER OF COMPANIES IN CATEGORY
Departmental Stores	13.3	24.7	1.9	14
Furnishing Stores	4.3	3.9	0.9	6
Stores : Mail Order	12.3	6.1	0.5	4
Stores : Multiple	31.4	57.7	1.8	26
Clothing	2.5	4.9	2.0	54
Cotton and Synthetic	116.5	228.5	2.0	4
Wool	3.4	3.6	1.1	18
Miscellaneous Textiles	25.0	79.7	3.2	30
Tobacco	163.6	281.2	1.7	3
Footwear	2.6	2.8	1.1	18
Toys and Games	3.9	2.9	0.7	9

TOTAL SAMPLE SIZE = 501 FIRMS

TABLE 4.10

CONSUMER DURABLE/NON-DURABLE SAMPLE

CONTINUING COMPANIES (1970-1978)

AVERAGE GROWTH RATE (PER CENT) BY CATEGORY

INDUSTRIAL/COMMERCIAL GROUP	MEAN	STANDARD DEVIATION	COEFFICIENT OF VARIATION	NUMBER OF COMPANIES IN CATEGORY
Light Electronics / Radio / TV	16.4	11.2	0.7	22
Radio and TV Rental	20.0	8.8	0.4	3
Floor Covering	11.2	6.4	0.6	15
Furniture and Bedding	13.5	7.6	0.6	18
Household Appliances	13.8	6.1	0.4	7
Kitchen and Tableware	16.5	6.3	0.4	9
Motor Components	17.3	8.4	0.5	15
Motor Distribution	14.9	7.6	0.5	29
Motor Vehicles	13.9	7.6	0.5	9
Breweries	11.2	5.2	0.5	23
Wines and Spirits	16.9	7.8	0.5	8
Hotels and Caterers	16.0	11.4	0.7	15
Leisure	21.1	14.4	0.7	29
General Food Manufacturing	14.2	8.0	0.6	25
Milling and Flour Confectionery	17.3	17.4	1.0	5
Food Retailing	17.2	11.4	0.7	19
Newspapers and Periodicals	11.3	4.2	0.4	8
Publishing and Printing	12.8	7.0	0.5	27
Packaging and Paper	12.9	9.4	0.7	29

TABLE 4.10 (continued) *CONSUMER DURABLE/NON-DURABLE SAMPLE*

CONTINUING COMPANIES (1970-1978)

AVERAGE GROWTH RATE (PER CENT) BY CATEGORY (Continued)

INDUSTRIAL/COMMERCIAL GROUP	MEAN	STANDARD DEVIATION	COEFFICIENT OF VARIATION	NUMBER OF COMPANIES IN CATEGORY
Departmental Stores	11.7	7.8	0.7	14
Furnishing Stores	17.4	8.4	0.5	6
Stores : Mail Order	12.5	7.6	0.6	4
Stores : Multiple	17.2	8.4	0.5	26
Clothing	14.0	12.0	0.9	54
Cotton and Synthetic	15.2	11.2	0.7	4
Wool	10.6	6.9	0.7	18
Miscellaneous Textiles	10.8	6.8	0.6	30
Tobacco	14.2	6.3	0.4	3
Footwear	15.2	7.6	0.5	18
Toys and Games	22.4	6.7	0.3	9

TOTAL SAMPLE = 501 FIRMS

TABLE 4.11

CONSUMER DURABLE/NON-DURABLE SAMPLE

CONTINUING COMPANIES (1970-1978)

AVERAGE PER CENT DIRECTOR CONTROL BY CATEGORY +

INDUSTRIAL/COMMERCIAL GROUP	MEAN	STANDARD DEVIATION	COEFFICIENT OF VARIATION	NUMBER OF COMPANIES IN CATEGORY
Light Electronics / Radio / TV	18.1	27.7	1.5	22
Radio and TV Rental	37.6	19.6	0.5	3
Floor Covering	27.4	30.7	1.1	15
Furniture and Bedding	32.6	30.1	0.9	18
Household Appliances	24.1	31.4	1.3	7
Kitchen and Tableware	41.6	25.6	0.6	9
Motor Components	16.8	29.0	1.7	15
Motor Distribution	31.1	27.5	0.9	29
Motor Vehicles	46.7	19.9	0.4	9
Breweries	12.5	24.8	2.0	23
Wines and Spirits	12.7	22.7	1.8	8
Hotels and Caterers	29.1	27.4	0.9	15
Leisure	28.9	25.0	0.9	29
General Food Manufacturing	14.4	25.1	1.7	25
Milling and Flour Confectionery	0.0	0.0	0.0	5
Food Retailing	25.0	27.5	1.1	19
Newspapers and Periodicals	18.2	23.0	1.3	8
Publishing and Printing	13.3	22.3	1.7	27
Packaging and Paper	7.2	14.2	2.0	29

TABLE 4.11 (Continued) *CONSUMER DURABLE/NON-DURABLE SAMPLE*

CONTINUING COMPANIES (1970-1978)

AVERAGE PER CENT DIRECTOR CONTROL BY CATEGORY+ (Continued)

INDUSTRIAL/COMMERCIAL GROUP	MEAN	STANDARD DEVIATION	COEFFICIENT OF VARIATION	NUMBER OF COMPANIES IN CATEGORY
Departmental Stores	22.5	28.4	1.3	14
Furnishing Stores	33.3	27.9	0.8	6
Stores : Mail Order	12.5	17.0	1.4	4
Stores : Multiple	28.0	29.4	1.0	26
Clothing	33.2	28.1	0.8	54
Cotton and Synthetic	6.9	13.8	2.0	4
Wool	17.2	22.8	1.3	18
Miscellaneous Textiles	18.2	20.9	1.1	30
Tobacco	23.3	40.4	1.7	3
Footwear	23.1	29.3	1.3	18
Toys and Games	35.8	22.4	0.6	9

TOTAL SAMPLE = 501 FIRMS.

+ Firms with Directoral holdings of less than 10% were included in the estimate at zero level of control in computing the averages.

TABLE 4.12. *CONSUMER DURABLE/NON-DURABLE SAMPLE*

CONTINUING COMPANIES (1970-1978)

AVERAGE EXTENT OF TAKEOVER ACTIVITY (MEASURED BY TAKEOVER INDEX) BY CATEGORY

INDUSTRIAL/COMMERCIAL GROUP	MEAN	STANDARD DEVIATION	COEFFICIENT OF VARIATION	NUMBER OF COMPANIES IN CATEGORY
Light Electronics / Radio / TV	0.8	1.3	1.6	22
Radio and TV Rental	0.6	1.0	1.7	3
Floor Covering	0.2	0.67	3.4	15
Furniture and Bedding	0.08	0.26	3.2	18
Household Appliances	0.5	0.93	1.9	7
Kitchen and Tableware	0.2	0.59	3.0	9
Motor Components	0.8	1.3	1.6	15
Motor Distribution	0.7	1.7	2.4	29
Motor Vehicles	0.06	0.07	1.2	9
Breweries	0.5	1.0	2.0	23
Wines and Spirits	0.08	0.09	1.1	8
Hotels and Caterers	0.7	1.6	2.3	15
Leisure	0.8	1.3	1.6	29
General Food Manufacturing	0.4	0.77	1.9	25
Milling and Flour Confectionery	1.1	1.0	0.9	5
Food Retailing	0.9	2.0	2.2	19
Newspapers and Periodicals	0.2	0.4	2.0	8
Publishing and Printing	0.4	0.7	1.8	27
Packaging and Paper	0.9	1.7	1.9	29

TABLE 4.12 (continued) CONSUMER DURABLE/NON-DURABLE SAMPLE

CONTINUING COMPANIES (1970-1978)

AVERAGE EXTENT OF TAKEOVER ACTIVITY (MEASURED BY TAKEOVER INDEX) BY CATEGORY (Continued)

INDUSTRIAL/COMMERCIAL GROUP	MEAN	STANDARD DEVIATION	COEFFICIENT OF VARIATION	NUMBER OF COMPANIES IN CATEGORY
Departmental Stores	0.9	1.5	1.7	14
Furnishing Stores	0.05	0.05	1.0	6
Stores : Mail Order	0.000	0.000	0.0	4
Stores : Multiple	0.6	1.1	1.8	26
Clothing	0.5	0.9	1.8	54
Cotton and Synthetic	0.9	0.6	0.7	4
Wool	0.6	1.0	1.7	18
Miscellaneous Textiles	0.5	1.0	2.0	30
Tabacco	1.4	1.5	1.1	3
Footwear	0.6	1.4	2.3	18
Toys and Games	0.3	0.3	1.0	9

TOTAL SAMPLE = 501 FIRMS

TABLE 4.13

CONSUMER DURABLE/NON-DURABLE SAMPLE

CONTINUING COMPANIES (1970-1978)

AVERAGE VALUE OF SHAREHOLDER WEALTH INDEX BY CATEGORY

INDUSTRIAL/COMMERCIAL GROUP	MEAN	STANDARD DEVIATION	COEFFICIENT OF VARIATION	NUMBER OF COMPANIES IN CATEGORY
Light Electronics / Radio / TV	8.0	9.9	1.2	22
Radio and TV Rental	6.8	2.7	0.4	3
Floor Covering	3.2	7.3	2.3	15
Furniture and Bedding	13.8	11.4	0.8	18
Household Appliances	7.2	4.9	0.7	7
Kitchen and Tableware	6.2	11.9	1.9	9
Motor Components	10.4	5.5	0.5	15
Motor Distribution	12.4	6.8	0.5	29
Motor Vehicles	- 0.5	9.6	19.2	9
Breweries	11.1	6.0	0.5	23
Wines and Spirits	13.0	6.7	0.5	8
Hotels and Caterers	7.7	7.7	1.0	15
Leisure	11.3	15.1	1.3	29
General Food Manufacturing	9.3	10.5	1.1	25
Milling and Flour Conectionery	4.2	7.7	1.8	5
Food Retailing	7.9	9.1	1.2	19
Newspapers and Periodicals	6.2	5.9	1.0	8
Publishing and Printing	6.3	8.0	1.3	27
Packaging and Paper	8.2	9.7	1.2	29

TABLE 4.13 (Continued) CONSUMER DURABLE/NON-DURABLE SAMPLE

CONTINUING COMPANIES (1970-1978)

AVERAGE VALUE OF SHAREHOLDER WEALTH INDEX BY CATEGORY (Continued)

INDUSTRIAL/COMMERCIAL GROUP	MEAN	STANDARD DEVIATION	COEFFICIENT OF VARIATION	NUMBER OF COMPANIES IN CATEGORY
Departmental Stores	10.0	9.0	0.9	14
Furnishing Stores	17.4	26.2	1.5	6
Stores : Mail Order	5.2	13.6	2.6	4
Stores : Multiple	13.5	14.6	1.1	26
Clothing	6.2	10.9	1.8	54
Cotton and Synthetic	9.0	6.4	0.7	4
Wool	5.9	7.7	1.3	18
Miscellaneous Textiles	6.7	9.3	1.4	30
Tobacco	5.2	7.1	1.4	3
Footwear	14.0	9.6	0.7	18
Toys and Games	9.5	11.2	1.2	9

TOTAL SAMPLE = 501 FIRMS

TABLE 4.14

CONSUMER DURABLE/NON-DURABLE SAMPLE

CONTINUING COMPANIES (1070-1978)

AVERAGE RATE OF RETURN (PER CENT) BY CATEGORY

INDUSTRIAL/COMMERCIAL GROUP	MEAN	STANDARD DEVIATION	COEFFICIENT OF VARIATION	NUMBER OF COMPANIES IN CATEGORY
Light Electronics / Radio / TV	50.0	50.6	1.0	22
Radio and TV Rental	37.7	10.5	0.3	3
Floor Covering	27.8	22.9	0.8	15
Furniture and Bedding	47.0	27.9	0.6	18
Household Appliances	44.0	21.3	0.5	7
Kitchen and Tableware	42.0	12.7	0.3	9
Motor Components	33.3	14.1	0.4	15
Motor Distribution	22.9	25.4	1.1	29
Motor Vehicles	30.5	15.5	0.5	9
Breweries	23.9	11.1	0.5	23
Wines and Spirits	30.7	9.4	0.3	8
Hotels and Caterers	22.8	18.2	0.8	15
Leisure	71.3	83.2	1.2	29
General Food Manufacturing	28.9	16.6	0.6	25
Milling and Flour Confectionery	46.2	68.9	1.5	5
Food Retailing	50.6	42.1	0.8	19
Newspapers and Periodicals	30.8	6.7	0.2	8
Publishing and Printing	37.7	30.8	0.8	27
Packaging and Paper	31.6	42.2	1.3	29

TABLE 4.14 (continued) *CONSUMER DURABLE/NON-DURABLE SAMPLE*

CONTINUING COMPANIES (1970-1978)

AVERAGE RATE OF RETURN (PER CENT) BY CATEGORY (Continued)

INDUSTRIAL/COMMERCIAL GROUP	MEAN	STANDARD DEVIATION	COEFFICIENT OF VARIATION	NUMBER OF COMPANIES IN CATEGORY
Departmental Stores	23.7	14.9	0.6	14
Furnishing Stores	33.5	14.5	0.4	6
Stores : Mail Order	34.9	20.3	0.6	4
Stores : Multiple	45.9	44.4	1.0	26
Clothing	48.1	55.4	1.2	54
Cotton and Synthetic	35.5	32.0	0.9	4
Wool	20.9	13.2	0.6	18
Miscellaneous Textiles	26.3	17.6	0.7	30
Tobacco	27.5	23.0	0.8	3
Footwear	35.1	28.0	0.8	18
Toys and Games	60.5	40.4	0.7	9

TOTAL SAMPLE = 501 FIRMS

TABLE 4.15

CONSUMER DURABLE/NON-DURABLE SAMPLE

CONTINUING COMPANIES (1970-1978)

KRUSKAL-WALLIS ANALYSIS OF VARIANCE BY RANKS

ANALYSIS OF KEY VARIABLES BY INDUSTRIAL/COMMERCIAL CATEGORY

KEY VARIABLES	CHI SQUARED VALUE	DEGREES OF FREEDOM	PROBABILITY OF OBTAINING A SAMPLE CHI SQUARE VALUE OF THIS SIZE OR LARGER	SAMPLE SIZE
SIZE	102.45	29	< 0.001	501
GROWTH	49.22	29	0.025	501
CONTROL+	46.23	28	0.025	262
TAKEOVER INDEX ++	32.38	28	0.262	277
SHAREHOLDER WEALTH INDEX	50.91	29	0.010	501
RATE OF RETURN	57.24	29	0.005	501

+ Restricted to a comparison of those Companies with a percentage Director control greater than 10%.

++ Restricted to a comparison of those Companies which made at least one takeover during the sample period.

TABLE 4.16

CONSUMER DURABLE/NON-DURABLE SAMPLE

SIGNIFICANCE TEST BETWEEN INDUSTRIAL/COMMERCIAL CATEGORIES OVER TOTAL SAMPLE (859 FIRMS) FOR SIZE, CONTROL AND AGE

VARIABLE	F VALUE DERIVED FROM ANALYSIS OF VARIANCE	SIGNIFICANCE LEVEL OF F VALUE
SIZE	2.652 (29 and 829 degrees of freedom)	0.001
CONTROL	2.272 (29 and 829 degrees of freedom)	0.001
AGE	3.436 (29 and 829 degrees of freedom)	0.001

TABLE 4.17

CONSUMER DURABLE/NON-DURABLE SAMPLE

ANALYSIS OF VARIANCE

SIGNIFICANCE TEST BETWEEN CONTINUING AND FAILED FIRMS+
OVER TOTAL SAMPLE (859 FIRMS) FOR SIZE, CONTROL AND AGE

VARIABLE	F VALUE DERIVED FROM ANALYSIS OF VARIANCE	SIGNIFICANCE LEVEL OF F VALUE
SIZE	6.525 (2 and 856 degrees of freedom)	0.002
CONTROL	3.229 (2 and 856 degrees of freedom)	0.040
AGE	1.431 (2 and 856 degrees of freedom)	0.240

+ The failed firms included those that were acquired as well as those that became insolvent.

TABLE 4.18 CONSUMER DURABLE/NON-DURABLE SAMPLE

T TEST (2 TAIL) BETWEEN CONTINUING COMPANIES AND VICTIM COMPANIES (1970-1978)

VARIABLE	NUMBER OF CASES	MEAN	STANDARD DEVIATION	SIGNIFICANCE (USING SEPARATE VARIANCE ESTIMATE)
(1) SIZE				
Continuing Companies	501	£16,907,702	£53,761,449	< 0.001
Victim Companies	306	£5,168,804	£15,837,690	
(2) CONTROL				
Continuing Companies	501	27.17%	26.67%	0.014
Victim Companies	306	18.46%	26.05%	
(3) AGE				
Continuing Companies	501	35.42 years	23.4 years	0.849
Victim Companies	306	35.76 years	25.8 years	

SAMPLE SIZE = 807 FIRMS.

TABLE 4.19 CONSUMER DURABLE/NON-DURABLE SAMPLE

AVERAGE AGE OF VICTIMS AT DEATH AND CONTINUING COMPANIES AT END OF SAMPLE PERIOD (1978)

CATEGORY OF COMPANY	AGE IN YEARS OF CONTINUING COMPANIES TO 1978	AGE IN YEARS AT DEATH OF VICTIM COMPANIES	CATEGORY OF COMPANY	AGE IN YEARS OF CONTINUING COMPANIES TO 1978	AGE IN YEARS AT DEATH OF VICTIM COMPANIES
Light Electronics	25	28.6	Food Retailing		
Radio and TV	32	21	Newspapers and Periodicals	29.4	37
Floor Coverings	37.5	29.4	Publishing and Printing	43.9	32
Furniture and Bedding	20.2	26.8	Packaging and Paper	35.6	45.2
Household Appliances	30.2	28.9	Departmental Stores	38.4	27.5
Kitchen and Tableware	29.2	32.2	Furnishing Stores	36.2	38.7
Motor Components	37.4	30.1	Stores : Mail Order	34	44
Motor Distribution	31.9	32.1	Stores : Multiple	23.6	33.7
Motor Vehicles	25.4	29	Clothing	38.9	27.4
Breweries	57.2	73.5	Cotton and Synthetic	31.3	35.3
Wines and Spirits	41	25.3	Wool	40.3	42.6
Hotels and Caterers	53.4	46.4	Miscellaneous Textiles	38.8	37.4
Leisure	39.5	35.9	Tobacco	36.4	36
General Food Manufacturing	42.3	38.6	Footwear	34	39.7
Milling and Flour Confectionery	48.4	31.2	Toys and Games	18	32

VALUE OF SPEARMAN RANK CORRELATION COEFFICIENT = 0.4526.

SIGNIFICANCE OF CORRELATION = 0.01 (1 TAIL TEST).

TOTAL SAMPLE = 807 FIRMS

4.3.2. Tests of Association (the "necessary" conditions)

The aim of the research is to demonstrate the "existence" of the managerial firm and by confirming that "existence" to provide a generalised explanation of the reason for firms being taken over. The idea of the "managerial firm" is a "construct", a classification of certain types of behaviour which can be aggregated to provide a useful way of characterising certain firms. The "construct" itself, being formed from assumptions concerning motive, is untestable and forms a "hard core" in the Lakatos terminology. Its "existence" can be established only by showing that behaviour implied by the axioms of motive is invariably associated with firms exhibiting the structural trait of widely dispersed ownership. These "necessary" relationships are examined by a comparison of statistical parameters and the use of correlation analysis which are to be found in the tables contained in this section of the chapter.

After some preliminary remarks on correlation analysis (4.3.2.(1)), the plan of attack is pursued in the following manner :-

Section 4.3.2.(2) assumes the behavioural profile of the managerial firm and investigates the Consumer Durable/Non-Durable Goods sample to seek confirmation of the expected relationships over a wide distribution of firms.

Section 4.3.2.(3) considers firms in the Consumer Durable/Non-Durable Goods sample which exhibit high levels for a variable assumed to be important in characterising managerial behaviour and searches for evidence that the other expected associations can be found.

Section 4.3.2.(4) takes "victim" firms from the Comparison sample as exemplars of managerial behaviour and seeks to substantiate that assumption. Predator and neutral firms are used for purposes of comparison.

4.3.2.(1) Correlations between Key Variables

By carrying out a test of the correlation coefficients between single pairs of variables, it is possible to assess

i) whether there is a functional relationship between the variables;

ii) whether the two variables are dependent on each other;

iii) whether one can predict the value of one variable from a knowledge of the other.

In order to employ the technique known as the calculation of the Pearson Correlation Coefficient, a number of assumptions have to be made :

a) That the two variables are normally distributed.

b) That the functional relationship between the two variables is linear (i.e. of the form $Y = ax + b$).

c) That the pairs of values follow a bivariate normal distribution. (Note: This is not guaranteed by (a) above since if (a) obtains but requirement (b) does not, then a bivariate normal distribution does not occur.(6)

If there is a low or zero value to the calculated correlation coefficient, then it does not necessarily imply an absence of relationship, since the two variables may not be normally distributed or the functional relationship may not be linear.

The existence of a significant correlation between two variables is equally no inevitable guide to the true relationship since the correlation may in fact reflect a relationship with a third variable not specified in the analysis. A further difficulty with the results of correlation analysis is that the technique makes no claim as to the direction of causation. A high correlation between A and B can be equally interpreted as A causes B, or B causes A; in order to assess the causal path it is necessary to refer to the underlying theory.

Since the sample size was large (i.e. 501 firms), it appeared to be safe to assume that the law of large numbers would operate and permit the assumption of a bivariate normal distribution.

(6) A bivariate normal distribution arises when a plot of the probability/frequency of the occurrence of joint values of the variables is found to trace out a normal curve.

4.3.2.(2) The Distribution of Managerial Firms in the Population

Hypothesis - that managerial behaviour is a widespread phenomenon amongst quoted companies.

Method - Table 4.20 provides correlations between key variables. The expected correlations are set out in a form which facilitates a contrast between expected and actual results, and conclusions are drawn. The sample analysed is of those companies who continued in existence from 1970 to 1978 from the Consumer Durable/Non-Durable Goods group.

In the comparisons which follow :

- indicates negative correlation

+ indicates positive correlation

(a) indicates statistical significance at 0.01 level.

a) GROWTH

Related Variable	Expected Correlation	Actual Correlation	Statistical Significance of Actual Correlation
Control	-	+	Not significant
Shareholder Wealth Index	-	+	(a)
Rate of Return	-	+	(a)

If disregard of shareholder interests are commonplace, then it can be anticipated that as ownership control diminishes growth will become more unrestrained and shareholder wealth and the rate of return will be increasingly sacrificed to the growth motive.

The large ($r = 0.73$) and significant effects between rates of growth and rates of return are not helpful to the Marris theory that high rates of growth will cause the rate of return (or the profit rate in Marris terminology) to decline. If there is no trade-off between the growth rate and the profit rate, then the essential managerial theorem is not confirmed. The situation is not irretrievable, since the expected negative relationship may only manifest itself at high rates of growth, and such high rates might be limited to a small number of firms, the effect being swamped among the larger number of companies. This possibility is examined in the next section of this chapter.

It might, however, be remarked that the rate of return in Table 4.20 has a significant positive correlation with all other key variables and that this is unique, suggesting that the variable plays a decisive role in the total situation.(7)

Assuming for the moment the reality of the growth/rate of return connection, the direction of that relationship is of interest. Do firms earn high rates of return because growth is continually opening up access to products and markets which have not been fully exploited and therefore yield a high profit rate, or is it the increasing rate of return which funds the growth? Since the figures represent averages over a period it is not possible to plot the leads and lags involved. There

(7) Further support for the importance of the Rate of Return variable came from a study using the CHI Squared Test which showed that when the Rate of Return was controlled, the significance of the correlation between growth and the Shareholder Wealth Index vanished.

is probably an element of two-way causation here in any event, but which is the dominant part of the relationship requires the findings of the latter part of this research before the argument can be developed.

There is no evidence in Table 4.20 that shareholder wealth is depressed as growth intensifies. It does not seem surprising that shareholder wealth should increase in harmony with an increasing rate of return. Since growth and the rate of return are evidently functionally related, it appears that shareholders benefit from the growth relationship, which again casts some doubt upon the managerial viewpoint that it is the pursuit of growth which disadvantages the holders of the equity and causes them to be responsive to bids from predator firms. It is, however, in order to recall the reservation that high growth may be not so beneficial, and this will be further explored below.

b) CONTROL

Related Variable	Expected Correlation	Actual Correlation	Statistical Significance of Actual Correlation
Growth	-	+	Not significant
Shareholder Wealth Index	+	+	Not significant
Rate of Return	+	+	Significant (1% level)

It is to be expected that the effect of increasing directorial control will lower growth rates to the benefit of the shareholder wealth index and the rate of return.

The small but significant positive correlation with the rate of return is entirely consistent with the managerial theory of the firm insofar as owner controlled firms are expected to have a greater regard for the prospect of earning high rates of return.

The parallel development in shareholder wealth is also expected corroboration, but the lack of statistical significance weakens this result. For the same reason, the contrary finding for growth cannot be given much weight.

c) FURTHER COMMENTARY ON TABLE 4.20

The theory of the managerial firm is less explicit on the variables of size and the maesure of takeover intensity.

It may generally be surmised that size may blunt the appetite for growth, but the confirmation shown in the table lacks statistical significance.

The negative inter-action of size with control is not unexpected since, as companies grow in size, it is to be expected that the need for extensive funding will lead to a dilution of the owners' share of the business. Nor is the positive increase in takeover activity with growing size unanticipated, since it is well known from previous research that large firms make more significant use of the merger mechanism.

The fact of a small inverse relationship between size and the rate of return has been reported elsewhere in the

research literature (Whittington, 222/1980, Eatwell (making a survey of the evidence), 62/1971), although this finding has been coupled with evidence that the larger size of company had reduced variability in its profit rate (this was also found to be the case in this study). The inverse relationship between size and the rate of growth of shareholder wealth is more probably the result of a positive correlation between rate of return and the shareholder wealth index.

Since mergers give rise to a faster investment in assets than is possible by internal means of growth, we can readily accept the evidence that higher rates of growth are connected with an increasing takeover intensity.

Equally, firms whose shares are mainly held by its Directors will be loath to make takeovers since control may be diluted either by the issue of shares for acquisition purposes or because of the difficulty of funding a greater size of enterprise without recourse to the Stock Market. The significant negative relationship between control and the takeover index is therefore not unexpected.

The correlation between takeovers and the rate of return may appear to fly in the face of the evidence of most studies that mergers have not been shown to be profitable (for example, Meeks, 153/1977), but it should be remembered that the majority of these studies relate to the acquisition of quoted firms, whereas the index calculated for this study also includes the

takeover of foreign companies and private firms. It is entirely possible that the acquisition of small non-quoted businesses is a reasonably successful form of venture.

d) CONCLUSION

The hypothesis that managerial behaviour is a widespread phenomenon among quoted companies is not supported by the evidence of this section. There seems to be little indication of any sacrifice of profit or shareholder's welfare to ambitious growth policies. However, this does not dispose of the possibility that a significant sub-set of firms can be so classified. It is for this reason that the next sub-section turns to consider whether firms manifesting high growth policies do exhibit the necessary profile, and that firms making high returns to shareholders or earning above average rates of return will demonstrate contrary characteristics.

4.3.2.(3) A Study of Firms with High Values for One of the Key Variables

If one selected all firms showing a high value for a given key variable, it was possible to examine what happened with large firms demonstrating high growth rates, firms making generous rates of return, etc. The reasons for examining the upper end of the spectrum for these variables were two-fold. In the first place, the simple correlations had cast doubts upon the managerial theory that profit rates might be sacrificed to some other

component of managerial utility (the growth rate, in the case of Marris's formulation of the theory). It was therefore important to examine whether the theory could be sustained if it were to be limited to firms displaying high values and presumably therefore motivated to maximise their performance with respect to these variables. The second reason was that since a number of circumstances had conspired to make the economic environment between 1970 and 1978 somewhat unfavourable for the display of managerial type behaviour, it therefore seemed important to give every opportunity for such activity to reveal itself for inspection.

Reference to Tables 4.21 to 4.26 illustrates the effect of looking at those firms which could be described as large, fast-growing, largely owner controlled, with a high propensity to grow by takeover, making an above average contribution to shareholder wealth and earning high rates of return. In all cases the figures for the variable maximisers are contrasted with the average value for the total number of continuing firms. The coefficient of variation is also calculated and contrasted with the same parameter for the average firm, in order to indicate whether the distribution of values is more or less variable for the maximising company, as against the average company. It is common in research into firms to compare levels of group values with the median since the distributions are known to be often skew and therefore the value established by

the firm or firms in the centre of the range of values is taken as being a better guide to the normal situation. In this case, however, it was decided that where a particular skew distribution of cases existed, as it did in the instance of size and the takeover index, then taking figures above the average was a better guide to those firms which might be reasonably assumed to have a dominant intention to maximise that particular value.

In most cases the Tables show that the maximising firms do not differ greatly from the pattern which emerged by study of the simple correlations. However, interesting differences did appear with respect to the merger intensive companies.

Table 4.27 supplements the information supplied by the preceding tables in that it surveys the correlations between the key variables and the firms showing above average values for the selected characteristic. It does not disturb in any major way the conclusions already reached in Section 4.3.2.(2).

A closer examination of the nature of growth companies is afforded by Tables 4.28 to 4.30. They should be read in conjunction with Table 4.22 (the Value of Key Variables for High Growth Firms) since they are designed to shed light on the way in which low growth and high growth firms may differ.

4.3.2.(4) The Characteristics of Managerial and Profit Maximising Firms

Hypotheses

i) Taking into account the conclusion of Section 4.3.2.(2) that there is no convincing evidence that managerial behaviour is widespread, it is assumed that a sub-set of firms from the Consumer Durable/ Non-Durable sample with above average rates of growth will demonstrate managerial characteristics.

ii) Firms with a greater than average proportion of voting shares held by their directors will, in contrast, show the behavioural characteristics of profit maximising enterprises.

iii) Firms earning above average rates of return will exhibit a profit maximising profile.

iv) Firms making above average increases in shareholder wealth will reveal a behavioural pattern appropriate to profit maximising motivation.

Additionally, large sized firms and firms making greater use of takeover as a means of growth, will be examined in order to contribute to understanding of the behaviour of acquiring firms.

Method

Since interest must focus on the managerial firm, the nature of high growth companies is given detailed examination. The actual profile of high growth firms is first compared with that expected of managerial companies

(Table 4.22). Then high growth and low growth companies are compared with respect to the selected variables to determine if different behavioural patterns can be detected (Tables 4.22 and 4.28).

Having compared the parameters for level, correlations between growth and the other variables are investigated for high and low growth companies to see if the direction of causation differs between high growth, low growth and the proposed managerial type of firm (Table 4.29).

Table 4.30 attempts to deal with the effect of risk. It is to be expected that managerial firms will undertake more risky investments in their search for growth than the average firm. This will occur because a greater amount of investment will provide less managerial time to devote to each individual project, thus introducing errors of judgement, and also because the search for more investment opportunities will tend to drive such firms into unfamiliar markets. It may even be that rates of return correlate positively with growth, but that in relation to the risks faced, such returns are too low with respect to the probability of failure. In order to meet this possibility, the rate of return should be risk adjusted.

The usual approach is to create a "certainty equivalent" value[8] in the numerator or to increase the discount factor by a risk premium and then calculate a net present value of the returns.

(8) A "certainty equivalent" may be defined as a sum which if received with certainty would be as equally acceptable to the investor as the expected sum, calculated from a probability distribution of returns. For further elaboration see A.A.Robichec and S.C.Myers "Optimal Financing Decisions" (Prentice Hall, 1965).

Table 4.30 proposes another method of adjusting the rate of return for risk. If we understand risk in financial analysis to be defined in terms of the likely variability of future returns, then our interest centres on the effect of that variability on the other profile elements, with the implication to be tested that high variability of return may be associated with high growth companies. The Table in question controls the growth factor in terms of level and also uses partial correlation analysis to control for the effect of the rate of return. The technique works by removing all co-variability between the rate of return and the other variables; in practical terms this means treating the rate of return as if it had a constant value. The process is intended to unmask the effect of a third variable (in this case, rate of return) upon a correlation between two other variables (i.e. high/low growth and the other key variables), for by comparing Table 4.29, where return is not controlled, with Table 4.30 where return is held constant, it is possible to observe whether the direction of the correlation or its order of magnitude has changed markedly in comparing high and low growth companies.

a) High and Low Growth Companies
(Tables 4.22, 4.28, 4.29 and 4.30)

High growth firms are smaller than average (about two-thirds of the average size in general). Their growth rate is 50% greater than average and more stable. The extent of owner control is a little above average and slightly more use is made of takeovers. Their rate of return is much above and more stable than average (61% compared with 38%), and shareholder wealth increase is above average.

This confirms the correlation analysis of Table 4.20 in establishing that growth, even high growth, is not detrimental to the shareholders' interests, which appears to refute the Marris viewpoint and makes it unlikely that high growth involves sacrificing profitability leading to the prospect of falling victim to a takeover bid. The Marris reasoning, however, seems, on the basis of these results, to have gone astray in associating high growth (which Marris seeks to define as excessive growth) with the managerial type firm, since Table 4.22 shows that owner control is as equally prevalent as managerial control in firms seeking to expand at a fast rate.

When attention is paid to the results for the Low Growth Companies, further corroboration of the above conclusion is revealed. Lower levels of growth do not

lead to any improvement in the rate of return or benefit to the shareholder; in fact the reverse occurs. The extent of director control has an average value which is similar for high and low growth companies and the standard deviation shows that the distribution of individual values round the mean does not differ except trivially. Low growth firms are found to be larger than high growth firms and to be less involved in takeovers, and this is consistent with the fact that takeovers are an essential component of high growth strategies. Rather more surprising is the revelation that low growth companies are larger in size and have a low level of value for the takeover index which offends against the received wisdom that large firms employ mergers as a means of growth more than smaller sized businesses (see Table 4.20 for evidence of a statistically significant effect of size on takeover intensity). This suggests that although larger firms acquire companies as a normal mode of investment, it in no way supports the viewpoint of the literature on industrial concentration which associates mergers with excessive growth in large companies. (Bear in mind, however, that conglomerate companies were not included in the Consumer Durable/Non-Durable Sample).

The correlation analysis of Table 4.29 indicates that higher rates of growth are compatible with higher rates of return than are to be found in low growth enterprises, and that the shareholders do not suffer in comparison, both results being statistically significant at the 0.01 probability level. When the variability of the rate of return is controlled (and hence by definition the financial risk facing the firm), the direction of correlation or the comparative magnitude of variables between high and low growth firms are not disturbed, with the exception of the takeover index. This falls to a trivial level ($r = 0.08$) and now lacks statistical significance. If we consider the significant relationship of rate of return with the takeover index in Table 4.20 and the absence of that relationship when associating high rate of return and the takeover variable in Table 4.27, we are led to the inference that takeovers in themselves do not appear to increase profitability, but that growth and profitability are securely related, and that the relationship between takeover and profitability in Table 4.20 is in reality a spurious one, reflecting the fact that growth is independently related to takeover as a means of increasing net asset size and profitability as a product of growth (or as a way of financing growth, since the effect of each upon the other may not be

unidirectional). The profitability/takeover connection is unreal, which is in conformity with the many commentators who have searched in vain for any indication that takeovers are more profitable than any other form of investment.

b) The Owner Controlled Companies (Tables 4.23 and 4.27).

Firms with large amounts of directorial control in their shareholding are assumed to pursue the virtuous path of shareholder wealth maximisation, since the directors are held to be eager to uphold the value of their equity stake in the company as it is a measure of their personal wealth.

These enterprises are, on average, only about one-third as large as the average firm. The number of voting shares held cluster around the 50% figure with much lower variability (a coefficient of variation of 0.26) than the sample as a whole; this recalls the feature recognised in the distribution earlier in this chapter, that the frequency distribution is bi-modal. This means that directors either hold few shares, or if they are so minded, ensure that they hold a sufficiency of votes to enforce their policies unquestionably.(9) Their rate of return is above average and their shareholders prosper more than most. They are less

(9) 262 firms in the total sample of 501 firms had holdings of less than 10% representing 52.3% of the whole.

prone to make takeovers which may be a function of their small size or more probably their unwillingness to permit their holding to be proportionately diminished. To this point they fit the characteristics of the profit motivated firm, but since their growth rate is above average, this agrees with the Radice verdict (178/1971) that owner controlled firms show no lesser rates of growth than managerialllly controlled firms.[10] A glance at Table 4.22 shows that their rate of return and contribution to equity wealth is less than that of the high growth companies.

The striking feature of Table 4.27 is that there is no significant causal relationship found for firms with large elements of owner control and any of the key variables. A separate test was run on High and Low Growth Companies holding control constant (i.e. using partial correlation analysis). The results have not been incorporated in this text, but they showed that significant relationships between growth and profitability and shareholder wealth existed at the 0.1% probability level. The inference must be that level of control is not an important factor in affecting the financial performance of quoted companies. This result is in line with a growing number of studies which have cast doubt

(10) Radice, in analysing his conclusions, however, pointed out that his sample, insofar as they had managed to maintain a high level of control while sacrificing the benefits of access to the capital market, could be conceived as being made up of exceptionally efficient firms.

on the growth/return trade-off as being explained by differences in the separation of ownership from control (Holl[11] (233/1975), Kamerschen (235/1968), McKean and Kania (236/1978) and Radice (178/1971)); and McEachern (237/1978) has gone so far as to argue that owner controlled companies may, because of their tight control of stock, use their position to evade market discipline.

c) Companies providing Shareholders with Above Average Increases in Wealth (Tables 4.25 and 4.27)

The modern theory of financial management is built on the foundation that the objective is to maximise the welfare of its owners. This welfare is defined in terms of the value of ownership claims (i.e. the share price) plus distributions (principally dividends). Companies involved in maximising shareholder wealth are therefore the pre-eminent exemplar of profit-maximising companies.

These firms are, on average, half the size of the typical firm but make an average number of takeovers and have the typical proportion of directorial control of the company. They serve the wealth creative interests of their equity holders twice as well as with the average firm, earn a 30% higher rate of return, and grow 20% faster. In every case, for Growth, Shareholder

(11) Holl sought to renege on this conclusion (233/1975) but the exchange between Holl and Lawriwsky (234/1980), to be found in the June issue of the Journal of Industrial Economics, cast some doubt on Holl's results.

Wealth and the Rate of Return, the variability (as measured by the coefficient of variation) was below average, i.e. indicating greater stability.

Table 4.27 shows that the correlation between shareholder wealth growth and the rate of return was highly significant (0.1% level) which reaffirms the message drawn from the examination of correlations for the whole sample. The correlation between wealth increase and growth was also highly significant (0.1% level). Since we already know from the correlation analysis that the rate of return/growth nexus is the most significant of all the relationships, we are bound to infer that growth is not inimical to shareholder interests.

d) Companies Earning High Rates of Return (Tables 4.26 and 4.27)

Amongst the firms making high rates of return we would expect profit maximising behaviour to be a norm. Table 4.26 offers no comfort for those searching for evidence of a consequent depression in growth rate. The average growth rate at 22.5% is virtually identical with that of the High Growth Companies of 22.9%. Shareholders benefit in equal measure in both types of company. The correlation analysis of Table 4.27 repeats the high significant relationship between growth and profitability found hitherto.

The relationship between the rate of return and the two variables, control and takeover intensity, may seem to fly in the face of previous analysis which suggested that takeover was neutral with respect to profitability and that control was not a causal factor in the model. Explanations can be offered for both situations if we accept that the relationship is masking real causal patterns. If takeover is a significant means of growth, and profitability and growth are strongly related, then the strength of the association between takeover and profitability is a spurious correlation due to the intervention of the growth variable. By a similar argument, since size and profitability have been shown to be negatively related, and size and control are also inversely connected, then the rate of return/control link is a phantom one due to the fact that lack of size has a beneficial effect on the rate of return and is also known to be the section of the population of quoted companies where director control is strongest.

e) Conclusion

In Section 4.3.2.(2) the proposition that "managerial behaviour" is widespread amongst quoted companies has found no support. Having examined companies with characteristics (e.g. high rates of growth, high rates

of return, etc.) which permitted them to be tentatively classified as managerial or profit-maximising, the anticipated behaviour has failed to assert itself. Growth, profitability and shareholder wealth show positive significant correlations. It is inevitable that these should be related when profitability is low, since there is a lack of funds to support high growth and directors anxious about their security will be concerned with shareholder interests. This section has shown that the proposed trade-off of growth with profitability/shareholders' interests cannot be detected, even at high levels of these variables. Moreover, one of the crucial foundations of the managerial firm theory has been critically questioned - that is, that the separation of ownership and control is a determinant of financial performance.

4.3.2.(5) The Acquiring Firms

Since large firms are known to make extensive use of acquisition as a means of expansion, and since firms with a heavy involvement in takeover have been identified in the Consumer Durable/Non-Durable Sample, the examination of the characteristics of such firms is of interest in a study of merger behaviour.

a) The Large Companies (Tables 4.21 and 4.27)

These companies were six to seven times larger than average. Their growth rate was less than average, the directorial shareholding was trivial, they made much more use of merger as a means of growth, and their rate of return and shareholder return was lower than average. The variability of return was also lower than average, thus confirming the generally agreed research finding that though profitability diminishes with size, the stability of profit increases. Measured in terms of the coefficient of variation, however, it should be noted that the variability in shareholder return is the same as for the average company (or nearly so, 0.97 compared with 1.18 for the average).

The correlation analysis of High Size firms in Table 4.27 indicates that size is only of importance in determining the amount of takeover activity.

The impression gained from the figures is that large firms are not growth maximisers but security maximisers, engaged through the takeover mechanism in repairing damage through obsolescence or competition to their product range and ensuring their longevity by making secure returns (rather than larger but riskier returns) both to themselves and their shareholders. The explanation is not incompatible with a managerial view of the firm. It is not necessarily

irreconcilable with the Marris theory of the firm, if we accept that after a certain given size is attained managers find sufficient satisfaction in the resulting combinations of power, prestige, discretionary use of funds, etc., without risking the package in the pursuit of excessive growth. The finding is equally in tune with the research that argues that takeover behaviour is not justified in terms of increasing profitability. The result could also be used to support the Weston and Mansinghka contention (219/1971) that the purpose of takeover is the "raising of profitability of firms with depressed earnings to the average for the industry generally". (The Weston and Mansinghka conclusion is related to the activity of conglomerate firms, but since this is the normal source of mergers in the U.S.A., the verdict can be generalised).

b) Predator Companies (Tables 4.24 and 4.27)

These are companies who, on average, engaged in four times as much takeover activity as the normal firm. Since takeover is measured by means of an index, it is not possible to disaggregate this and state whether the mergers were predominantly with quoted, unquoted or foreign companies, but their predatory nature is unquestionable. As we would expect, they are approximately three times larger than the typical firm. The control percentage is low and their growth rate high; thus they meet the Marris

prescriptions for a managerial type firm. Insofar as their rate of return is above average, they show no indications of the debilitating effects of excessive growth, although their shareholder wealth increases are below average, implying not that the growth path is ill chosen (since this would be reflected in the rate of return) but raises the possibility that they either spend excessively to achieve future returns (e.g. advertising or research/ product development costs are high),[12] or that they make payments in cash or shares (or both) for victims which are in excess of what the investment warrants.

Since they are, on average, half the size of the large firm group but two-and-a-half times the size of the typical firm, and taking into account the highly positively skewed distribution, they fall into the upper size bracket of firms where the benefits of largeness (such as possession of market power, ease of access to funds and the prestige factors) have become within reach and they may therefore be motivated to seek a faster rate of growth in order finally to realise these prizes. This concept of firms being encouraged by their relative position to make a "growth spurt" is supported by the fact that their merger intensity is one-third greater than that of large firms who

(12) It might be considered that the expenditure would show up as a cost in the accounts, thus reducing the rate of return. However, the rate of return as calculated in this instance has a constant denominator of net assets in 1970, and so the reduction in return could pass unnoticed.

themselves make three times as many takeovers as the average company.

4.3.2.(6) Summary of Findings from the Tests of Association

a) Growth, Profit Rates and the Shareholder Wealth Index are all positively related. This refutes the view that growth is carried out at the expense of either the profit rate or shareholders' returns, although it does seem to be the case that shareholder wealth does not increase in the same proportions as the rate of return. In this view, shareholders seem to be paid a satisfactory return and the remainder of the wealth earned goes towards the growth of the firm, which may be some indication that managers are motivated to growth.

b) Size leads to a lower performance with respect to the rate of return and the growth of shareholder wealth, although the stability of these returns may compensate the shareholder for the reduction in return.

c) Takeovers are carried out by larger firms than average and are positively associated with high growth. The shareholder, however, fares less well than average with firms pursuing more intensive merger policies, which implies that growth is being increased at the expense of the shareholder.

d) High levels of directorial control appear to have less influence on performance than the theory of the managerial firm proposes. Although there is some evidence of above average profitability, this appears to derive from the fact that control in general diminishes with increase in size. Therefore, high control is more prevalent amongst the smaller firms. But it is amongst such firms that growth and profitability reach above average levels. Therefore the conclusion is drawn that the correlation between control and the rate of return to be found in Table 4.20 is a spurious relationship.

e) Smaller sized firms tend to perform better with respect to growth, rate of return and increase in shareholder wealth.

4.3.2.(7) Data Analysis

The analysis of data on which are based the interpretations of the preceding pages is set out in tabular form in Tables 4.20 to 4.30 which follow.

TABLE 4.20

CONSUMER DURABLE/NON-DURABLE SAMPLE

CONTINUING COMPANIES (1970-1978)

SIMPLE CORRELATION BETWEEN KEY VARIABLES

	SIZE	GROWTH	CONTROL	TAKEOVER INDEX	SHAREHOLDER WEALTH INDEX	RATE OF RETURN
SIZE	1.0000 (a)	- 0.0695	- 0.1879 (a)	+ 0.3591 (a)	- 0.1098 (a)	- 0.1131 (a)
GROWTH	- 0.0695	1.0000 (a)	+ 0.0633	+ 0.2507 (a)	0.3627 (a)	+ 0.7305 (a)
CONTROL	- 0.1879 (a)	+ 0.0633	1.0000 (a)	- 0.1855 (a)	0.0636	+ 0.1255 (a)
TAKEOVER INDEX	+ 0.3591 (a)	+ 0.2507 (a)	- 0.1855 (a)	1.0000 (a)	- 0.0069	+ 0.1620 (a)
SHAREHOLDER WEALTH INDEX	- 0.1098 (a)	+ 0.3627 (a)	+ 0.0636	- 0.0069	1.0000 (a)	+ 0.3432 (a)
RATE OF RETURN	- 0.1131 (a)	+ 0.7305 (a)	+ 0.1255 (a)	+ 0.1620 (a)	+ 0.3432 (a)	1.0000 (a)

(a) = Significant at 0.01 level.

SAMPLE SIZE = 501 FIRMS.

TABLE 4.21

CONSUMER DURABLE/NON-DURABLE SAMPLE

CONTINUING COMPANIES (1970-1978)

VALUE OF KEY VARIABLES FOR HIGH SIZE FIRMS +

	MEAN	STANDARD DEVIATION	COEFFICIENT OF VARIATION
SIZE	£106,724,104	£111,624,821	1.05
	(£16,968,867)	(£53,860,162)	(3.17)
GROWTH	12.6%	6.4%	0.51
	(14.6%)	(9.4%)	(0.64)
CONTROL	6.4%	16.58%	2.59
	(23.2%)	(26.7%)	(1.15)
TAKEOVER INDEX	1.56	1.74	1.11
	(0.56)	(1.2)	(2.08)
SHAREHOLDER WEALTH INDEX	6.06%	5.9%	0.97
	(8.8%)	(10.4%)	(1.18)
RATE OF RETURN	23.6%	13.8%	0.58
	(37.8%)	(39.5%)	(1.05)

+ High Size is defined as having a net asset value in 1970 of greater than £16,968,700 which is the mean value for all firms in total sample.

NUMBER OF CASES = 67

(Figures in brackets show comparison values for total sample)

TABLE 4.22

CONSUMER DURABLE/NON-DURABLE SAMPLE

CONTINUING COMPANIES (1970-1978)

VALUES OF KEY VARIABLES FOR HIGH GROWTH FIRMS+

	MEAN	STANDARD DEVIATION	COEFFICIENT OF VARIATION
SIZE	£10,334,681	£38,304,949	3.70
	(£16,968,687)	(£53,860,162)	(3.17)
GROWTH	22.9%	7.9%	0.34
	(14.6%)	(9.4%)	(0.64)
CONTROL	25.1%	26.8%	1.07
	(23.2%)	(26.7%)	(1.15)
TAKEOVER INDEX	0.7210	1.3679	1.90
	(0.56)	(1.2)	(2.08)
SHAREHOLDER WEALTH INDEX	12.0%	11.0%	0.92
	(8.8%)	(10.4%)	(1.18)
RATE OF RETURN	61.0%	50.3%	0.82
	(37.8%)	(39.5%)	(1.05)

(Figures in brackets show comparison values for total sample)

+ High growth is defined as having an annual growth rate of greater than 14.6%.

NUMBER OF CASES = 210

TABLE 4.23

CONSUMER DURABLE/NON-DURABLE SAMPLE

CONTINUING COMPANIES (1970-1978)

VALUE OF KEY VARIABLES FOR FIRMS WITH A LARGE ELEMENT OF OWNER CONTROL+

	MEAN	STANDARD DEVIATION	COEFFICIENT OF VARIATION
SIZE	£5,096,439	£28,000,941	5.5
	(£16,968,687)	(£53,860,162)	(3.17)
GROWTH	15.2%	9.9%	0.65
	(14.6%)	(9.4%)	(0.64)
CONTROL	51.2%	13.6%	0.26
	(23.2%)	(26.7%)	(1.15)
TAKEOVER INDEX	0.32	0.87	2.72
	(0.56)	(1.2)	(2.08)
SHAREHOLDER WEALTH INDEX	9.4%	11.9%	1.3
	(8.8%)	(10.4%)	(1.18)
RATE OF RETURN	41.7%	40.1%	0.96
	(37.8%)	(39.5%)	(1.05)

(Figures in brackets show comparison value for total sample)

+ A large element of owner control is defined as more than 23.2% of the voting shares held by the Directors.

SAMPLE SIZE = 221 FIRMS

TABLE 4.24. CONSUMER DURABLE/NON-DURABLE SAMPLE

CONTINUING COMPANIES (1970-1978)

VALUE OF KEY VARIABLES FOR FIRMS MAKING ABOVE AVERAGE NUMBER OF TAKEOVERS+

	MEAN	STANDARD DEVIATION	COEFFICIENT OF VARIATION
SIZE	£43,223,365	£86,539,009	2.0
	(£16,968,687)	(£53,860,162	(3.17)
GROWTH	17.88%	11.46%	0.64
	(14.6%)	(9.4%)	(0.64)
CONTROL	13.83%	22.9%	1.66
	(23.2%)	(26.7%)	(1.15)
TAKEOVER INDEX	2.03	1.56	0.77
	(0.56)	(1.2)	(2.08)
SHAREHOLDER WEALTH INDEX	7.8%	9.4%	1.2
	(8.8%)	(10.4%)	(1.18)
RATE OF RETURN	46.76%	56.9%	1.22
	(37.8%)	(39.5%)	(1.05)

(Figures in brackets show comparison value for total sample)

+ Above average takeover record is defined as having a value of the takeover index greater than 0.56.

SAMPLE SIZE = 126 FIRMS.

TABLE 4.25

CONSUMER DURABLE/NON-DURABLE SAMPLE

CONTINUING COMPANIES (1970-1978)

VALUE OF KEY VARIABLES FOR FIRMS MAKING ABOVE AVERAGE RETURN TO SHAREHOLDERS+

	MEAN	STANDARD DEVIATION	COEFFICIENT OF VARIATION
SIZE	£7,021,560	£24,776,849	3.5
	(£16,968,687)	(£53,860,162)	(3.17)
GROWTH	17.6%	9.8%	0.56
	(14.6%)	(9.4%)	(0.64)
CONTROL	24.0%	27.1%	1.13
	(23.2%)	(26.7%)	(1.15)
TAKEOVER INDEX	0.5017	1.1621	2.32
	(0.56)	(1.2)	(2.08)
SHAREHOLDER WEALTH INDEX	17.12%	8.35%	0.49
	(8.8%)	(10.4%)	(1.18)
RATE OF RETURN	48.76%	44.08%	0.90
	(37.8%)	(39.5%)	(1.05)

(Figures in brackets show comparison values for total sample)

+ Above average return to shareholders is defined as increasing the value of the shareholder's wealth by an annual compound rate of interest of more than 8.8% (i.e. the mean value for the total sample of firms).

BASED ON 232 CASES.

TABLE 4.26

CONSUMER DURABLE/NON-DURABLE SAMPLE

CONTINUING COMPANIES (1970-1978)

VALUE OF KEY VARIABLES FOR FIRMS MAKING ABOVE AVERAGE RATES OF RETURN+

	MEAN	STANDARD DEVIATION	COEFFICIENT OF VARIATION
SIZE	£7,758,583	£29,373,768	3.8
	(£16,968,687)	(£53,860,162)	(3.17)
GROWTH	22.5%	9.2%	0.41
	(14.6%)	(9.4%)	(0.64)
CONTROL	26.8%	26.9%	1.03
	(23.2%)	(26.7%)	(1.15)
TAKEOVER INDEX	0.74	1.45	1.96
	(0.56)	(1.2)	(2.08)
SHAREHOLDER WEALTH INDEX	13.04%	11.0%	0.84
	(8.8%)	(10.4%)	(1.18)
RATE OF RETURN	71.8%	49.7%	0.69
	(37.8%)	(39.5%)	(1.05)

(Figures in brackets show comparison value for total sample)

+ Above average rate of return is defined as earning an average pre-tax profit (1970-1978) as a percentage of net assets in 1970 greater than 37.8% (the average for the total sample).

NUMBER OF FIRMS = 175

TABLE 4.27

CONSUMER DURABLE/NON-DURABLE SAMPLE

CONTINUING COMPANIES (1970-1978)

CORRELATIONS BETWEEN KEY VARIABLES AND FIRMS SHOWING HIGH LEVELS FOR SELECTED VARIABLES

TYPE OF FIRM	SIZE	GROWTH	CONTROL	TAKEOVER INDEX	SHAREHOLDER WEALTH	RATE OF RETURN	NUMBER OF FIRMS OF GIVEN TYPE
LARGE SIZE (Having net asset value in 1970 greater than £16,986,700)	-	- 0.04	- 0.06	0.29 (b)	- 0.22	- 0.15	67
HIGH GROWTH (Greater than 14.6%)	- 0.13	-	0.10	0.33 (a)	0.26 (a)	0.69 (a)	210
HIGH LEVEL OF OWNER CONTROL (Director shareholding of more than 23.2%)	0.03	0.02	-	- 0.10	0.83	0.11	221
MAKING ABOVE AVERAGE USE OF TAKEOVER (Value of takeover index greater than 0.56)	0.27 (a)	0.24 (a)	- 0.12	-	0.12	0.13	126
MAKING HIGH RETURNS TO SHAREHOLDERS (Increasing shareholder wealth by annual rate in excess of 8.8%)	- 0.11	0.26 (a)	0.21 (a)	- 0.02	-	0.34 (a)	232
EARNING OF HIGH RATES OF RETURN (Earning a pre-tax rate of return greater than 37.8%)	- 0.09	0.68 (a)	0.17 (b)	0.17 (b)	0.26 (a)	-	175

(a) = Significant at 0.01 level. (b) = Significant at 0.05 level.

TABLE 4.28

CONSUMER DURABLE/NON-DURABLE SAMPLE

CONTINUING COMPANIES (1970-1978)

VALUES OF KEY VARIABLES FOR LOW GROWTH FIRMS +

	MEAN	STANDARD DEVIATION	COEFFICIENT OF VARIATION
SIZE	£21,756,113	£62,363,993	2.87
GROWTH	8.7%	4.8%	0.55
CONTROL	21.8%	26.5%	1.22
TAKEOVER INDEX	0.44	0.96	2.18
SHAREHOLDER WEALTH INDEX	6.5%	9.3%	1.43
RATE OF RETURN	21.0%	13.9%	0.66

+ Low Growth is defined as having an annual growth rate of less than 14.6%.

NUMBER OF CASES = 291.

TABLE 4.29

CONSUMER DURABLE/NON-DURABLE SAMPLE

CONTINUING COMPANIES (1970-1978)

CORRELATION VALUES FOR HIGH AND LOW GROWTH COMPANIES+
BETWEEN GROWTH AND SELECTED VARIABLES

	SIZE	CONTROL	TAKEOVER INDEX	SHAREHOLDER WEALTH	RATE OF RETURN
HIGH GROWTH COMPANIES	- 0.13	0.10	0.33 (a)	0.26 (a)	0.69 (a)
LOW GROWTH COMPANIES	0.12 (b)	- 0.06	0.10	0.26 (a)	0.48 (a)

(a) = Significant at 0.01 level.
(b) = Significant at 0.05 level.

+ The dividing line between High and Low Growth Companies is the mean growth rate for the total population (i.e. 14.6%).

SAMPLE SIZE : Number of High Growth Companies = 210
Number of Low Growth Companies = 291

TABLE 4.30

CONSUMER DURABLE/NON-DURABLE SAMPLE

CONTINUING COMPANIES (1970-1978)

CORRELATION VALUES FOR HIGH AND LOW GROWTH COMPANIES+
HOLDING RATE OF RETURN CONSTANT

	SIZE	CONTROL	TAKEOVER INDEX	SHAREHOLDER WEALTH
HIGH GROWTH COMPANIES	- 0.12	- 0.04	0.08	0.30 (a)
LOW GROWTH COMPANIES	0.13 (b)	- 0.06	0.12 (b)	0.16 (b)

(a) = Significant at 0.01 level.
(b) = Significant at 0.05 level.

+ The Dividing line between High and Low Growth Companies is the mean growth rate for the total population (i.e. 14.6%).

SAMPLE SIZE : Number of High Growth Companies = 210
Number of Low Growth Companies = 291

4.3.3. Tests of Difference (the "sufficient" conditions)

The attempt to establish that a certain pattern of behaviour, deriving from a concentration on the ambitions of professional managers rather than the service to the shareholder was essentially related to firms showing high growth characteristics, has not been successful. One difficulty in the approach was the necessity to assume that high growth could be equated with excess growth. It could well be that the high growth firms are composed of a mixture of profit maximising firms maintaining fast growth rates and managerial firms engaged in unjustified growth policies, but the confounding of the two types was not conducive to clear distinctions being drawn.

Marris proposed that victim firms (i.e. those that were taken over) were brought to their sorry state by undertaking growth policies without proper regard for their effect on shareholder wealth. If this hypothesis is true, then several useful inferences follow :-

a) The existence of managerial behaviour, and hence the managerial firm, is supported.

b) A generalised theory of merger activity is established.

c) The efficiency of the Stock Market in allocating capital to the firms best able to employ it and its denial to companies who cannot profitably employ it is confirmed.

Using the Comparison Sample of 150 firms divided equally into Predators, Victims and Neutrals, this section tests whether the anticipated managerial behaviour pattern is "sufficient" to indicate the existence of the managerial firm. Sufficiency conditions are analysed by finding evidence that where a factor "a" occurs, then state "b" exists; and where factor "a" does not occur, state "b" does not exist. If Victim Firms are assumed to be managerial firms *per se* and Predator Firms and a control group of Neutral Firms are assumed to be of a different nature, and the difference can be shown to depend on an anticipated behavioural pattern which can be related to the pursuit of managerial interests, then the sufficiency conditions are confirmed.

Two points are worth making on the rationale underlining this analysis. First, to demonstrate that a presumed managerial behaviour pattern is a "sufficient" but not "necessary" condition for the existence of the managerial firm means that there may be other forms of behaviour compatible with the managerial firm not captured by the analysis. The second point is that if the managerial firm concept is not confirmed, then the lack of success can be explained in several ways :-

a) Victim firms do not pursue unbalanced growth and therefore the concept of the managerial firm should be abandoned as unrealistic.

b) The particular behaviour pattern defined as being "managerial" may be wrongly specified.

c) The assumption that Victim Firms are examples of managerial firms is unjustified.

Each objection is perfectly valid. But this illustrates that any attempt to establish a hypothesis within a theory depends upon other supporting assumptions. A hypothesis which is not corroborated may not necessarily therefore fail because the hypothesis is false but because the supporting assumptions are not valid. This is a practical example of the Lakatos thesis, that each theory stands in relation to a complex web of theories and the problem that, because of this, no hypothesis can ever be decisively rejected. A series of failures in testing a variety of hypotheses leads to serious doubt being cast upon the "hard core" assumption, in this case that the "managerial firm" as defined in the literature is a useful concept.

4.3.3.(1) The Comparison Sample: Predators,Victims,Neutrals. Univariate Analysis.

The reasons for drawing this particular sample of 150 companies was to discover if the profiles of predators, victims and companies who had developed by means of internal growth without impediment from predators were markedly different, and to ascertain whether these differences supported the managerial theory of the firm, and in particular if victim companies promoted their own downfall by pursuing growth at the expense of profitability. The fact that we have so far failed to uncover convincing evidence of a growth/profitability trade-off is not necessarily fatal to the prospect of discovering such an exchange in the new sample. The reason is that by widening the sample to include capital goods companies and those engaged in general manufacturing, we offer a revised opportunity for the effect to be discerned. Equally, the outcome of concentrating our attention on quoted firms making takeovers of other quoted companies in 1978 and 1979 is that we have raised the size of these firms measured in terms of net assets. In the Consumer Durable/Non-Durable Sample, the average size of predator was about £43 million; in the new sample, predators have grown to an average size of £150 million. The average size of victim was £5 million and has now become £17 million. Although some of this variation is due to differences in measuring size, the previous sample defined size with respect to accounts published in 1970, while the present sample takes a 5 year average ending in the year prior to the merger incident in 1977 and 1978 which allows inflation to affect the figures, bearing in mind that

the value of the £ sterling dropped by about 50% between 1970 and 1975/1976 (the middle year of the estimate), the differences are still too large to be explained away by this factor alone. The average percentage owner control has fallen for high takeover companies in the earlier sample from 13.8% to 9.7%, making their managerial nature more apparent. The differences between the two samples could possibly have a two-fold effect. Firstly, the greater size of companies involved may increase their propensity to display managerial type behaviour, in the first place because it has already been established that ownership control falls with size (see Table 4.21) and also because the greater size may have insulated the companies more from the difficult economic circumstances of the decade 1970 to 1980, already alluded to in Chapter 1 of this thesis. The second factor, not unrelated to the first, is that the limitation to quoted companies exclusively has brought the research into line with other research studies such as that of Singh, Kuehn and Meeks, so that we may have somewhat enhanced confidence in the possibilities of the Marris thesis being confirmed. (A later section in Chapter 6 considers the question of the extent to which the Marris hypothesis has been supported by other empirical research work).

A wider range of variables has also been introduced with the Comparison Sample. They are fully defined in Appendix E.

Since the Comparison Sample was based on an analysis of the published balance sheets of companies as against the secondary data used for the earlier sample, it was possible to take into account

a number of variables dealing with the sources of funds: (i) the retention ratio, (ii) the gross retention ratio (i.e. the retention ratio plus depreciation), (iii) gearing, (iv) use of external funds, and also the profit margin as an example of pricing behaviour and the liquidity ratio as an illustration of the use of funds.

Some changes have occurred in the definition of variables that exist in both samples which are recorded in the Appendix but which may be justifiably identified at this point. These are:-

a) SIZE - this was defined as net assets shown in the 1970 accounts in the Consumer Durable/Non-Durable Sample; in the Comparison Sample the figure is based on an average of 5 years.

b) CONTROL - in the first sample all directorial voting percentages below 10% were treated as representing zero control; in the second sample the voting percentage is treated as a continuous variable (all values between 0% and 100% were faithfully represented).

c) PROFIT RATE/RATE OF RETURN - although these variables have similar purpose, i.e. to measure the profit rate, they were estimated in slightly different ways. The rate of return (as shown in the Consumer Durable/Non-Durable Sample) was based on average pre-tax profits for the years 1970 to 1978 as a percentage of the 1970 net assets. The profit rate (in the Comparison Sample) was calculated on the basis of net profits after tax averaged over 5 years divided by an average of net assets over the same 5 years.

The differences must be borne in mind in comparing the two samples. Because of the importance of the valuation ratio in Marris's work and the controversy in the research literature concerning its use as an indicator of the risk of being taken over (Kuehn finding it to be of importance (118/1975), and Singh (198/1971) in company with Newbould (166/1970) casting doubt on its value), three versions of the valuation ratio were tested - its average over a five year period, its level in the year immediately preceding a merger (in the case of predator and victim firms; it is merely calculated in the final year of the five for neutrals), and its change between year 1 and year 5 in percentage terms. It was hoped to offer in this way every chance for the significance of the index either to establish itself or to fail to do so.

4.3.3.(2) Testing the Comparison Sample

Hypothesis

That victim firms which are assumed to be managerial in nature differ significantly on certain financial and structural variables from the level of these variables as recorded for predator and neutral companies. These variables have been selected on the basis of their ability to distinguish managerially motivated enterprises from firms engaged in furthering the welfare of the owners of their equity.

Method

A table is drawn up indicating, for each included variable, the expected differences in level between victim firms and predator firms. On the basis of the results of a statistical description of the firms (Table 4.31), a further column shows whether the actual results confirmed the anticipated outcomes.

Each variable is then separately examined using a 't' test of significance and comparing the categories :

(i) Victims and Predators (Table 4.32)

(ii) Predators and Neutrals (Table 4.33)

(iii) Victims and Neutrals (Table 4.34).

Finally the total sample is then subjected to an analysis of variance test to find out whether certain variables, important to the theory of the managerial firm, could be statistically distinguished if the firms are classified as victims, predators and neutrals. These results are displayed in Table 4.35.

A) Statistical Comparison of the Categories (Victim, Predator and Neutral). (Table 4.31).

Using the reasoning advanced in Chapter 3, a schedule of the variables in the Comparison Sample can be drawn up indicating the level of the variable to be expected if victims are prototypes of the managerial firm. This is done, and a further column indicates whether the data analysed in Table 4.31 confirms the expectation..

Variable	Category of Firms Showing High Value +	Category of Firms Showing Low Value +	Was Expectation Confirmed?
Size	P	V	Yes
Growth	V	P	No
Retention Ratio	V	P	No
Gross Retention Ratio	V	P	Yes
Control	P	V	Yes
Profit Rate	P	V	Yes
Gearing	V	P	No
External Funds	V	P	No
Average Valuation Ratio	P	V	No
Change in Valuation Ratio	V	P	Yes
Final Valuation Ratio	P	V	No difference
Shareholder Wealth Index	P	V	Yes
Profit Margin	P	V	No
Liquidity Ratio	P	V	No

It cannot be too strongly emphasised that the table needs to be read as a whole since the aim is to substantiate or otherwise a profile of attributes.

+ P = Predator
V = Victim

Table 4.31 shows that the victim firms in relation to predators were on average smaller by a large factor (the predators were typically nine times as large), had lower growth rates, were two and a quarter times more under the control of their directors, had a profit rate about 70% of that of the predator group, served their shareholders less well than the predators but earned higher profit margins on their sales. Surprisingly, their average valuation ratios were similar to those of the predator group, as was their final valuation ratio, but a difference strikingly emerged with respect to the change in the valuation ratio where the victim firms commonly showed a fall over the five year period preceding the takeover, whereas the predator firms showed an increase.

A clear picture therefore emerges in which victims under-performed the predators, and though this under-performance did produce average valuation ratios and final valuation ratios of below unity (implying that the book value of the firm was above its market value), the important information which the valuation ratio contained was in its drop in level by one-fifth in the years preceding takeover. The victims fail to meet the Marris specification of excessive growth rate, but in other respects could be looked at as under-performers who met the fate that the neo-classical theory of capital markets reserves for those who use their allotted capital funds in mediocre ways.

The retention ratios were alike for victims and predators, as were the levels of liquidity which both maintained against contingencies. Where the two groups differed heavily was in the way in which predators made three times as much use of long term borrowing and raising of funds by share issue as the victims. These firms were growing at a fast rate but did not therefore seem embarrassed at the prospect of raising funds externally. There is confirmation, however, that the victims did make less appeal to external sources of finance (be that debt or equity). Since the victims did not exhibit high growth, the impression given is that of firms who, because of poor results or possibly smaller size which made them less attractive to lenders, limited their growth rate in relation to the funds which they could generate themselves internally. The predators, on the other hand, grew at a fast pace (despite valuation ratios of less than unity) because of their ability to increase the supply of capital.

As was reported in respect of the Consumer Durable/Non-Durable Sample, the existence of a growth objective involving the sacrifice of profit appears to be without substance. However, the concept of a market for corporate control which rewards efficiency and penalises the lack of it by the way funds are distributed, seems perfectly consistent with the facts of Table 4.31. This is strengthened if one considers the way in which shareholder wealth increased by almost 100% for predators

over victims, making it likely that the shareholders in victim firms would be glad to accept a takeover offer which rescued them from a poor performance in which the fall in their share prices (evidenced by the dropping valuation ratio) had locked them in.

B) 'T' Test Comparisons between Predators, Victims and Neutrals (Tables 4,32, 4.33 and 4.34)

The differences noted in the previous section invite enquiry as to the statistical significance of those differences. The category of companies was therefore compared pair-wise with respect to each variable.

Table 4.32 enlarges the picture painted above, showing significant differences (size, growth, profit rate, gearing, external funds and change in valuation ratio) between victim and predator firms, and finding no significance in other variables (the retention ratios, the average and final valuation ratios and the liquidity ratio) where the straight comparison of means had shown little difference. The profit margin also proved not to differ significantly. The fact that there is no significant difference in the extent of control indicates the possible "managerial" nature of predator firms.

At one point, however, the statistical test fails to support the interpretation given above, and unfortunately in a most vital area for the theory of the allocation of capital, or more precisely of an efficient capital market. The difference between

the predators and victims with regard to the increase in shareholder wealth fails to achieve significance at the 5% level of probability. This seems to repeat an observation already brought out that the returns to shareholders do not seem to relate to high rates of return in the manner which one would expect.

The real problem arises when we bring the neutral firms into consideration. A reading of Table 4.31 indicates that they have profiles close to those of the victim firms but show evidence of a slightly better performance with respect to growth, the profit rate and returns to shareholders. They make slightly more use of external funds than the victims, are slightly larger in size, are much more under the influence of owners, and even produce an average valuation ratio above unit and a final valuation ratio close to unity. But Table 4.34 shows that no variable is significantly different in its level between victims and neutrals if the 5% level of probability is chosen as a cut-off point, and only one variable - growth, with a significant level of 8.6% - is even near to attaining such distinction.

A new piece of the puzzle is visible if we consider Table 4.33, where a 't' test is made of the difference between means for predators and neutrals. We find that they can be distinguished by reason of the fact that the neutrals are smaller, grow at a slower pace, and are more under the control of their

directors. They also show, as do the victim firms, a reluctance to use external funding and lower gearing ratios. On many of the variables, however, it is not possible to find significant differences, and among these we find the three valuation ratios and the profit rate. The situation we have arrived at is one where we can differentiate A and C, but B (which seems to have an intermediate range of value levels between A and C) is indistinguishable from A and only recognisably different to a limited extent from C.(13)

We seem to have come to a point where we can recognise victims as being considerably smaller than predators, growing less hurriedly, and under a greater degree of directorial control. Only predators are able to make significant use of borrowed funds and new equity. But we are not able to sort out victims from continuing neutral companies in any effective way on the basis of univariate analysis. The position regarding the shareholder wealth parameter remains slightly unsatisfactory insofar as, just as in the comparison of predators and victims, the variable just fails to indicate significant differences between predators and neutrals at the 5% probability level (actual level is 7.2%).

The picture which starts to emerge is one in which large firms, by virtue of their size (implying greater wealth and greater stability of earnings by reason of their greater diversification of product and markets and possibly the

(13) In this illustration, A = Victim Firm, B = Neutral Firm, and C = Predator Firm.

possession of some degree of monopoly power), are able to raise funds which enable them to grow faster (making fairly extensive use of mergers, as is shown in Table 4.21). They choose victims who have lower profit and growth rates and who most probably have served their shareholders less well. However, since the profit rate overlaps between victims, neutrals and predators, we would be unwise to consider victims as failing firms but merely accept that they tend to be at the lower end of the profit range. High growth is a property of predators not victims (as theory suggests), and the difference in growth rates is probably due to constraint of funds (i.e. the growth/demand function is only available for firms of the largest scale). It may be, however, that a grouping of the variables may offer a better opportunity of discrimination, and this is a matter for the next chapter.

C) Analysis of Variance of Several Selected Variables (Table 4.35)

From the evidence so far presented, it appears that predator firms show greater success with respect to the performance variables size, growth, profitability and increase in shareholder wealth. Structurally they exhibit greater size and lower levels of directorial control. Financially they make greater use of external funds and have a higher gearing ratio.

The victim and neutral firms, on the other hand, have results which are somewhat similar to each other. If one considers the evidence of the 't' tests (Tables 4.32, 4.33 and 4.34), it is clear that one cannot distinguish between victims and neutrals with respect to :

Size

Profit Rate

Average Valuation Ratio

Shareholder Wealth.

The growth variable also fails as an indicator between the two types of firms at the 5% level of significance, though it comes closest to fulfilling this purpose with a difference between victims and neutrals which would only arise by chance 8.6 times in a 100 samples.

As a final check on this situation, the most important variables for the managerial theory of the firm were tested using an analysis of variance to see if it was possible to distinguish between groups as a whole. The selected variables were :

Size

Growth

Profit Rate

Shareholder Wealth

Average Valuation Ratio.

Since the total number in the sample was 150 and no group was less than 50, it was considered justified in using a

parametric analysis of variance, despite the obvious problems of non-homogeneity of variance in the groups and the absence of normality. (For support for this judgement, see Kerlinger (107/1973, page 287).

The analysis of variance seeks to answer the question - can we distinguish between the three group means with respect to the given variable?[14] This is a different question from the one previously asked, which is - are there significant differences between the groups taken in pairs? It differs by deriving a measure of individual variation over the 150 sample items and then comparing it with the variability between groups so that we may answer the question - does the variable differ between the types of firms (predators, victims and neutrals) if we assume the variance is common to each group as against distinctive for each group (which is the basis of the 't' test using separate variance estimates). By this means we can check whether the neutrals who occupy a position on each of the chosen variables higher than that of the victims, in fact overlap with the predators at one and and the victims at another, making it unwise to use the variable to differentiate between firms as a whole.

The results of this test are to be found in Table 4.35. The three groups differ significantly (at the 1% level of

(14) The Analysis of Variance, to state the purpose of the test with more rigour, proposes the hypothesis that all means for the separate groups are equal. If this "null hypothesis" is rejected, then it is necessary to test the groups pair-wise to find which means are, in fact, dissimilar.

significance) with respect to size and growth rates, and (at the 5% level of significance) for the profit rate.

The shareholder wealth index and the average valuation ratio are non-significant. We can therefore firmly reject the view that the shareholder wealth index is an important distinguishing characteristic, and also that the average valuation ratio tells us anything about the nature of the three types of firm, at least with respect to this sample.

In doing so, we nullify the major portion of the Marris argument that shareholders sell their firm to a bidder because of disenchantment with the way in which the management of the firm have pursued their own self interests. However, the fact that the profit and growth rates may still be important variables in characterising the class of firm leaves open the possibility that firms which under-perform fall victim to more successful enterprises as we would expect if the capital market is working efficiently. The powerless shareholder described in the managerial theorists' view of the firm appears not to be as important as expected, even on the basis of his ability to sell his shares in a takeover.

D) Conclusions

The main findings for the sample comparing predators, victims and neutrals based on univariate analysis are :-

a) Predators, in comparison with victims and neutrals, are larger, grow faster, have higher profit rates and make larger increases in the wealth of their shareholders. They do this to some extent by making more use of external funds and by having a higher gearing ratio. The amount of directorial control is low.

b) Victims and neutrals have similar values on all variables but the neutrals always show slightly higher values on the chosen variables without these higher values being significantly different in a statistical sense.

c) The retention ratios are similar for predators, victims and neutrals.

d) The valuation ratios (average and final) are similar for predators and victims and are only above unity for neutral firms.

e) Growth rates and rates of return are positively related, thus confirming the results of the Consumer Durable/Non-Durable Sample.

f) The valuation ratio falls for victim firms over the five year sample period.

g) The shareholder wealth index does not appear to differ significantly amongst predators, victims and neutrals, which casts doubt on the hypothesis that the source of merger activity is disgruntled shareholders who are unable to control the managerial group who run the company.

TABLE 4.31 COMPARISON GROUPS (PREDATORS, VICTIMS AND NEUTRALS)

COMPARISON OF KEY VARIABLES

VARIABLE	VICTIMS			PREDATORS			NEUTRALS		
	MEAN	STANDARD DEVIATION	COEFFICIENT OF VARIATION	MEAN	STANDARD DEVIATION	COEFFICIENT OF VARIATION	MEAN	STANDARD DEVIATION	COEFFICIENT OF VARIATION
SIZE	£17,049,000	£47,983,000	2.81	£150,332,000	£272,138,000	1.81	£21,540,000	£60,379,000	2.80
GROWTH	11.7%	10.2%	0.87	20.7%	13.7%	0.66	15.9%	13.9%	0.87
RETENTION RATIO	60%	16%	0.27	64%	16%	0.25	66%	14.	0.21
GROSS RETENTION	128%	57%	0.44	116%	42%	0.36	129%	64%	0.50
CONTROL	22.1%	20.0%	0.90	9.7%	16.4%	1.69	27.0%	21.0%	0.78
PROFIT RATE	9.6%	8.8%	0.92	13.9%	7.1%	0.51	11.8%	7.3%	0.62
GEARING	9.9%	13.4%	1.35	25.9%	26.1%	1.01	11.6%	16.3%	1.40
EXTERNAL FUNDS	9.3%	18.6%	2.0	27.4%	42.7%	1.56	11.4%	23.6%	2.07
AVERAGE VALUATION RATIO	0.89	0.56	0.63	0.81	0.56	0.69	1.03	1.03	1.0
CHANGE IN VALUATION RATIO	-22.9%	50.4%	2.20	+12.5%	106.6%	8.53	+1.3%	158.7%	122.08
FINAL VALUATION RATIO	0.67	0.46	0.69	0.67	0.41	0.61	0.91	1.43	1.57
SHAREHOLDER WEALTH INDEX	7.1%	26.0%	3.66	14.9%	16.3%	1.09	9.7%	12.1%	1.25
PROFIT MARGIN	3.2%	7.9%	2.47	2.1%	2.21%	1.05	1.8%	1.0%	0.56
LIQUIDITY RATIO	7.7%	18.7%	2.43	5.3%	13.6%	2.57	4.2%	9.5%	2.26

TOTAL NUMBER IN EACH GROUP: PREDATORS = 50; VICTIMS = 50; NEUTRALS = 50.

TOTAL SAMPLE = 150 FIRMS

TABLE 4.32 COMPARISON GROUPS (PREDATORS, VICTIMS AND NEUTRALS)

T TEST OF KEY VARIABLES FOR VICTIMS AND PREDATORS

VARIABLE	GROUP	MEAN VALUE	T VALUE (2 TAIL USING SEPARATE VARIANCE ESTIMATE)	SIGNIFICANCE LEVEL	SIGNIFICANCE AT 0.05 LEVEL	SIGNIFICANCE AT 0.01 LEVEL
SIZE	VICTIMS PREDATORS	£17,049,000 £150,332,000	- 3.41 (52 degrees of freedom)	0.001	YES	YES
GROWTH	VICTIMS PREDATORS	11.7% 20.7%	- 3.76 (91 degrees of freedom)	< 0.001	YES	YES
RETENTION RATIO	VICTIMS PREDATORS	60% 64%	- 1.18 (98 degrees of freedom)	0.242	NO	NO
GROSS RETENTION RATIO	VICTIMS PREDATORS	128% 116%	1.20 (90 degrees of freedom)	0.232	NO	NO
CONTROL	VICTIMS PREDATORS	22.1% 9.7%	3.39 (94 degrees of freedom)	0.001	YES	YES
PROFIT RATE	VICTIMS PREDATORS	9.6% 13.9%	- 2.68 (94 degrees of freedom)	0.009	YES	YES
GEARING	VICTIMS PREDATORS	9.9% 25.9%	- 3.87 (73 degrees of freedom)	< 0.001	YES	YES

TABLE 4.32 COMPARISON GROUPS (PREDATORS, VICTIMS AND NEUTRALS)

(Continued).. T TEST OF KEY VARIABLES FOR VICTIMS AND PREDATORS

VARIABLE	GROUP	MEAN VALUE	T VALUE (2 TAIL USING SEPARATE VARIANCE ESTIMATE)	SIGNIFICANCE LEVEL	SIGNIFICANCE AT 0.05 LEVEL	SIGNIFICANCE AT 0.01 LEVEL
EXTERNAL FUNDS	VICTIMS PREDATORS	9.3% 27.4%	- 2.75 (67 degrees of freedom)	0.008	YES	YES
AVERAGE VALUATION RATIO	VICTIMS PREDATORS	0.89 0.81	0.72 (98 degrees of freedom)	0.474	NO	NO
CHANGE IN VALUATION RATIO	VICTIMS PREDATORS	- 22.9% + 12.5%	- 2.12 (70 degrees of freedom)	0.037	YES	NO
FINAL VALUATION RATIO	VICTIMS PREDATORS	0.67 0.67	- 0.02 (97 degrees of freedom)	0.982	NO	NO
SHAREHOLDER WEALTH INDEX	VICTIMS PREDATORS	7.1% 14.9%	- 1.80 (82 degrees of freedom)	0.076	NO	NO
PROFIT MARGIN	VICTIMS PREDATORS	3.2% 2.1%	0.99 (57 degrees of freedom)	0.324	NO	NO
LIQUIDITY RATIO	VICTIMS PREDATORS	7.7% 5.3%	0.73 (89 degrees of freedom)	0.465	NO	NO

TOTAL NUMBERS IN EACH GROUP: VICTIMS = 50; PREDATORS = 50.

TABLE 4.33

COMPARISON GROUPS (PREDATORS, VICTIMS AND NEUTRALS)

T TEST OF KEY VARIABLES FOR PREDATORS AND NEUTRALS

VARIABLE	GROUP	MEAN VALUE	T VALUE (2 TAIL TEST USING SEPARATE VARIANCE ESTIMATE)	SIGNIFICANCE LEVEL	SIGNIFICANT AT 0.05 LEVEL	SIGNIFICANT AT 0.01 LEVEL
SIZE	PREDATORS NEUTRALS	£150,332,000 £21,540,000	3.27 (54 degrees of freedom)	0.002	YES	YES
GROWTH	PREDATORS NEUTRALS	20.7% 15.9%	1.75 (98 degrees of freedom)	0.083	YES	NO
RETENTION RATIO	PREDATORS NEUTRALS	64% 66%	- 0.6 (96 degrees of freedom)	0.550	NO	NO
GROSS RETENTION RATIO	PREDATORS NEUTRALS	116% 129%	- 1.18 (84 degrees of freedom)	0.241	NO	NO
CONTROL	PREDATORS NEUTRALS	9.7% 27.0%	- 4.61 (93 degrees of freedom)	< 0.001	YES	YES
PROFIT RATE	PREDATORS NEUTRALS	13.9% 11.8%	1.47 (98 degrees of freedom)	0.145	NO	NO
GEARING	PREDATORS NEUTRALS	25.9% 11.6%	3.30 (82 degrees of freedom)	0.001	YES	YES

TABLE 4.33

(Continued)..

COMPARISON GROUPS (PREDATORS, VICTIMS AND NEUTRALS)

T TEST OF KEY VARIABLES FOR PREDATORS AND NEUTRALS

VARIABLE	GROUP	MEAN VALUE	T VALUE (2 TAIL TEST USING SEPARATE VARIANCE ESTIMATE)	SIGNIFICANCE LEVEL	SIGNIFICANT AT 0.05 LEVEL	SIGNIFICANT AT 0.01 LEVEL
EXTERNAL FUNDS	PREDATORS NEUTRALS	27.4% 11.4%	2.33 (76 degrees of freedom)	0.023	YES	NO
AVERAGE VALUATION RATIO	PREDATORS NEUTRALS	0.81 1.03	- 1.36 (75 degrees of freedom)	0.177	NO	NO
CHANGE IN VALUATION RATIO	PREDATORS NEUTRALS	+ 12.5% + 1.3%	0.41 (86 degrees of freedom)	0.680	NO	NO
FINAL VALUATION RATIO	PREDATORS NEUTRALS	0.67 0.91	- 1.14 (57 degrees of freedom)	0.259	NO	NO
SHAREHOLDER WEALTH INDEX	PREDATORS NEUTRALS	14.9% 9.7%	1.82 (91 degrees of freedom)	0.072	NO	NO
PROFIT MARGIN	PREDATORS NEUTRALS	2.1% 1.8%	0.89 (67 degrees of freedom)	0.375	NO	NO
LIQUIDITY RATIO	PREDATORS NEUTRALS	5.3% 4.2%	0.48 (88 degrees of freedom)	0.633	NO	NO

TABLE 4.34

COMPARISON GROUPS (PREDATORS, VICTIMS AND NEUTRALS)

T TEST OF KEY VARIABLES FOR VICTIMS AND NEUTRALS

VARIABLE	GROUP	MEAN VALUE	T VALUE (2 TAIL USING SEPARATE VARIANCE ESTIMATE)	SIGNIFICANCE LEVEL	SIGNIFICANT AT 0.05 LEVEL	SIGNIFICANT AT 0.01 LEVEL
SIZE	VICTIMS NEUTRALS	£17,049,000 £21,540,000	- 0.41 (93 degrees of freedom)	0.681	NO	NO
GROWTH	VICTIMS NEUTRALS	11.7% 15.9%	- 1.74 (90 degrees of freedom)	0.086	NO	NO
RETENTION RATIO	VICTIMS NEUTRALS	60% 66%	- 1.86 (96 degrees of freedom)	0.067	NO	NO
GROSS RETENTION	VICTIMS NEUTRALS	128% 129%	- 0.07 (97 degrees of freedom)	0.948	NO	NO
CONTROL	VICTIMS NEUTRALS	22.1% 27.0%	- 1.20 (98 degrees of freedom)	0.234	NO	NO
PROFIT RATE	VICTIMS NEUTRALS	9.6% 11.8%	- 1.34 (95 degrees of freedom)	0.184	NO	NO
GEARING	VICTIMS NEUTRALS	9.9% 11.6%	- 0.57 (94 degrees of freedom)	0.568	NO	NO

TABLE 4.34

(Continued)..

COMPARISON GROUPS (PREDATORS, VICTIMS AND NEUTRALS)

T TEST OF KEY VARIABLES FOR VICTIMS AND NEUTRALS

VARIABLE	GROUP	MEAN VALUE	T VALUE (2 TAIL USING SEPARATE VARIANCE ESTIMATE)	SIGNIFICANCE LEVEL	SIGNIFICANT AT 0.05 LEVEL	SIGNIFICANT AT 0.01 LEVEL
EXTERNAL FUNDS	VICTIMS NEUTRALS	9.3% 11.4%	- 0.48 (93 degrees of freedom)	0.630	NO	NO
AVERAGE VALUATION RATIO	VICTIMS NEUTRALS	0.89 1.03	- 0.88 (75 degrees of freedom)	0.382	NO	NO
CHANGE IN VALUATION RATIO	VICTIMS NEUTRALS	- 22.9% + 1.28%	- 1.03 (59 degrees of freedom)	0.308	NO	NO
FINAL VALUATION RATIO	VICTIMS NEUTRALS	0.67 0.91	- 1.14 (59 degrees of freedom)	0.259	NO	NO
SHAREHOLDER WEALTH INDEX	VICTIMS NEUTRALS	7.1% 4.2%	0.63 (69 degrees of freedom)	0.530	NO	NO
PROFIT MARGIN	VICTIMS NEUTRALS	3.2% 1.8%	1.29 (50 degrees of freedom)	0.201	NO	NO
LIQUIDITY RATIO	VICTIMS NEUTRALS	7.7% 4.2%	1.19 (73 degrees of freedom)	0.240	NO	NO

TOTAL NUMBERS IN EACH GROUP : VICTIMS = 50; NEUTRALS = 50.

TABLE 4.35 COMPARISON GROUPS (PREDATORS, VICTIMS AND NEUTRALS)

ANALYSIS OF VARIANCE OF SEVERAL KEY VARIABLES
(SIZE, GROWTH, PROFITABILITY, SHAREHOLDER WEALTH INDEX AND AVERAGE VALUATION RATIO)
BY CATEGORY (PREDATORS, VICTIMS AND NEUTRALS)

	RATIO OF BETWEEN GROUPS VARIANCE TO WITHIN GROUPS VARIANCE	PROBABILITY OF RATIO ARISING BY CHANCE (F DISTRIBUTION)
SIZE	10.740 (2 and 147 degrees of freedom)	0.001
GROWTH	6.734 (2 and 147 degrees of freedom)	0.002
PROFIT RATE	3.798 (2 and 147 degrees of freedom)	0.025
SHAREHOLDER WEALTH INDEX	2.177 (2 and 147 degrees of freedom)	0.117
AVERAGE VALUATION RATIO	1.1682 (2 and 147 degrees of freedom)	0.3138

SAMPLE SIZE = 150 FIRMS

4.4. SUMMARY OF CHAPTER

The intention of this chapter is to subject the hypothesis relating to mergers and the nature of the managerial firm to statistical examination, using the methods of univariate analysis. Some of the strengths and weaknesses of univariate analysis are set out in sub-section 4.1.1.

The research design is explained (sub-section 4.1.2.) as being one in which, by statistical methods, "necessary" and "sufficient" relationships between categories of firms assumed to be managerial are related to behavioural and structural variables expected of such companies. The purpose of sub-section 4.1.3. is to define this "managerial" behavioural profile, and 4.2. is devoted to describing how the variables incorporated in the analysis serve in revealing this profile.

A preliminary analysis is undertaken in sub-section 4.3.1. of the statistical distribution of variables, the effect of industrial category on the variables, and whether the data confirms the existence of a "life cycle" in the fortunes of industries. The first two of these issues concern the generality of the findings and the last is a presumption underlying the assumption that firms need to adapt by diversification (and possibly merger) in order to maintain the pace of growth.

The later sections of the chapter (4.3.2. and 4.3.3.) deal with the statistical analyses and interpretation of the two samples.

Treating the two samples collectively, the following conclusions emerge :-

a) Both samples demonstrate that growth and profitability are complementary factors and are not inversely related as is proposed by the managerial theory of the firm. This remained true, even when the Consumer Durable/Non-Durable Sample was restricted to a study of those firms displaying high rates of growth.

b) It was not possible to support the implicit Marris hypothesis that victim firms are selected by reason of their poor profit performance on the evidence of the Comparison Sample which indicated no statistically significant differences with respect to profit between the acquired firms and firms of similar size and characteristics (i.e. the "neutral" firms) who were not subject to a takeover bid.

c) Firms with high levels of directorial control are shown by the Consumer Durable/Non-Durable Sample to have favourable records of both growth and profit in relation to the other firms in the sample, thus casting doubt on the belief that owner controlled firms would choose to pursue profitability at the expense of growth in contrast to managerially controlled firms.

d) Various forms of the valuation ratio were found not to be of importance in signalling the existence of a takeover prospect. There was some evidence that victim firms did

experience a fall in their valuation ratio over a five year period (i.e. a relative rather than an absolute measure). This is probably the result of a fall in the victim firm's share price (and hence market value) just prior to the merger. Since, on the evidence of average profitability over the five year period, victim firms were not shown to be different from non-acquired companies, this suggests that the market was making a judgement on the future prospects of the firm.

e) Predator firms had above average levels of profitability. Since this finding is at variance with a great deal of research which indicates that mergers create situations of low profitability, it will be considered in later chapters more fully.

f) The retention ratios of victims, predators and neutrals are similar in level. Large firms do seem to make more use of external funding and to have higher gearing ratios. There seems to be no corroboration for the view that managerial firms attempt to pursue unprofitable growth paths using retained funds to deprive shareholders, and the market generally, of any opportunity to pass unfavourable verdicts on their policy.

g) There is some evidence suggesting that shareholder wealth does not increase proportionately with the growth of profits. This is especially true of large firms and predatory firms (which is an overlapping class).

h) The extent of takeover activity was found, in the Consumer Durable/Non-Durable Sample, to be similar within all industrial categories. Thus managerial firms do not appear to congregate in industries with differing growth prospects. Alternatively, that merger is a normal form of investment activity used by up to half the firms surveyed (i.e. the larger firms on the evidence presented) when the cost of so doing is lower than investment internal to the company.

i) The levels of growth are shown by the Consumer Durable/Non-Durable Sample to be equitably distributed amongst firms. The approach towards "normality" in the statistical distribution of this variable leads to the inference that it is affected by a large number of random factors. This would make it more difficult to manipulate by deliberate acts of managerial policy.

j) There are signs of the existence of "life cycles" in industrial products judged by the age since public registration of the firms concerned, but no justification was found for the proposition that as an industry matures there will be a consolidation of firms by the elimination of a number of weaker companies through takeovers.

CHAPTER 5

TESTING OF HYPOTHESES CONCERNING THE MANAGERIAL FIRM

MULTIVARIATE ANALYSIS

5.0. AIM OF THE CHAPTER

The purpose of this chapter is to bring the research programme to a conclusion by means of pronouncing verdicts on a number of crucial issues. The verdicts must be properly conceived in the theoretical framework of competing paradigms within which the research has been carried out. There are no "crucial experiments" possible within either the physical or the social sciences, if by a crucial experiment we refer to one which will settle the issue irrevocably, since what Popper has referred to as "immunizing" strategies are always possible permitting shifts in the auxiliary assumptions or the scope of the framework within which the theory operates to preserve the hypothesis from annihilation. Nevertheless, it is possible to look at the predictive consequences of a given theory to see how well those predictions operate, and so to either strengthen or weaken our confidence in the theory.

The preceding chapter considered the hypotheses set out in Chapter 3 using the medium of univariate analysis. On this basis, certain inferences were drawn:-

a) It was established that factors specific to an industrial category had an importance that gainsaid the view that firms were able to manipulate their future development by use of the demand/growth function as a general rule.

b) There was a positive relationship between growth and rates of return which cast doubt on the concept of a growth/profitability trade-off, although there was some

evidence that the increase in shareholder wealth lagged behind the increase in the rate of return, suggesting that managerial behaviour asserts itself once a "satisficing" level of shareholder return has been achieved.

c) The shareholder wealth index was found to be valueless as a means of differentiating between predators, victims and neutrals, which dealt a severe blow to the concept that victims are failing firms that are eliminated by means of successful firms capturing them using the resources of an efficient capital market to achieve this end.

d) Takeovers were shown to be related to growth and increasing rates of return, but appeared to be at the expense of increases in shareholder wealth.

e) Although control by directors displayed positive association with increases in return and shareholder wealth, since the growth rate was not distinguishable between firms on the basis of the control variable, it is difficult to maintain the view that the growth rate is higher than the optimum in managerially motivated firms.

These judgements were based on comparisons of means and single measures of correlation between variables. There are known defects in such methods. The most obvious is that no single variable provides an adequate description of the essential nature of firms, and the result is a series of positive and negative scores for the theory which are difficult to aggregate into simple verdicts on the

theory as a whole. The second major defect of such procedures relates to the technical limitations of correlation analysis. Where variables are independent, then simple correlation works efficiently, but where variables are inter-correlated, then the strength and significance of the correlation is at risk and the sign of positive and negative correlations may be unstable. This last point is particularly serious in economics where the direction of the correlation is often the only guide to the results conformity with the underlying theory. The variables under study may be affected by another variable, and since this is known to be the case from the correlation tables, this must undermine some of the confidence in our results. For example, a partial correlation analysis of the relationship between growth and shareholder wealth which was carried out during the research, indicated a positive correlation for predator firms using the comparison sample; however, when the profit rate was taken into account the value of the correlation coefficient doubled in size and became negative, suggesting that when firms exhibited a similar level of profitability, shareholder wealth was diminished by growth, not increased.

5.1. KEY ISSUES IN MERGER BEHAVIOUR

5.1.1. An Examination of the Crucial Issues

In order, therefore, to pick our way through the maze created by univariate analysis, certain measures were called for and are employed in this chapter.

First it was decided to conflate the hypothesis into three major issues which were judged essential to the

examination of a managerial theory of the firm, a Marris type theory of takeovers and a wealth maximising theory of takeovers. Thesee are :-

i) Is there evidence that profit is being sacrificed to growth by the firm?

ii) Are there indications that "victim" firms are less profitable than the acquiring companies which carry out the takeovers?

iii) Is there any confirmation of the opinion that the growth of firms is being undertaken at the expense of shareholder wealth maximisation?

a) The Growth/Return Trade-off

If no such trade-off could be detected, then the case for the managerial firm would be in considerable disarray. It is evident that growth is the means by which size is attained and with it those aspects of managerial utility such as power, prestige, authority over staff and the employment of discretionary funds which are seen as the ultimate goals to which management is striving within the managerial model of business activity. If managers approach this goal via a highly correlated positive growth/return function, then we have only revealed a profit maximising situation where the fruits of that profitability are then enjoyed by the ultimate victors in the race, once large size is reached. We would expect to find, therefore, a preference for growth at the expense of profitability. Linked to this we would expect to find another component in the managerial framework represented by a low level of ownership control, and

that increasing control should represent a restraining influence over the motives for unbridled growth.

b) The Failing Firm Proposition

The expression "efficient capital market" is normally used in the literature to refer to a market in which the security prices reflect the available information. But the phrase is meant within this setting to refer to the ability of the capital market to allocate capital to companies that will make the best use of it (i.e. earn a marginal rate of return at least equal to any similar opportunity for using funds) and also to discover firms that are using the funds made available to them by that market unwisely and who penalise such negligence by transferring the capital to firms who can employ it profitably.(1)

This involves two issues. One, are unprofitable firms the victims of takeover raids, and are predators, on the basis of their past record, better able to make use of the physical and financial resources taken during the raid? The link with the managerial theory of the firm emerges in that the major cause of funds misuse is postulated as the excess growth based on the

(1) The distinction between efficiency in providing information and efficiency in allocating capital which is made here, is not always recognised. For example, Lev (129/1974) states - "An efficient capital market is defined as one in which security prices always fully reflect all publicly available information concerning the securities traded. Such a market is efficient in the sense that it properly fulfills the primary role of a capital market - the optimal allocation of resources". But whereas the statement would be true in a perfectly competitive market, it does not follow that pricing efficiency and allocative efficiency are necessarily so closely related in conditions of uncertainty. The price set may reflect the best judgement of the market and this judgement may turn out to be totally erroneous. The issue turns on the extent to which accounting information is designed to measure economic events efficiently. For an exposition of the problems see Treynor (210/1972).

pursuit of unprofitable opportunities. It has, however, already been pointed out that successful confirmation of this hypothesis is antithetical to the Marris formulation of "managerialism" in that since an efficient capital market will wreak vengeance on the unworthy holders of funds, and so circumscribe attempts at sacrificing profitability to growth, then the outcome will be profit maximising behaviour enforced by the discipline of the market.

c) The Maximisation of Shareholder Wealth

A finding of Chapter 4 based on univariate analysis was that although growth, rate of return and the index representing the increase in shareholder wealth appeared to be positively correlated, the shareholder wealth index was less correlated with growth than the rate of return (a correlation of 0.7305 between growth and the rate of return as against 0.3627 between growth and the shareholder wealth index, both correlations being significant at the 1% level (Table 4.20)). The rate of return also showed a weaker correlation with the shareholder wealth index (0.3432 again significant at the 1% level in Table 4.20) than with growth. This induced the suspicion that a modified form of managerial motivation was affecting the relationship; that firms grew by means of a profit related growth curve but failed then to transfer the gains "pro rata" to their shareholders, using any excess return over that performance needed to satisfy shareholders to indulge their penchant for an increase in physical size. Such a finding would be destructive to the

Marris thesis that firms used unprofitable methods of augmentation, but not to the view that after ensuring an adequate return to investors, all available funds were invested in the growth process. Since the index of shareholder wealth was designed to capture not only the outflow of dividends to the investor but also gains made by sale of shares of a capital nature, this presupposes that although firms make adequate returns on the funds invested, the investment carried out does not create the potential for increased income flow (at least in the short periods 9 and 5 years for the two samples). For this to be true, two inferences follow. First, that a great deal of growth is about the replacement of existing earning opportunities when products or markets start to decline, these earning opportunities being neither more nor less profitable than the ones which they are replacing. Secondly, that size brings with it a decline in the rate of return (which is confirmed in Table 4.20 by the significant negative correlation between the rate of return and size; a further correlation test (not published) showed a significant negative correlation links the profit rate and size for predator firms (which are known to be the larger size of company). The observation of this sub-section is not a commentary on the well documented evidence that managers tend to even out dividend payments from year to year to prevent unwelcome fluctuations in the income of shareholders. Most firms appear to have a "target" payment rate which they seek to maintain, and (bearing in mind that dividend increases are signals about earning prospects)

only raise the target when they are sure that the increase represents a fundamental improvement in their earning ability and will produce a dividend flow which is sustainable at the new level. Nor is it a reflection of certain classes of investors for capital gains (taxed at a reduced level from dividend income) over dividends. The variable that is being measured is "shareholder wealth' which is a combination of dividend flow and increase in capital value. The inference must be that having paid "satisfactory" dividends the firm then uses its "excess earnings" to diversify its activities in order to lower the variability of earnings flow and to ensure the replacement of failing products by new products, not in order to increase shareholder wealth but to guarantee the security of the management team.

This would be prudent behaviour for a group pursuing their own self interest. But since shareholders, by holding a portfolio, can determine the level of security which they wish to attain, managerial diversification (in the absence of positive bankruptcy costs) is not of value to them. If managers pursue growth for security reasons (and not for "power" as the managerial theories presuppose) then the wealth maximisation aim is being subverted.

Linked to this consideration of the extent to which shareholder wealth maximisation is a goal to which firms strive, is the extent to which shareholders respond to a takeover bid by selling shares because of an inability to restrain the professional management team in charge of a company who, by their policies, are failing to maximise shareholder wealth.

5.1.2. Technical Decisions designed to assist Statistical Interpretations

In order to explore these decisive issues, certain tactical decisions were made :-

1) Multivariate analysis is used as a predictive instrument. The actual techniques utilised were multiple regression analysis and discriminant analysis. (The following section describes these statistical methods and the advantages and disadvantages of their use). Multivariate analysis will more successfully cast light on these issues, since the theories under examination assume certain profiles for the managerial firm, victims, and profit maximising companies; and multivariate techniques are the appropriate tools for determining the existence of such profiles. In themselves, the techniques are barren, providing only a pattern of linkages between characteristic variables of more or less size and significance. It is only by relating them to the expectations that can be derived from theory and demonstrating the conformity or lack of conformity with the theory that makes the results capable of interpretation.

2) The number of variables used is reduced, this action being taken for several reasons. First, because of the virtues of simplicity and manageability; there is no reason why the laws governing economic behaviour should be simple and every reason to think that the complexity of economic behaviour is the rule, but the demonstration of a few strong relationships over a

multitude of associations of varying strength improves the possibility of making intelligent judgements concerning the meaning. Secondly, certain of the variables, amongst which we must include the growth rate, profit rate and growth of shareholder wealth, represent possible targets which we can directly connect with the motivational drives assumed in the theory, and therefore it is essential to the purpose of the research to unravel the web of relationships which join them, bringing also into account certain of the stronger correlations revealed by univariate analysis. Finally, it is well recognised in research using multivariate analysis that it is possible to increase the value of multiple correlations by adding a long string of profile items without adding much to the explanatory power of the function and at the same time increasing the probability that chance relationships are being swept into the explanation, thus distorting the final judgements.

3) Where two variables are highly correlated, the estimating process becomes very difficult, since we cannot reasonably distinguish the variation of the two variables separated from each other. The result is that estimates become very sensitive to random errors, and this is reflected in possible large variances of the partial regression coefficients and the intercept in a regression relationship. The relationship between the two variables may be very real, but because of the large standard error of the slope parameter, it is not possible to discern how other variables are related to the highly

inter-correlated variables. The problem of multi-collinearity, however, does not necessarily affect the overall prediction value of a multiple regression, since the fact that two variables jointly influence the final outcome may be taken as no more than a reflection of the real situation. The fact that we cannot discriminate between the joint effects represents the truth that we cannot expect a statistical analysis to distinguish inter-relationships that we are unable to quantify in any way.

However, where the focus of the research is on the individual components of the regression equation, the uncertainty of the outcome in terms of the relative value of the two inter-correlated variables is damaging to any understanding based on both the size and significance of the individual parameter estimates. Since the present research aims to uncover not only the predictability of the total profiles but also the importance of the relationship between characteristics that go to make up those profiles, the problem must be acknowledged. (For a clear definition of the issues of multi-collinearity and possible solution, see Koutsoyiannis (Chapter 11, 114/1973).

In many cases where the inter-correlations are not of large magnitude, a pragmatic decision is taken to accept the risks involved, since the exact effects of collinearity have not yet been theoretically established. However, in the case of both the Consumer Durable/Non-Durable sample and the Comparison sample, the highest significant correlations revealed were between the rate of return/profit rate and growth ($r = 0.7305$ in the former case (Table 4.20) and 0.7216 was calculated to be in the case of the latter).

There was also evidence of a more modest but still significant correlation between the shareholder wealth index and the rate of return/profit rate. This must give cause for concern in a research study which acknowledges these variables to be of central importance and is based on contrary expectations.

There are several possible remedies prescribed for this situation. Where the multi-collinearity arises from the accidents of sampling, then it is recommended that the sample is increased in size by the introduction of a greater amount of data, but this cure will not suffice if the defect is not due to sampling fluctuations but represents a true inter-correlation which will be sustained as sample size is increased. There are strong theoretical grounds for assuming that growth and the rate of return will be strongly correlated, since continuing growth depends on the capital supply to fund it, whether this derives from the availability of internal sources of funds or whether it depends on demonstrating an adequate profit rate to persuade external providers of capital to entrust their money to the company. Previous research has also shown this association to be a valid one (see for example Eatwell's survey (62/1971) of the growth/profitability relationship).

Another possible means of salvation is to drop one of the offending variables, but this is only proposed where one of the variables is judged on theoretical grounds to be of minor importance, and this cannot be so

with respect to the growth/profitability function in the present research. The absence of one of these crucial variables would lead to mis-specification of the model. The method of principal component analysis has been suggested, but since it creates artificial orthogonal (i.e. uncorrelated) variables based on linear combinations of the existing variables, there is often great difficulty in finding a plausible economic interpretation of these new variables. Another suggestion due to Koyck (115/1954) is to use lagged values of one of the variables, since this will often reduce the level of inter-correlation.

The solution adopted to this dilemma (which is endemic to most economic research) was to construct on theoretical grounds two new variables. These were:-

a) A measure of "warranted" profit.

b) A measure of "warranted" shareholder return.

Warranted Profit is defined as the rate of return/profit rate (the variables are differently named in the two samples but serve the same function) divided by the growth rate and thus producing a measure of the profit earned per percent change in the growth rate.

Warranted Shareholder Return is defined as the index of shareholder wealth divided by the growth rate thus creating a measure of the increase in shareholder wealth per percent change in the growth rate.

The rationale behind these constructs is straightforward.

The "Warranted" Profit Rate

Any firm which wishes to choose a justifiable growth path will aim to secure a high value of the profit rate for each percent change in its growth. If, however, it is reckless as to the value of such a prudent choice and is seeking to grow at all costs, then it will tend to achieve a low profit increase for each incremental unit of growth. Although the absolute levels of this variable cannot be predicted, we could expect a profit maximiser to exhibit a high value for this ratio and a growth maximiser to show a low value for this ratio. If this assumption is true, then we have a means of differentiating growth maximisers from profit maximisers.

The "Warranted" Growth Rate

From the analysis of Chapter 4, it has become apparent that profit maximisers as defined above (that is, maximising the pre-tax rate of profit in the case of the Consumer Durable/ Non-Durable sample and the post-tax rate of profit in the instance of the Comparison sample, christened respectively as the rate of return and the profit rate) are not necessarily shareholder wealth maximisers. The phenomenon has already been discussed earlier in this chapter, and the possibility explored that there is another category of firm intermediate between the profit maximising and growth maximising types which might be described as "prudent" growth maximisers, since they

seek to ensure a satisfactory return to shareholders before indulging their passion for growth. Hence the introduction of a variable describing "warranted" shareholder return measuring the amount of increase in the index of shareholder wealth per growth step. The hypothesis underlying this variable is that a firm seeking to serve its shareholders' interests will restrict its growth rate in order to ensure a maximum rate of shareholder return; if, however, the firm is dominated by its own managerial interests, then it may seek to turn its profit rate into growth not beneficial to its shareholders. It enlarges the idea of a growth/profit trade-off into a growth/profit/shareholder wealth trade-off.

The immediate problem with both variables is that they represent an "ex post" judgement on "ex ante" policies. Firms may have intended to grow and make profit at rates other than actually occurred. But if this is so, that those who govern policy within firms are, in general, unable to dominate economic events so as to achieve their aims, then the hypothesis of managerial behaviour has been refuted. We are not in the business of reading the innermost thoughts of managers, the task is to explain and predict economic phenomenon. If economic events are not to be related to managerial intentions then other sources of explanation of the growth and profit rates must be explored.

The Marris thesis specifically supports the proposition that growth and profit rates are set and held to as a matter of policy, and the demand/growth function is the means by which the policies are achieved, so that the concept of the quoted firm using its abilities to diversify between products and markets in pursuit of these policies would also be seriously undermined. It is acknowledged that the two responses to this problem are inter-related, since the whole concept of a demand/growth function assumes the ability of managers to achieve set purposes.

It might be objected that the new variables for warranted profit and warranted shareholder return, since they would presumably be correlated with the profit and shareholder wealth index variables already, would add to the multi-collinearity difficulty, not subtract from it. Warranted profit has a correlation coefficient of 0.185 with the rate of return, and warranted shareholder wealth a correlation of 0.33949 with the shareholder wealth index (for the Consumer Durable/Non-Durable sample). The latter is certainly high enough to be a slight cause for concern. However, the two measures, warranted and unwarranted, of profit and shareholder return are never mixed in the analysis that follows, since it is the relationship of these variables with other variables in the sample which is of interest. For example, the issue of whether the takeover index (which reports on the intensity of merger activity) is significantly associated with the rate

of return on the one hand or the warranted rate of return on the other is the question posed. No attempt is ever made to yoke the variables together in any of the calculations.

Further examination showed that (for the Consumer Durable/ Non-Durable sample) the correlation between growth and the warranted profit variable was -0.033, and between growth and the warranted shareholder wealth variable was -0.066, which can be taken as sufficiently low to suggest that multi-collinearity would not be a problem. The same situation was found with respect to the Comparison sample, except that the correlation between growth and the warranted shareholder return variable rose to 0.227.

4) The strategy, may be summarised, as to use multivariate analysis to examine separately the three major issues identified earlier in this chapter as being of crucial importance to sustaining the managerial thesis.

5.2. DETAILS CONCERNING THE USE OF MULTIPLE REGRESSION AND DISCRIMINANT ANALYSIS

No attempt is made to offer any comprehensive discussion of these techniques since excellent coverage on the basic information concerning multiple regression can be found in Draper and Smith (60/1966) and the techniques of multivariate statistical analysis are competently described in Tatsuoka (207/1971) and Cooley and Lohnes (52/1971).

The intention of the next section is to bring out the manner in which the two methods are engaged in the analysis of the data and any problems arising from the manner of their use.

5.2.1. Multiple Regression Analysis

In this chapter, multiple regression is used for two purposes - prediction and explanation. The success of predictions are measured by the coefficient of multiple determination (which is the square of the multiple correlation coefficient) and this is a measure of the amount of variation in the dependent variable which is eliminated by using the method of least squares to fit a linear function to a composite of independent variables in a hyperplane. The variance remaining (after the linear function has been fitted) as a ratio of the total variance, represents the variance unexplained by fitting the function; this ratio when subtracted from unity (which would be the value if there was

total predictive certainty in the linear function) provides the guide to the success or otherwise of the function.

Using the symbols:

u^2 = amount of variance remaining after the function has been derived using lease squares methods;

V^2 = total variance of the dependent variable prior to the calculation of least squares;

then the coefficient of determination (R^2) is defined as:-

EQUATION 5.1.

$$R^2 = 1 - \frac{u^2}{V^2}$$

There are several statistical assumptions underlying this technique:

1) That the dependent variable can be expressed as a linear function of the independent variables.

2) That each of the variables employed is approximately normally distributed (or its equivalent that the total function approximates to a multivariate normal distribution).

3) That the variance of each of the variables is homogenous (i.e. does not change with an increase or decrease in size of the variable).

4) That the independent variables are not correlated with each other nor with the disturbance term (i.e. u in Equation 5.1.).

These assumptions also underly the use of multiple regression equations. In general, the analysis proceeds on the basis that the size of the sample in conjunction with the law of large numbers, plus the fact that curvilinear relationship can be described by a linear function (at the cost of loss of information) and the general robustness of the function to deviations from the ideal situation permits the analysis to perform acceptably. Insofar as this stance is not justified, the results will generate standard errors which are large, and so reduce significance. The interpretation of the results is then subject to a Type II error, i.e. that the null hypothesis of no difference will be falsely rejected. This tendency of the analysis to underestimate the significance of the results should be borne in mind in the following pages.

There are three matters that cannot be so lightly dealt with in considering the ability of multiple correlation and multiple regression to tease out the nature of the relationships being explored.

The first of these relates to the ability to generalise the results. Multiple regression postulates that the independent variables are set at fixed levels and that the statistical variation which is under examination belongs to the dependent variable. The reason for this is that the methodology was developed to deal with problems in agriculture and biology where the independent variable was controlled and represented types of drug used or amount of fertilizer employed. By using

classical techniques of experimental design, the "independence" of the "independent" variable could be assured (i.e. they were orthogonal to each other) and interest could then be centred upon the variability of the response variable. Such control not being possible within the Social Sciences, one is faced with the fact that the results refer to the levels of the independent variables as found in the sample drawn. If the sample is biased in its representation of the total population, then that bias will extend to the reported outcomes of the analysis. How much generality we can assume in the findings therefore depends on the confidence we have that the sample is representative of the population as a whole.

Secondly, the problem of multi-collinearity has particular relevance to the techniques employed. If we are content to use the coefficient of multiple determination (i.e. the square of the coefficient of multiple correlation) for purposes of prediction, then, subject to the issue of the generality of the sample taken which is mentioned above, and the problem of the specification of the model which is mentioned below, we may have confidence in the value of that prediction. That confidence derives from the fact that, providing we have selected the most significant variables to enter into our calculation, then the order in which those variables occur in the linear function is immaterial. The position with regard to multiple regression is not so fortunate. It is obviously of the greatest value not only to show the strength of the linear combination of independent variables as a composite predictor, but also to seek

to explain the influence which each variable has upon the final result. But this influence cannot be disentangled from the ordering of the variables in the multiple regression equation.

The general form of a linear multiple regression equation is:-

EQUATION 5.2 $$y = a_o + b_1x_1 + b_2x_2 \ \ldots \ + b_nx_n \pm u$$

where y = dependent variable.

x_i = the independent variables where the value of the index i ranges from 1 to n

n = the number of independent variables in the regression

u = the error term

a_o = the value of the intercept term when the values of x_i are assumed to be zero

b_i = partial regression coefficients where the value of the index i ranges from 1 to n.

The b_i are partial regression coefficients, representing the relationship between the x_i variables when the other independent variables are held constant with respect both to x_i and y. Another way of expressing this is to say that b_i is the expected difference produced in y when x_i is increased by one unit but all other variables are not changed.

If the x_i variables are entered in different order or if another variable $x_{(n+1)}$ is added, then the values of the coefficients (b_i) will change. This is not true if there is no inter-correlation between the independent variables(2), but this is rarely found to be true in studies carried out in the social sciences, and in economics in particular there is a general tendency for variables to possess some

(2) When the independent variables are not correlated, the proportion of variance attributable to a given variable is equal to the squared zero order correlation between it and the dependent variable. Furthermore, under such circumstances, each regression coefficient is equal to the zero order co relation between the dependent variable and the variable with which it is associated.

inter-correlation because of the way in which each variable is affected by general factors such as fluctuations in business conditions or Government action with respect to interest rates, money supply, etc.

The difficulty derives from the fact that the first regression coefficient to enter the equation reflects not only its own inherent variability but also covariability with the other independent variables. The second regression coefficient comes into the equation minus the joint variability it shares with the first coefficient with respect to the dependent variables. This process continues as more regression coefficients are added. In short, where two independent variables jointly vary with the dependent variable, the variation which is common to the two independent variables is arbitrarily assigned to the first one.

This problem does not arise when using the coefficient of multiple determination where disentangling the proportion of cause to be assigned to each variable is not at issue.
It is for this reason that predictions can be undertaken more confidently than explanation. Nor should it be thought that there is a statistical problem which is purely mathematical in origin with no relationship to reality. At the root of the problem is Hume's statement that "cause" is not a metaphysical function that can be in any way defined, but represents no more than a regularity of association between two entities. If the data shows that the profit rate and the use of external funds are correlated, and that both then covary with the rate of growth and without further investigation this is all that we know about the situation, we should be amazed

if a statistical technique could uncover relationships which the data itself is incapable of revealing.

Goldberger considers the problem insoluble, saying

> "When orthogonality is absent the contribution of an individual regressor remains inherently ambiguous". (Page 201, 80/1964).

In order to attempt to deal with this difficulty, stepwise regression was used to determine the order of entry of the regression coefficients into the function. The first independent variable was elected for inclusion by reason of having the largest partial correlation coefficient with the dependent variable; the next variable for incoporation is the one with the largest squared "partial" correlation with the dependent variable after the effects of the first variable have been taken into account, and so on. But to guard against the inherent defects of the technique, it is necessary to check theoretical explanation against results constantly.

The third problem of large order concerns the specification of the model. Although specification includes the form of the model (e.g. linear, nonlinear, exponential, etc.), it has been assumed that a linear approximation will be acceptable for the purposes of the thesis, but specification also deals with the variables to be included in the model. If the model includes variables of low explanatory power, then the outcome is assured in that we will be unable to demonstrate significant

relationships to support or contradict the theory. The more worrying problem is that although the coefficient of multiple determination is invariant with respect to the ordering of variables, it is not so when additional explanatory variables are added. (It will be recalled that partial regression coefficients are neither invariant with respect to the order nor the addition of variables). In fact, it is always possible to increase the value of the coefficient by adding more variables, but in doing so the increase is at a declining rate. The more variables that are added, however, the greater the opportunity for the incorporation of chance relationships. The policy adopted has been to keep the equations generally restricted to a few variables and in addition to test for the significance of any change in the value of the coefficient of multiple determination using an F test and rejecting any variable with a low value for additional variance explained by this variable. In fact, this cut-off value for the proportion of additional variance explained was set at 0.001, thus making it highly improbable that any significant relationship was omitted.

In the report of results, it is important to bear in mind these inherent defects of multiple regression and multiple correlation and the importance of using theoretical presuppositions to assess the soundness of the results.

5.2.2. Discriminant Analysis

The aim of multiple discriminant analysis is to discover whether, on the basis of a profile representing scores on a number of variables, it is possible to determine if a composite linear function of these variables can be developed which will distinguish the profiles and assign these profiles to distinct groups.

Linear discriminant analysis provides a bonus in the fact that the multi-collinearity which plagues the interpretation of multiple regression analysis is eliminated. This is because each variable is allocated a space dimension which is orthogonal (i.e. set at 90^{o}) to all other dimensions, i.e. variable measurements. It does this, however, at a price. Just as in factor analysis and principal component analysis it relates the variables to a linear composite function in n-space which is artificial, by which I mean to say it is a product of the mathematical methods employed and it is difficult to find an interpretation of how this function relates to the real world since it creates hybrid variables. Fortunately, there is no need to seek to define the meaning of the linear composite as with the other techniques mentioned; it suffices for our purpose if we accept that it is produced by averaging a score which relates each variable for every observation on that variable to the discriminant line and using an estimate of the between-group to within group variances to determine the maximum value of an F-ratio calculated in this way. We thus use analysis of variance to produce the optimum discrimination function.

The scores mentioned above represent the angle between the discriminant line and each observation for each variable expressed as a cosine. It can be shown that if the variables are expressed in standard form (that is, transformed so that they have zero mean and unit standard deviation), this cosine is equivalent to a zero order correlation coefficient. They are normally referred to as "loadings", and as with all correlation coefficients, their squared value represents the amount of variance explained by that variable.

Formally, using matrix notation, the problem is to find a linear composite.

EQUATION 5.3

$$Z = X K$$

X = matrix of values for independent variables (adjusted by subtracting each observation from its mean)

K = is the matrix of "loadings" that maximises between group variation relative to within group variation.

The problem is to maximise

EQUATION 5.4

$$\lambda = \frac{K^1 A K}{K^1 W K}$$

A = between groups (mean corrected) sum of squares and cross products matrix

W = pooled within-groups (mean corrected) sums of squares and cross products matrix

K = matrix as previously defined of loadings. K^1 is its transpose.

By differentiating λ with respect to K and setting the partial derivatives equal to the 0 vector, the resulting matrix equation leads to a matrix K of values that maximise λ. This equation is

EQUATION 5.5 $$(W^{-1}A - \lambda I)\ K = 0$$

where I is the unit matrix.

Where there are more than two groups, more than 1 discriminant function can be defined. With n groups there are n-1 discriminant functions each related to the values of λ (called an eigenvalue) found in solving the matrix Equation 5.5 with the property that each discriminant axis is uncorrelated with other axes (though not necessarily orthogonal).

The sum of the loadings squared indicates the variance accounted for by the first discriminant function. The second discriminant function accounts for the part of the remaining variance, and so on.

If within-group covariance matrices are not equal (analagous to the requirement in regression analysis of homogenous variance for each variable) then the test for equality of centroids (the mean value of the scores on the discriminant function for each member of a given group) is biased. As a result, in the two group situation the hypothesis of no significant difference between groups is accepted more frequently, and too many observations tend to be assigned to the group with the largest covariance matrix. The equality of group covariance matrices can be tested using Box's M and associated F test (for details see Cooley and Lohnes, page 229, 52/1971).

As with multiple regression, in carrying out the analysis a stepwise method was employed, independent variables being selected for entry on the basis of their discriminating power. If a variable fails to add a minimum level of discrimination to the linear function, then it is excluded from the analysis. The test employed is Rao's V (see Rao, 179/1952) which is a generalised distance measure. Each variable is selected on the basis that it promotes the largest increase in the value of V when added to the variables included, V being a measure of the overall separation of the groups. Using this criterion, a variable is considered for selection only if its partial multivariate F ratio is larger than 1.0, the partial F ratio being a measure of the discrimination already achieved by the other included variables.

Since the aim of the research is to seek to define a profile of the managerial firm, and then to assess the Marris view that victim firms in a takeover represent one extreme of managerial type of behaviour, the Comparison sample of victims, predators and neutrals defined in terms of 14 variables is well suited to be the subject of analysis by means of discriminatory analysis. In fact, the aim of building the profiles of victims and predators alongside of a control group (the neutrals), and testing by means of developing discrimination functions, was the initial reason why the sample was designed in the way that it was.

There are three ways in which the technique is utilised in the research.

First, the loadings are valuable in defining the importance of the variable to the discrimination between groups, a large loading denoting an important relationship and vice-versa for smaller ones, providing that the loadings have been expressed in terms of standardised values of the independent variables (i.e. the variables are transformed into a form in which they exhibit zero mean and unit standard deviation). In determining the value of the variable for purposes of discrimination, the magnitude of the loading coefficient can be read without reference to the coefficient's sign. The sign of the coefficient serves other purposes. The signs attached to these loadings relate to geometrical considerations of the quadrant in which the variable is established. The coefficient's sign is useful in establishing "bi-polarity" in relation to a continuous variable, i.e.demonstrating that the categories involved in a discriminant analysis can be distinguished by the way in which high or low values of the variables can be grouped.

Secondly, having defined the group mean which is the average of the discriminant scores for all the individuals in that group, the question can be asked as to whether group centroids differ significantly for the given discriminant function. This is equivalent to seeking to discover if the discriminant function effectively distinguishes between the groups. In order to

carry out this test, Wilks' lambda is used:

EQUATION 5.6

$$\Lambda = \frac{|W|}{|T|}$$

Λ = Wilks' lambda.

$|W|$ = the determinant of the pooled within-groups sum of squares and cross products matrix

$|T|$ = the determinant of the total sums of squares and cross products matrix.

Wilks' lambda is distributed exactly as the F distribution for 2 or 3 groups and so can be evaluated using that distribution. The smaller the value of Wilks' lambda, the more significant are the centroid differences, Wilks' lambda is therefore an inverse of the F ratio. Wilks' lambda scores can be transformed into a chi-square value and it is these values which are used to test the significance of the differentiation in this research.

If the groups have been classified on the basis of prior information, then it is possible to compare the known accurate record of group membership with that obtained on the basis of the total for each individual obtained by multiplying the individual's score on each independent variable by the coefficients of the discriminant function. In order to do this, it is necessary to determine a cut-off point so that each individual is assigned (on the basis of the total score) to the group whose centroid is nearest to that score. Thus one can obtain a pragmatic measure of how well the discrimination process is working. This is necessary, since although it may be that the group centroids differ significantly, the discriminant scores (which depend on dispersion of values) may overlap and cause discrimination difficulties.

5.2.3. The Purpose behind Multiple Regression and Discriminant Analysis in the Research

It was pointed out in Chapter 4 while explaining the methodology of univariate statistical analysis that the search for cause in a relationship was based on the logical form - "If P then Q". It was further argued that the form was inadequate in that the establishment by statistical means of a strong correlation between P and Q (assuming that theory has prescribed the direction of the association) still leaves undecided the issue of whether P is a necessary condition for Q or a sufficient condition for Q or both necessary and sufficient. Multivariate analysis acknowledges this difficulty by accepting that the social world (where experimental control of variables is usually impossible) is structured so that the form "If P, S and T then Q" is more appropriate. It reflects the viewpoint that we are unlikely to find single causes so dominant that they are likely to work under a wide range of associated conditions. It avoids the distinction between "necessary" and "sufficient" conditions by assuming that inter-relationships between factors will be accepted "ab initio". By bringing all the important factors into play simultaneously, it should lead normally to superior prediction capability and thus give greater scope for assessing the theoretical reasoning underlying the result in terms of the variables involved.

Multiple regression carries out this predictive task by minimising the residual variance (i.e. the method of least squares). In effect, this amounts to assuming that the hypothesis is in fact

true, but subject to "noise", and then testing to examine the significance of the amount of variance "explained" to the total variance. As a prediction of association the method is sound, but the inter-relationship between the independent variables is plagued by multi-collinearity.

Discriminant analysis attempts to deal with this collinearity problem by creating new hybrid variables such that between-group variance as a ratio of the within-group variance is maximised. In the case of two groups, the result is mathematically equivalent to carrying out a multiple regression in which the categories are treated as dummy variables having the values "1" and "0" depending on whether they are a member of one of the groups or not. But multiple regression can be demonstrated to be mathematically equivalent to analysis of variance, using dummy variables as has been defined, so that what has occurred is that we have produced an analysis of variance situation. The aim is to maximise the F-ratio of the between-group to the within-group variance estimates, and the discriminant function is located to produce the best "analysis of variance" estimate. We have, in effect, made the assumption that the difference between a linear function of variables defining the groups is real, and having maximised that difference, it is then tested for the extent of overlap of group membership. If in these circumstances the overlap is such as to fail the Chi-squared test, then we assume that even under the most favourable circumstances the variables cannot distinguish between the groups. If, however, the distinction is statistically

significant, we have some support for assuming the variables involved have an important effect on attributing individuals to one group or another. We have not, of course, overcome the multi-collinearity problem, merely assumed it away. Having established that the variables being employed are justified and have useful explanatory powers, we then turn to theory to seek to explain the relationship between variables.

To summarise, multiple regression analysis using the selected independent variables assumes the relationship is correct and we test to see if that relationship explains a significant amount of total variation in the dependent variable. Discriminant analysis assumes that group membership as defined by the variables used is correct and tests whether the variables employed can distinguish between categories.

In the pages that follow, discriminant analysis is used to find out whether we are using the important variables to distinguish between managerial type firms (assumed to be growth maximisers) and other firms. Multiple regression analysis assumes we are using the appropriate variables and seeks to discover the confidence we can have in predictions based on a linear composite of those variables.

TABLE 5.0 FRAMEWORK OF MULTIVARIATE ANALYSIS

SECTION	PURPOSE	STATISTICAL METHODS EMPLOYED	TABLE REFERENCE NUMBERS
5.3.1.	Evidence for the Growth/Return trade-off. The ability to discriminate between hypothesised profiles of High and Low Growth Firms was tested. Multiple Regression was used to examine variables involved in explaining Company growth and the growth equations of assumed Managerial and Profit Maximising categories of firms.	(i) Discriminant Analysis. (ii) Multiple Regression.	5.1 to 5.8
5.3.2.	Evidence for the "Failing Firm" propositions. The ability of various discrimination functions to distinguish between Predators, Victims and Neutrals was examined.	(i) Discriminant Analysis.	5.9 to 5.12
5.3.3.	Evidence concerning the Maximisation of Shareholder Wealth. The Analysis of Variance + 't' tests were used to examine significant variations in returns to shareholders of Predator, Victim and Neutral Firms. A discriminant function was employed to test for differences between Managerial and Profit-Maximising Firms defined in relation to shareholder wealth gains. Multiple Regression equations developed to explore the relationship between profit and growth and shareholder wealth and growth.	(i) Analysis of Variance + 't' tests. (ii) Discriminant Analysis. (iii) Multiple Regression.	5.13 to 5.18 (Figures 5.1 and 5.2)
5.4.	Examination, using multiple regression, of the effect of takeover activity and other variables on the growth of firms.	(i) Multiple Regression. (ii) Linear Probability Function.	5.19 to 5.23

5.3. THE STATISTICAL ANALYSIS OF THE CRUCIAL ISSUES

5.3.1. The Evidence for a Growth/Return Trade-off

It has already been noted that the existence of a growth/return trade-off is essential to the managerial view of the firm. In its absence there would be some difficulty in asserting that the interests of managers and their shareholders diverged. The absence of any operational significance to the hypothesis does not mean that it does not exist. It may be that managers systematically assign a fixed proportion of their profit flow to sustain their own well-being, and if this behaviour is uniform among all firms, there would be no indication in performance of its existence. However, it is hard to believe in such uniformity of behaviour occurring in all the diverse circumstances in which the management of a firm find themselves; and of necessity, if the activity has no visible manifestation, in respect to the present state of data availability, then the theory has little practical purpose since it is not possible to find evidence to falsify it.

The data used to examine this issue is that derived from the Consumer Durable/Non-Durable Goods Sample of 501 firms. This sample is superior to the Comparison Sample for this purpose since it covers a longer period of years (9 compared with 5) which offers a better opportunity for leads and lags in the growth/profit relationship to even themselves out. It is also composed of firms irrespective of their involvement in

takeover activity. It may well be that firms that participate in merger situations (either as predators or victims) exhibit singular growth patterns; indeed, the Marris thesis is based on just this postulate with regard to victim firms. But the relationship portrayed in the literature is one in which growth characteristics depend not upon this sort of aggression but on the distinction of the extent of managerial control.

Because we already have the evidence of Chapter 4 which demonstrated by univariate analysis that profitability and growth appear to be highly and positively correlated, this must be taken into account in designing the analysis. If that correlation is rendering a false account of how profitability interacts with growth, then it must be because some other factor is affecting both variables but has not been taken into account. The obvious candidate for this role is the amount of managerial control which could possibly be a source of both positively related growth and profitability, but there may be other variables performing the same function. Therefore the question now to be answered is can we discover other variables which will explain rates of growth more explicitly and possibly show that when taken in conjunction with these other variables the rate of profit is of diminished significance. Since statistical methods are being used we are, in effect, seeking to discover what part these variables play in explaining the variation in the growth rate.

The strategy involves the following moves:

a) To divide the sample into those firms showing above average rates of growth over the sample period and those displaying below average growth rates.

b) To use Discriminant Analysis for two main purposes:-

(i) To enquire as to whether we can distinguish high and low growth firms by the use of certain variables.

(ii) To determine which variables have an important part to play in the discrimination of high growth from low growth firms and by considering the magnitude of that influence (measured by means of the standardised discriminant coefficients) to gain some idea of the relative value of these factors in any theory of growth.

Discriminant analysis is well fitted to carry out these tasks because it transforms the variables to take effect in the most favourable circumstances (by maximising the differences between the groups). If there is a failure to distinguish the groups after such a transformation, then the variables employed will enjoy little confidence as explanatory factors.

c) To specify certain varieties of growth behaviour which appear to relate to different ambitions concerning growth or profitability and then to use this breakdown to develop

growth equations using multiple regression methods. On theoretical grounds the variable measuring managerial influence should be a critical component in dividing growth maximising from profit maximising companies. However, since the univariate analysis of the previous chapter gave some indication that profit maximisation and shareholder wealth maximisation were not synonymous, a further classification was attempted into firms displaying low and high values for the growth of shareholder wealth. The categories of firms were :-

i) The Profit Maximising defined as those exhibiting high growth coupled with high rates of return.

ii) The Virtuous Profit Maximising defined as those uniting high growth with a high growth rate of shareholder wealth.

iii) The Managerial defined as showing high growth but making poor returns to shareholders.

iv) The Extreme Managerial defined as conjoining high growth with low rates of return.

In each and every case the high and low values of growth are matched respectively by high levels of return and shareholder wealth for high growth firms and vice versa for low growth firms (Table 5.1). Additionally, alternative definitions of these firms were tested using the warranted rate of return and warranted shareholder wealth constructs at above and below average levels (these averages are also to be found in Table 5.1).

Large firms, because of their greater range of product diversification, are able to operate with greater security both in maintaining a given level of earnings (because of reduction in variability) and also in the avoidance of bankruptcy. Although there is much debate in the financial literature as to whether this lowering of risk confers any advantage on shareholders, it is apparent that it confers benefit on professional managers owning little or none of the firm's equity by ensuring the continuity of their employment. Since this will enhance the ability of such managers in their pursuit of their own ends, size is included as a variable in the discrimination tests of Tables 5.2. and 5.5. and excluded, by way of contrast, from Tables 5.3. and 5.4.

The purpose of the eight tables (Tables 5.1. to 5.8.) relevant to the growth/profitability trade-off are as follows :-

Table 5.1. indicates the average values for each variable for High and Low Growth Firms and for the 501 companies as a whole.

Table 5.2. tests for differences between High and Low Growth firms including the size factor.

Table 5.3. shows the results of carrying out the same analysis as Table 5.2. but excluding size.

Table 5.4. is a re-run of Table 5.2. but replaces rate of return by the warranted rate of return and shareholder wealth by warranted shareholder wealth.

Table 5.5. adds size as a variable to the analysis already undertaken in Table 5.4.

Table 5.6. consists of multiple regression equations which seek to predict and explain the growth rate using the original and then the warranted variables and including and excluding size in both instances. The regressions are based on the totality of firms in the sample.

Table 5.7. shows the results of multiple regression analysis on the divers types of firms defined in relation to their net asset growth over the years 1970 to 1978 and recorded results with respect to their rate of return and growth of shareholder wealth.

Table 5.8. indicates the outcome of several multiple regressions for categories of firms but differs from Table 5.7. in that the warranted rate of return and warranted increase in shareholder wealth are used in determining the classifications of the firms.

The purpose of concentrating the analysis on the high growth firms arises from the fact that since firms need profits to fuel their growth, and since the univariate analysis demonstrated a strong positive correlation between growth and rate of return, we stand the highest possibility of being able to detect symptoms of a sacrifice of growth to profit if we look at the extreme growth situation.

It can be brought as an objection to the method of analysis used that 'post hoc' results are being used to justify 'ex ante' intentions; that we are assuming that the results achieved were related to the aims of the companies at the start of the period. The objection is a valid one. But assume the alternative, that the outcomes are a collection of random events depending upon factors not included in the analysis. The hypothesis of growth maximising behaviour will be correctly rejected since it is one of the foundations of the theory that managers are in a position to dominate the environment (by diversification), and to react to changes in that the fortunes of their companies by modifying the proportion of funds available used for investment and so achieve results which are broadly consistent with the policies adopted.

The Analysis

The comparison between High and Low Growth Firms in relation to the means of each group for each variable is to be found in Table 5.1. The first matter of note is that the average size of High Growth Firms is well below the total sample average and that Low Growth Firms are larger than the total sample average. Having said this, the performance indicators for shareholder wealth and rate of return are consistently in favour of the smaller companies. This confirms the general finding in the research literature that there is a slight tendency for growth and profitability to be negatively correlated with size.

The greater reliance placed upon takeover activity by the High Growth Firms may seem to be inconsistent with the known fact that large firms are more involved in takeover activity, but the average size of the Low Growth Firms at £21.8 million does not put them into the category of industrial giants by a long measure (as a comparison the net asset value of a company such as Imperial Chemical Industries in 1970 was about £1.03 billion). The increase in takeover activity amongst High Growth Firms more probably reflects one of the methods by which high growth was achieved.

The control variable for the High Growth Firms was above average, but since the fast growth was accompanied by a handsome profit performance, no conclusions can reasonably be drawn on the effect of ownership on a profit/growth exchange. Since the High Growth Firms are smaller, it is to be expected that ownership control would still be strong.

No firm conclusions can be drawn from the observation that the warranted rate of return for Low Growth Firms is the same as the average for all firms but slightly above that of the High Growth Firms. The levels are not widely divergent, but the discrepancy between the warranted shareholder wealth construct for High and Low Growth firms in favour of the low growth group requires comment. One possibility is that the target exists for dividend payments to shareholders (as suggested by Lintner (133/1956), firms making low returns are nevertheless committed to meeting these targets despite the low growth, and hence the result.

The Discriminant Analyses are contained in Tables 5.2 to 5.5. The results of Tables 5.4 and 5.5 can be summarily dismissed. Use of the warranted variables produces a result that is no better in distinguishing High from Low Growth Firms than would be achieved by spinning a coin and assigning firms to the groups on the number of times head or tails appear. However, the outcomes reported in Tables 5.2 and 5.3 show strong discriminatory ability. Using the discriminant functions of these tables, it should be possible to classify firms into high or low growth categories with a success rate of almost 80%. Sadly, for those with ambitions to make a fortune on the Stock Exchange, low growth firms are identified with astonishing accuracy but the ability to recognise high growth companies is less. Three observations from these tables should be noted. First, size has little value in determining the growth category; when it is introduced into the analysis (Table 5.2) the ability to correctly classify is improved by a miniscule 0.6%. Secondly, the rate of return, as measured by the magnitude of the standardised coefficient, is the only major factor amongst those involved to govern growth rates. Thirdly, control is in both cases excluded as a variable with any discriminatory powers concerning the class of growth company. Thus, the univariate analysis which found no evidence of a profitability/growth trade-off appears to be confirmed, and the influence of ownership or managerial control over a firm's policies is seen as negligible and thus casts into disarray the managerial thesis that control is the key variable in explaining growth behaviour.

Tables 5.6, 5.7 and 5.8 use multiple regression to test the predictive value of the chosen variables in explaining growth behaviour. Overall, each of the tables confirms the results of the Discriminant Analysis; the rate of return occupies a position of prominence in governing growth rates, control is shown to have little value as a distinguishing variable, and size plays little part in growth.

The total sample is surveyed in Table 5.6. We may discount the equations (c) and (d) since they forecast at best no more than 10% of any variation in growth. Equation (a) indicates that profitability, increases in shareholder wealth and increase in takeover intensity all positively and significantly relate to growth. Note that for every 1% increase in growth, takeover activity accelerates by 1.2%. Observe also that a 1% addition to growth leads to a 0.16% rise in the rate of return but only 0.12% of shareholder wealth. When in equation (b) size and control are added to the regression, the coefficient of determination improves by 0.001%, and both these variables are tiny in magnitude, negative in effect and lack any vestige of statistical significance.

The original variables are used to define High Growth Firms in terms of previously defined examples of managerial behaviour in Table 5.7. The most striking result is in equation (d) where no more than 5 firms in 501 possible choices can be found who unite high growth rates with below average rates of return (i.e. the Extreme Managerial type of company). The remaining results from this equation can be ignored since so small a sample size renders

them without value. The other equations have coefficients of determination of around 50% and betray the same importance attaching to takeover activity, indicate a significant link between profitability and growth and insignificant connections with size and the amount of directorial control. Shareholder wealth fails to achieve any significance in these equations.

The various types of managerial behaviour are redefined using warranted variables in the last table of this section (Table 5.8). Profit Maximising Firms are those with high growth and high rate of return per unit of growth, Virtuous Profit Maximising Firms have high shareholder wealth per unit of growth, whilst the Managerial and Extreme Managerial Firms have low shareholder wealth and low rate of return per unit of growth respectively. The Profit Maximising Firms show an immediate gain in the determination coefficient (almost 80%). The support for takeover activity and profitability is again confirmed, the lack of support for control and size appear, but the shareholder wealth variable appears twice as significant and twice as not statistically significant. In equations (b) and (d) the definition of the managerial behaviour is sufficient explanation of why shareholder wealth has the status shown. The Profit Maximising Firm where shareholder wealth presents itself without statistical significance stands in contrast to the instance of the Managerial Firms where shareholder wealth shows the reverse situation. This necessitates further interpretation which will be attempted in the conclusion.

Conclusions Concerning the Hypothesis of a Growth/Profitability Trade-off

It is clear from the analysis that the amount of directorial control over a firm has no effect on the growth rate achieved. The rate of return is seen to be significantly linked with growth, without question, on the evidence of this section. The hypothesis which was under examination is therefore not confirmed.

Takeover activity is seen to figure prominently in growth strategies. Since we know from the previous chapter that the intensity of merger occurrence is related to size, and since Table 5.1 indicates that High Growth Firms are smaller than average in size, the emphasis on the use of takeovers in policies of growth is reinforced.

Size has little influence on growth achievements. Where it does appear in the regression equations, it has a negative coefficient and is of miniscule dimension. Granted that large size in itself may inhibit growth, it does not appear to covary with growth or offer any explanation of changes in growth rates.

Shareholder wealth appears to play some part in growth but the relationship is unclear. It is shown to be statistically significant when the growth equations for the total sample are examined (Table 5.6), fails to show the same result when the High Growth Firms are considered with the Managerial Types of Firms defined in terms of the original variables but reappears in most of the cases when the Managerial Types of Firms are selected on the basis of the warranted variables. We are aware from the results

of the univariate analysis that profitability and increases in shareholder wealth are positively related, and since the former is closely correlated with growth, we can assume that shareholders do benefit from the increase in profitability associated with growth. We may surmise, however, that growth does not necessarily benefit shareholders in any proportionate way. This would certainly be consistent with the theories advanced regarding the stability of dividend payments to shareholders which lay growth of earnings in order to ensure that any increase in payout can be maintained (see Lintner (133/1956) and Brittain (44/1966)), but it will be recalled that the shareholder wealth index used in this study also incorporates a measure of capital gain over the 9 year period. Therefore there may, here, be some evidence that Profit Maximising Firms are not necessarily Shareholder Wealth Maximising Firms.

These conclusions can be summarised as follows. There are no firm grounds for the belief that managers sacrifice the profit rate in the interests of increasing growth; that a profit maximising management is not necessarily a shareholder wealth maximising management; and that takeover activity figures prominently as a factor in growth strategies.

TABLE 5.1

CONSUMER DURABLE/NON-DURABLE SAMPLE (1970-1978)

COMPARISON BETWEEN HIGH GROWTH AND LOW GROWTH FIRMS+

NUMBER OF FIRMS IN LOW GROWTH SAMPLE = 291
NUMBER OF FIRMS IN HIGH GROWTH SAMPLE = 210

GROUP MEANS

	LOW GROWTH FIRMS	HIGH GROWTH FIRMS	AVERAGE VALUE OF VARIABLE FOR TOTAL SAMPLE
SIZE	£21,756,113.4	£10,334,681	£16,968,867
CONTROL	21.8	25.1	23.2
TAKEOVER INDEX	0.44	0.72	0.56
SHAREHOLDER WEALTH INDEX	6.5	12.0	8.8
RATE OF RETURN	21.0	61.0	37.8
WARRANTED RATE OF RETURN	2.7	2.5	2.7
WARRANTED SHAREHOLDER WEALTH	0.82	0.54	0.7

+ The cut-off point separating high growth from low growth firms was defined as an annual compound growth rate of 14.6% per annum.

SAMPLE SIZE = 501

TABLE 5.2

CONSUMER DURABLE/NON-DURABLE SAMPLE (1970-1978)

DISCRIMINANT ANALYSIS: HIGH AND LOW GROWTH FIRMS

ANALYSIS 1

VARIABLES INCLUDED IN ANALYSIS = SIZE, RATE OF RETURN, SHAREHOLDER WEALTH, CONTROL, TAKEOVER INDEX.

VARIABLES EXCLUDED FROM FINAL RESULT BY RAO V TEST = CONTROL.

STANDARDISED DISCRIMINANT COEFFICIENTS

SIZE	0.157
RATE OF RETURN	- 0.872
SHAREHOLDER WEALTH	- 0.224
TAKEOVER INDEX	- 0.167

EIGENVALUE = 0.36178
WILKS LAMBDA = 0.7343324
CHI SQUARED TEST OF SIGNIFICANCE = < 0.001

CLASSIFICATION RESULTS

PREDICTED RESULTS

ACTUAL GROUP	LOW GROWTH	HIGH GROWTH	NUMBER OF CASES
LOW GROWTH	263 (90.4%)	28 (9.6%)	291
HIGH GROWTH	73 (34.8%)	137 (65.2%)	210

PERCENTAGE OF GROUP CASES CORRECTLY CLASSIFIED = 79.8%

TABLE 5.3

CONSUMER DURABLE/NON-DURABLE SAMPLE (1970-1978)

DISCRIMINANT ANALYSIS: HIGH GROWTH AND LOW GROWTH FIRMS

ANALYSIS 2

VARIABLES INCLUDED IN ANALYSIS = TAKEOVER INDEX, CONTROL, SHAREHOLDER WEALTH INDEX, RATE OF RETURN.

VARIABLES EXCLUDED FROM FINAL RESULT BY RAO V TEST = CONTROL.

STANDARDISED DISCRIMINANT COEFFICIENTS

TAKEOVER INDEX	0.107
SHAREHOLDER WEALTH INDEX	0.233
RATE OF RETURN	0.898

EIGENVALUE = 0.35425
WILKS LAMBDA = 0.7384176
CHI SQUARED TEST OF SIGNIFICANCE = $\prec$ 0.001

CLASSIFICATION RESULTS

PREDICTED RESULTS

ACTUAL GROUP	LOW GROWTH	HIGH GROWTH	NUMBER OF CASES
LOW GROWTH	263 (90.4%)	28 (9.6%)	291
HIGH GROWTH	76 (36.2%)	134 (63.8%)	210

PERCENTAGE OF GROUP CASES CORRECTLY CLASSIFIED = 79.2%

TABLE 5.4

CONSUMER DURABLE/NON-DURABLE SAMPLE (1970-1978)

DISCRIMINANT ANALYSIS: HIGH GROWTH AND LOW GROWTH FIRMS

ANALYSIS 3

VARIABLES INCLUDED IN ANALYSIS = CONTROL, TAKEOVER INDEX, WARRANTED RETURN, WARRANTED SHAREHOLDER WEALTH.

VARIABLES EXCLUDED FROM FINAL RESULT BY RAO V TEST = WARRANTED RETURN.

STANDARDISED DISCRIMINANT COEFFICIENTS

CONTROL	- 0.554
TAKEOVER INDEX	- 0.857
WARRANTED SHAREHOLDER WEALTH	0.340

EIGENVALUE	= 0.0252
WILKS LAMBDA	= 0.9754235
CHI SQUARED TEST OF SIGNIFICANCE	= 0.006

CLASSIFICATION RESULTS

PREDICTED RESULTS

ACTUAL GROUP	LOW GROWTH	HIGH GROWTH	NUMBER OF CASES
LOW GROWTH	164 (56.4%)	127 (43.6%)	291
HIGH GROWTH	96 (45.7%)	114 (54.3%)	210

PERCENTAGE OF GROUP CASES CORRECTLY CLASSIFIED = 55.5

TABLE 5.5

CONSUMER DURABLE/NON-DURABLE SAMPLE (1970-1978)

DISCRIMINANT ANALYSIS: HIGH GROWTH AND LOW GROWTH FIRMS

ANALYSIS 4

VARIABLES INCLUDED IN ANALYSIS = SIZE, CONTROL, TAKEOVER INDEX, WARRANTED RATE OF RETURN, WARRANTED SHAREHOLDER WEALTH.

VARIABLES EXCLUDED FROM FINAL RESULT BY RAO V TEST = WARRANTED RATE OF RETURN.

STANDARDISED DISCRIMINANT COEFFICIENTS

SIZE	- 0.761
WARRANTED SHAREHOLDER WEALTH	- 0.266
CONTROL	0.309
TAKEOVER INDEX	0.880

EIGENVALUE	=	0.04939
WILKS LAMBDA	=	0.9529340
CHI SQUARED TEST OF SIGNIFICANCE	=	0.001

CLASSIFICATION RESULTS

PREDICTED RESULTS

ACTUAL GROUP	LOW GROWTH	HIGH GROWTH	NUMBER OF CASES
LOW GROWTH	172 (59.1%)	119 (40.9%)	291
HIGH GROWTH	83 (39.5%)	127 (60.5%)	210

PERCENTAGE OF GROUP CASES CORRECTLY CLASSIFIED = 59.7%

TABLE 5.6

CONSUMER DURABLE/NON-DURABLE SAMPLE (1970-1978)

MULTIPLE REGRESSION

GROWTH EQUATIONS
(Total Sample = 501 Cases)

(a) $GROWTH = \underset{(0.43)}{6.93}^{**} + \underset{(0.008)}{0.16(RR)}^{**} + \underset{(0.24)}{1.18(TO)}^{**} + \underset{(0.028)}{0.12(SW)}^{**}$ $R_2 = 0.754$, $R^2 = 0.568$, Significance = < 0.001. ∅

(b) $GROWTH = \underset{(0.5)}{7.09}^{**} + \underset{(0.008)}{0.16(RR)}^{**} + \underset{(0.267)}{1.29(TO)} + \underset{(0.028)}{0.122(SW)}^{**} - \underset{(0.000006)}{0.000007(S2)} - 0.0018\ (CTRL)$ $R_2 = 0.755$, $R^2 = 0.569$, Significance = < 0.001

(c) $GROWTH = \underset{(0.7)}{12.89}^{**} + \underset{(0.36)}{2.18(TO)}^{**} + \underset{(0.02)}{0.04(CTRL)}^{**} - \underset{(0.18)}{0.23(WSW)} - \underset{(0.12)}{0.09(WRR)}$ $R_2 = 0.281$, $R^2 = 0.079$, Significance = < 0.001

(d) $GROWTH = \underset{(0.7)}{13.38}^{**} + \underset{(0.37)}{2.65(TO)}^{**} - \underset{(0.000008)}{0.00003(SZ)}^{**} + \underset{(0.015)}{0.032(CTRL)}^{**} - \underset{(0.18)}{0.25(WSW)} - \underset{(0.11)}{0.11(WRR)}$ $R_2 = 0.324$, $R^2 = 0.105$, Significance = < 0.001

VARIABLE CODE

- RR = Rate of Return
- TO = Takeover Index
- SW = Shareholder Wealth
- CTRL = Control
- SZ = Size
- WSW = Warranted Shareholder Wealth
- WRR = Warranted Rate of Return.

∅ NOTE: Control was excluded since it failed to add minimum increase of 0.001 proportion of variance explained.

TABLE 5.7

CONSUMER DURABLE/NON-DURABLE SAMPLE (1970-1978)

MULTIPLE REGRESSION

GROWTH EQUATIONS

(Total Sample = 501 Cases)

A COMPARISON OF GROWTH EQUATIONS FOR VARIOUS TYPES OF FIRM

	Sample Size	Type of Firm+		
(a)	146	PROFIT MAXIMISING		
		Growth = 14.92** + 0.10(RR)** + 1.47(TO)** + 0.07(SW) - 0.00002(SZ) - 0.006(CTRL)	R_2	= 0.743
		(1.08) (0.01) (0.34) (0.00004) (0.75)	R^2	= 0.552
			Significance	= < 0.001
(b)	131	VIRTUOUS PROFIT MAXIMISING		
		Growth = 15.19** + 0.10(RR)** + 1.33(TO)** - 0.00007(SZ) + 0.07(SW) + 0.002(CTRL)	R_2	= 0.736
		(1.18) (0.01) (0.37) (0.00004) (0.07) (0.02)	R^2	= 0.541
			Significance	= < 0.001
(c)	78	MANAGERIAL		
		Growth = 15.95** + 0.09(RR)** + 1.52(TO)** - 0.000007(SZ) + 0.06(SW) - 0.005(CTRL)	R_2	= 0.723
		(1.18) (0.012) (0.49) (0.00001) (0.01) (0.02)	R^2	= 0.523
			Significance	= < 0.001
(d)	5	EXTREME MANAGERIAL		
		Growth = 27.95** - 0.04(RR) + 0.07(CTRL) - 2.22(TO)	R_2	= 0.99
		(0.28) (0.005) (0.01)	R^2	= 0.99 ø
			Significance	= Nil.

VARIABLE CODE

RR = Rate of Return
TO = Takeover Index
SW = Shareholder Wealth
CTRL = Control
SZ = Size.

** Significant at 1% level.
* Significant at 5% level.

ø Size and Shareholder Wealth excluded for lack of significance.

+ See text for explanation of types of firm and their definition. Note the definitions exclude the Warranted Variables.

TABLE 5.8

CONSUMER DURABLE/NON-DURABLE SAMPLE (1970-1978)

MULTIPLE REGRESSION

GROWTH EQUATIONS
(Total Sample = 501 Cases)

A COMPARISON OF GROWTH EQUATIONS FOR VARIOUS TYPES OF FIRMS

	Sample Size	Type of Firm[+]		
(a)	81	PROFIT MAXIMISING		
		Growth = $10.94^{**} + 0.11(RR)^{**} + 1.88(TO)^{**} + 0.067(SW) + 0.029(CTRL) - 0.000004(SZ)$	R_2	= 0.88153
			R^2	= 0.777
			Significance	< 0.001
(b)	70	VIRTUOUS PROFIT MAXIMISING		
		Growth = $10.31^{**} + 0.09(RR)^{**} + 1.86(TO)^{**} + 0.22(SW)^{**} - 0.00003(SZ) - 0.012(CTRL)$	R_2	= 0.875
		(1.2) (0.013) (0.45) (0.06) (0.00003) (0.02)	R^2	= 0.766
			Significance	< 0.001
(c)	140	MANAGERIAL		
		Growth = $15.84^{**} + 0.091(RR)^{**} + 0.26(SW)^{**} + 0.94(TO)^{**} - 0.000006(SZ) - 0.0032(CTRL)$	R_2	= 0.737
		(0.98) (0.0095) (0.063) (0.34) (0.00001) (0.019)	R^2	= 0.543
			Significance	< 0.001
(d)	129	EXTREME MANAGERIAL		
		Growth = $14.06^{**} + 0.18(RR)^{**} + 0.67(TO)^{*} + 0.043(SW) + 0.006(CTRL) - 0.000003(SZ)$	R_2	= 0.621
		(1.2) (0.02) (0.32) (0.05) (0.02) (0.00001)	R^2	= 0.386
			Significance	< 0.001

VARIABLE CODE
RR = Rate of Return
TO = Takeover Index
SW = Shareholder Wealth
SZ = Size
CTRL = Control.

[+] See text for explanation of types of firms and their definition. Note the definitions are based on the warranted variables.

** Significant at 1% level.
* Significant at 5% level.

5.3.2. The Evidence for the "Failing Firm" Proposition

An efficient capital market is one which ensures that liquid funds are transferred to those entities which will use them most efficiently. There is a full literature dealing with the issue of the efficient capital market and impressive evidence to suggest that the London Stock Market and the New York Stock Exchange qualify as efficient capital markets. (For evidence with respect to Britain, see Kendall (106/1953), Solnik (202/1973) and Franks, Broyles and Hecht (73/1977)). The focus of attention of the published research has been the question of whether share prices adequately reflect "the intrinsic worth" of the company. The concentration on price efficiency is easily understandable in that the Stock Exchange is a secondary market which is more important as a means of valuing and exchanging shares rather than as a primary source of funds. However, if shares are valued efficiently, then discrepancies between market value and asset value will be noted and lead to difficulties in raising capital funds by badly managed companies and an increased availability of such funds to companies showing high performance levels. Marris expresses a strong conviction that this happens and is the primary factor in initiating merger activity. The major reason advanced for the performance failure is the pursuit of unprofitable growth. We may, in the preceding section, have come to doubt the case for a growth/profit trade-off, but this does not also dismiss the "failing firm" doctrine since there are other reasons why firms may get into difficulties.

The Analysis.

The major source of evidence on the prospect of merger activity being an aspect of the workings of an Efficient Capital Market is to be found in the discriminant function analyses performed on the Comparison Sample (predators, victims and neutrals) in Tables 5.9 to 5.12.

The strategy adopted for use of discriminant analysis was to contrast first the predators, victim and neutral firms in an overall analysis in Table 5.9 and then to seek to discriminate between :-

Predators and Victims	(Table 5.10)
Victims and Neutrals	(Table 5.11)
Predators and Neutrals	(Table 5.12).

In each case, three equations were tested in which the specification of the variables involved was slightly changed from equation. The first equation examined contained the variables :

Growth, Control, Average Valuation Ratio, Profit Rate, Shareholder Wealth Index and Retentions.

The second equation added Size to the six variables in the first analysis.

The third equation replaced the Profit Rate and the Shareholder Wealth Index by the Warranted Profit Rate and the Warranted Shareholder Wealth Index and dropped Size from the analysis.

The purpose of these adaptations was to contrast the use of the actual Profit Rate, Shareholder Wealth Index variables with their Warranted counterparts, and also to introduce Size, which is known to be a characteristic of predators, into the analysis in order to see how this affected the discriminating ability of the functions. Where the discriminant function was judged to be without statistical significance as measured by the value of Wilks' Lambda, the result was not reported (except where it was the only function available).

If the capital market is working efficiently, we would expect to find that the profit rate of victims was low and ideally that the profit rate was a valuable discriminating factor in identifying victims. If Marris's conjectures have substance, the growth rate of victims should be high and their shareholdings should be widely dispersed.

Let us examine the findings of each analysis in turn :-

a) Tables 5.9(a - d). A Comparison of Predators, Victims and Neutrals

If one considers the group means shown in Table 5.7 (a) there is little scope to support the Marris view on the configuration of Victim firms. Predators are seen to grow faster, suffer little constraint from shareholder control, retain more profit after tax, and even return a lower average valuation ratio (by which ratio Marris set some store) than the Victim companies. The Marris argument concerning the valuation ratio was that when market value

(the numerator in the ratio) fell in relation to net asset value (the denominator); the discrepancy would provide an incentive for a takeover bid. Since Predators are large and successful businesses who should not lack the expertise involved in revaluing their assets periodically, the result is particularly striking.

The hypothesis that victim firms are those who fail to secure adequate returns on the capital they employ looks more promising. It can be seen that Predators are, in relation to Victims, much larger in size, much faster growing, have an enhanced profit rate and provide their shareholders with larger increases in wealth. The warranted variables must, however, be taken into account. Victims and Predators hardly differ when the growth rate is divided into the profit rate, and when the same division by the growth rate is made into the increase in shareholder wealth, there is a strong contrast between the low value per unit of growth of Predators and the much larger value shown by Victim Firms. Those firms which face a takeover challenge must also be confronting restricted growth opportunities (which is also reflected in the manner in which their valuation ratio falls in the penultimate year before merger), but there does seem some indication that Predator Firms have an unbridled appetite for growth.

The Discriminant Analyses (Tables 5.9(b), 5.9(c) and 5.9(d)) show that distinguishing between the firms cannot be done at better than even odds except as in Table 5.9(c) where size is brought into the equation when the percentage of firms correctly classified climbs to 60%. The lack of shareholder control of Predators is shown to be important, and the growth rate also has a large predictive value in the results (but as has been argued above, in the reverse sense to which Marris attributed its effect).

b) Tables 5.10 (a - d). A Comparison of Victims and Predators

The discrimination achieved now rises to over 70%. Size again reveals its importance, its introduction into the variables involved permitting the percentage correctly classified to reach 78%. As in the Tables of 5.7, growth and control figure as the most important distinguishing variables.

c) Tables 5.11 (a - d). A Comparison of Victims and Neutrals

The most important fact to be noted about these tables is that despite a discriminatory success of around 60%, the result fail to achieve statistical significance at the 5% level in two cases and at the 1% level in the third. All the other discriminatory equations quoted to this point have indicated that they would arise by chance in less than 1 case in 1,000 (i.e. the 0.1% level). In the circumstances we must judge that there is a general

failure to discriminate between Victim and Neutral Firms.

d) Tables 5.12 (a - d). A Comparison of Predators and Neutrals

The discriminations are statistically significant and as is the case of the comparison of Victims and Predators, have a successful prediction rate in the 70% region. Size appears as an important variable, bringing the ability to pick out each category of firm to the 78% level. The large proportion of owner control exercised over Neutral Firms predictably appears in the discriminant function, as does the solidarity of Neutral Firms shown by an average valuation ratio in which market value slightly exceeds book value.

It was somewhat surprising to discover that the warranted shareholder wealth variable was not included in the final discriminant function of Table 5.12 (d), when the wide discrepancy between levels for Predators and Neutrals is noted in Table 5.12 (a), but close examination of the raw data showed that the high value for Neutral Firms was affected by a small number of large values in which growth rates had been very limited in relation to the profits earned.

Conclusions concerning the "Failing Firm" Proposition

The Comparison Sample points to the existence of firms whose size measured in terms of net assets is average for quoted companies in the period studied (i.e. £17 million to £20 million),

who have a low growth rate, earn reduced rates of profit and whose shareholders increase their wealth at a slow pace. Such firms do become victims of takeover raids. They show few of the characteristics required by the Marris specification of takeover victims since they do not appear to trade growth against profitability and so involve themselves in disaster; indeed the warranted profit rate variable revealed that they made a higher rate of profit per unit of growth than the Predator companies.

Unfortunately, if we compare Victim Firms with companies of equivalent size (i.e. the Neutral Companies), we cannot distinguish between them. The discriminant analyses of this chapter echo the results of the 't' tests and analyses of variance in Chapter 4 in this finding. The Predator Companies are extremely large (i.e. averaging £150 million), the gap between Predator size and Victim size is an illustration of the skewness in the positive direction of a size analysis of quoted companies. The Predators also grow at a significantly faster rate than their victims and, as can be expected, have a widely distributed shareholding. Otherwise the categories are difficult to tell apart with reference to the other variables. It is dangerous to be small since it increases the likelihood that the firm's identity will be lost in a merger.

The final verdict must be that although victims earn lower profit rates and make lower returns to shareholders than predators, since we cannot practically find significant

differences with regard to these variables between victim firms (who were taken over) and neutrals (who were not taken over), we must refute the view that victims can be characterised as failing firms.

TABLE 5.9 (a)

COMPARISON SAMPLE

DISCRIMINANT ANALYSIS: PREDATORS, VICTIMS, NEUTRALS

GROUP MEANS

GROUPS	SIZE	GROWTH RATE	RETENTION	PROFIT RATE	CONTROL	GEARING	USE OF EXTERNAL FUNDS	AVERAGE VALUATION RATIO	CHANGE IN VALUATION RATIO	SHAREHOLDER WEALTH INDEX	WARRANTED PROFIT RATE	WARRANTED SHAREHOLDER WEALTH
VICTIMS	£17.0 million	11.7%	60.2%	9.6%	22.1%	9.9%	9.3%	0.89	- 22.9%	7.1%	0.69	0.82
PREDATORS	£150.0 million	20.7%	64.0%	13.9%	9.7%	25.9%	27.4%	0.81	12.4%	14.9%	0.63	0.08
NEUTRALS	£21.5 million	15.9%	65.8%	11.8%	27.0%	11.6%	11.4%	1.03	1.3%	9.7%	0.86	0.86

TOTAL SAMPLE = 150

TABLE 5.9 (b)

COMPARISON SAMPLE

DISCRIMINANT ANALYSIS: PREDATORS, VICTIMS, NEUTRALS (Continued)

ANALYSIS 1

VARIABLES INCLUDED IN ANALYSIS = GROWTH, CONTROL, AVERAGE VALUATION RATIO, PROFIT RATE, SHAREHOLDER WEALTH INDEX, RETENTIONS.

VARIABLES EXCLUDED FROM FINAL RESULT BY RAO V TEST = PROFIT RATE, SHAREHOLDER WEALTH INDEX, RETENTIONS.

2 DISCRIMINANT FUNCTIONS CALCULATED. SECOND FUNCTION EXCLUDED FOR LACK OF SIGNIFICANCE.

STANDARDISED DISCRIMINANT COEFFICIENTS

GROWTH	0.69277
CONTROL	- 0.79764
AVERAGE VALUATION RATIO	- 0.51024

EIGEN VALUE	= 0.27507
WILKS LAMBDA	= 0.7612167
CHI SQUARED TEST OF SIGNIFICANCE	= < 0.001

CLASSIFICATION RESULTS

PREDICTED GROUPS

ACTUAL GROUP	VICTIMS	PREDATORS	NEUTRALS	NUMBER IN SAMPLE
VICTIMS	19 (38.0%)	14 (28.0%)	17 (34.0%)	50
PREDATORS	7 (14.0%)	37 (74.0%)	6 (12.0%)	50
NEUTRALS	15 (30.0%	15 (30.0%)	20 (40.0%)	50

PERCENTAGE OF CASES CORRECTLY CLASSIFIED = 50.7%

TABLE 5.9 (c)

COMPARISON SAMPLE

DISCRIMINANT ANALYSIS: PREDATORS, VICTIMS, NEUTRALS (Continued)

ANALYSIS 2

VARIABLES INCLUDED IN ANALYSIS = GROWTH, SIZE, PROFIT RATE, SHAREHOLDER WEALTH INDEX, CONTROL, AVERAGE VALUATION RATIO, RETENTIONS.

VARIABLES EXCLUDED FROM FINAL RESULT BY RAO V TEST = PROFIT RATE, SHAREHOLDER WEALTH INDEX.

2 DISCRIMINANT FUNCTIONS CALCULATED. SECOND FUNCTION EXCLUDED FOR LACK OF SIGNIFICANCE.

STANDARDISED DISCRIMINANT COEFFICIENTS

GROWTH	= 0.65961	EIGENVALUE	= 0.41963
SIZE	= 0.61587	WILKS LAMBDA	= 0.6729444
CONTROL	= - 0.53983	CHI SQUARED TEST OF SIGNIFICANCE	= < 0.001
AVERAGE VALUATION RATIO	= - 0.40079		
RETENTION RATIO	= 0.08660		

CLASSIFICATION RESULTS

PREDICTED GROUPS

ACTUAL GROUP	VICTIMS	PREDATORS	NEUTRALS	NUMBER IN SAMPLE
VICTIMS	31 (62.0%)	3 (6.0%)	16 (32.0%)	50
PREDATORS	10 (20.0%)	34 (68.0%)	6 (12.0%)	50
NEUTRALS	19 (38.0%	6 (12.0%)	25 (50.0%)	50

PERCENTAGE OF CASES CORRECTLY CLASSIFIED = 60.0%

TABLE 5.9 (d)

COMPARISON SAMPLE

DISCRIMINANT ANALYSIS: PREDATORS, VICTIMS, NEUTRALS (Continued)

ANALYSIS 3

VARIABLES INCLUDED IN ANALYSIS = GROWTH, CONTROL, AVERAGE VALUATION RATIO, RETENTION, WARRANTED PROFIT RATE, WARRANTED WEALTH.

VARIABLES EXCLUDED FROM FINAL RESULT BY RAO V TEST = WARRANTED PROFIT RATE, RETENTION.

2 DISCRIMINANT FUNCTIONS CALCULATED

FUNCTION 1. STANDARDISED DISCRIMINANT COEFFICIENTS

GROWTH	0.77475	EIGENVALUE	- 0.29473
WARRANTED SHARE-HOLDER WEALTH	- 0.29185	WILKS LAMBOA	0.7237144
CONTROL	- 0.79805	CHI SQUARED TEST OF SIGNIFICANCE	< 0.001
AVERAGE VALUATION RATIO	- 0.51952		

FUNCTION 2. STANDARDISED DISCIMINANT COEFFICIENTS

GROWTH	0.56688	EIGENVALUE	0.06722
WARRANTED SHARE-HOLDER WEALTH	- 0.74259	WILKS LAMBDA	0.9370143
CONTROL	0.37043	CHI SQUARED TEST OF SIGNIFICANCE	0.0237
AVERAGE VALUATION RATIO	0.16339		

CLASSIFICATION RESULTS

PREDICTED GROUPS

ACTUAL GROUP	VICTIMS	PREDATORS	NEUTRALS	NUMBER IN SAMPLE
VICTIMS	20 (40.0%)	14 (28.0%)	16 (32.0%)	50
PREDATORS	7 (14.0%)	38 (70.0%)	8 (16.0%)	50
NEUTRALS	15 (30.0%)	14 (28.0%)	21 (42.0%)	50

PERCENTAGE OF CASES CORRECTLY CLASSIFIED = 50.7%

TABLE 5.10(a)

COMPARISON SAMPLE

DISCRIMINANT ANALYSIS: VICTIMS AND PREDATORS

GROUP MEANS

GROUPS	SIZE	GROWTH RATE	RETENTION RATIO	PROFIT RATE	CONTROL	GEARING	USE OF EXTERNAL FUNDS	AVERAGE VALUATION RATIO	CHANGE IN VALUATION RATIO	SHAREHOLDER WEALTH INDEX	WARRANTED PROFIT RATE	WARRANTED SHAREHOLDER WEALTH
VICTIMS	£17.0 million	11.7%	0.60	9.6%	22.1%	9.9%	9.3%	0.89	- 22.9%	7.1%	0.69	0.82
PREDATORS	£150.3 million	20.7%	0.64	13.9%	9.7%	25.9%	27.4%	0.81	12.5%	14.9%	0.63	0.08

TOTAL SAMPLE = 100

TABLE 5.10(b)

COMPARISON SAMPLE

DISCRIMINANT ANALYSIS: VICTIMS AND PREDATORS (Continued)

ANALYSIS 1

VARIABLES INCLUDED IN ANALYSIS = GROWTH, CONTROL, AVERAGE VALUATION RATIO, PROFIT RATE, SHAREHOLDER WEALTH INDEX, RETENTION RATIO.

VARIABLES EXCLUDED FROM FINAL RESULT BY RAO V TEST = PROFIT RATE, SHAREHOLDER WEALTH, RETENTION RATIO.

STANDARDISED DISCRIMINANT FUNCTION

GROWTH	0.83592
CONTROL	- 0.66604
AVERAGE VALUATION RATIO	- 0.32119

EIGENVALUE	= 0.32389
WILKS LAMBDA	= 0.7553476
CHI SQUARED TEST OF SIGNIFICANCE	= <0.001

CLASSIFICATION RESULTS

PREDICTED GROUPS

ACTUAL GROUP	VICTIMS	PREDATORS	NUMBER OF CASES
VICTIMS	34 (68.0%)	16 (32.0%)	50
PREDATORS	11 (22.0%)	39 (78.0%)	50
NEUTRALS	35 (70.0%)	15 (30.0%)	50

PERCENTAGE OF CASES CORRECTLY CLASSIFIED = 73.0%

TABLE 5.10(c)

COMPARISON SAMPLE

DISCRIMINANT ANALYSIS: VICTIMS AND PREDATORS (Continued)

ANALYSIS 2

VARIABLES INCLUDED IN ANALYSIS = SIZE, GROWTH, CONTROL, RETENTION RATIO, PROFIT RATE, SHAREHOLDER WEALTH INDEX, AVERAGE VALUATION RATIO.

VARIABLES EXCLUDED FROM FINAL RESULT BY RAO V TEST = PROFIT RATE, SHAREHOLDER WEALTH, AVERAGE VALUATION RATIO.

STANDARDISED DISCRIMINANT FUNCTION

GROWTH	0.71327
SIZE	0.65031
CONTROL	- 0.49702
RETENTION RATIO	0.21165

EIGENVALUE	= 0.47683
WILKS LAMBDA	= 0.6771278
CHI SQUARED TEST OF SIGNIFICANCE	= < 0.001

CLASSIFICATION RESULTS

PREDICTED GROUPS

ACTUAL GROUP	VICTIMS	PREDATORS	NUMBER OF CASES
VICTIMS	39 (78.0%)	11 (22.0%)	50
PREDATORS	11 (22.0%)	39 (78.0%)	50
NEUTRALS	37 (74.0%)	13 (26.0%)	50

PERCENTAGE OF CASES CORRECTLY CLASSIFIED = 78.0%

TABLE 5.10(d)

COMPARISON SAMPLE

DISCRIMINANT ANALYSIS: VICTIMS AND PREDATORS (Continued)

ANALYSIS 3

VARIABLES INCLUDED IN ANALYSIS = GROWTH, CONTROL, AVERAGE VALUATION RATIO, WARRANTED SHAREHOLDER WEALTH, WARRANTED PROFIT RATE, RETENTION RATIO.

VARIABLES EXCLUDED FROM FINAL RESULT BY RAO V TEST = WARRANTED PROFIT RATE, RETENTION RATIO.

STANDARDISED DISCRIMINANT FUNCTION

GROWTH	0.84224
WARRANTED SHAREHOLDER WEALTH	- 0.37821
CONTROL	- 0.67033
AVERAGE VALUATION RATIO	- 0.34643

EIGENVALUE = 0.3749
WILKS LAMBDA = 0.7273266
CHI SQUARED TEST OF SIGNIFICANCE = <0.001

CLASSIFICATION RESULTS

PREDICTED GROUPS

ACTUAL GROUP	VICTIMS	PREDATORS	NUMBER OF CASES
VICTIMS	34 (68.0%)	16 (32.0%)	50
PREDATORS	13 (26.0%)	37 (74.0%)	50
NEUTRALS	33 (66.0%)	17 (34.0%)	50

PERCENTAGE OF CASES CORRECTLY CLASSIFIED = 71.0%

TABLE 5.11(a)

COMPARISON SAMPLE

DISCRIMINANT ANALYSIS: VICTIMS AND NEUTRALS

GROUP MEANS

GROUPS	SIZE	GROWTH	RETENTION RATIO	PROFIT RATE	CONTROL	GEARING	USE OF EXTERNAL FUNDS	AVERAGE VALUATION RATIO	CHANGE IN VALUATION RATIO	SHAREHOLDER WEALTH INDEX	WARRANTED PROFIT RATE	WARRANTED SHAREHOLDER WEALTH
VICTIMS	£17.0 million	11.7%	0.60	9.6%	22.1%	9.9%	9.3%	0.89	- 22.9%	7.1%	0.69	0.82
NEUTRALS	£21.5 million	15.9%	0.66	11.8%	27.0%	11.6%	11.4%	1.03	1.3%	9.7%	0.86	0.86

TOTAL SAMPLE = 100

TABLE 5.11(b) COMPARISON SAMPLE

DISCRIMINANT ANALYSIS: VICTIMS AND NEUTRALS (Continued)

ANALYSIS 1

VARIABLES INCLUDED IN ANALYSIS = GROWTH, PROFIT RATE, SHAREHOLDER WEALTH, CONTROL, AVERAGE VALUATION RATIO, RETENTION RATIO.

VARIABLES EXCLUDED FROM FINAL RESULT BY RAO V TEST = PROFIT RATE, SHAREHOLDER WEALTH, CONTROL, AVERAGE VALUATION RATIO.

STANDARDISED DISCRIMINANT FUNCTION

GROWTH	0.58227
RETENTION RATIO	0.65746

EIGENVALUE	=	0.05083
WILKS LAMBDA	=	0.9516322
CHI SQUARED TEST OF SIGNIFICANCE	=	0.0903

CLASSIFICATION RESULTS

PREDICTED GROUPS

ACTUAL GROUP	VICTIMS	NEUTRALS	NUMBER IN SAMPLE
VICTIMS	31 (62.0%)	19 (38.0%)	50
NEUTRALS	20 (40.0%)	30 (60.0%)	50

PERCENTAGE OF CASES CORRECTLY CLASSIFIED = 61.0%

TABLE 5.11(c)

COMPARISON SAMPLE

DISCRIMINANT ANALYSIS: VICTIMS AND NEUTRALS (Continued)

ANALYSIS 2

VARIABLES INCLUDED IN ANALYSIS = GROWTH, SIZE, PROFIT RATE, SHAREHOLDER WEALTH, CONTROL, AVERAGE VALUATION RATIO, RETENTION RATIO.

VARIABLES EXCLUDED FROM FINAL RESULT BY RAO V TEST = SIZE, PROFIT RATE, SHAREHOLDER WEALTH, CONTROL, AVERAGE VALUATION RATIO.

STANDARDISED DISCRIMINANT FUNCTION

GROWTH	0.58227
RETENTION RATIO	0.65746

EIGENVALUE	=	0.05083
WILKS LAMBDA	=	0.9516322
CHI SQUARED TEST OF SIGNIFICANCE	=	0.0903

CLASSIFICATION RESULTS

PREDICTED GROUPS

ACTUAL GROUP	VICTIMS	NEUTRALS	NUMBER IN SAMPLE
VICTIMS	31 (62.0%)	19 (38.0%)	50
NEUTRALS	20 (40.0%)	30 (60.0%)	50

PERCENTAGE OF CASES CORRECTLY CLASSIFIED = 61.0%

TABLE 5.11(d)

COMPARISON SAMPLE

DISCRIMINANT ANALYSIS: VICTIMS AND NEUTRALS (Continued)

ANALYSIS 3

VARIABLES INCLUDED IN ANALYSIS = GROWTH, CONTROL, AVERAGE VALUATION RATIO, RETENTION RATIO, WARRANTED PROFIT RATE, WARRANTED SHAREHOLDER WEALTH.

VARIABLES EXCLUDED FROM FINAL RESULT BY RAO V TEST = CONTROL, AVERAGE VALUATION RATIO.

STANDARDISED DISCRIMINANT FUNCTION

GROWTH	0.56044
WARRANTED PROFIT RATE	0.46489
RETENTION RATIO	0.37097

EIGENVALUE	=	0.12723
WILKS LAMBDA	=	0.8871296
CHI SQUARED TEST OF SIGNIFICANCE	=	0.0215

CLASSIFICATION RESULTS

PREDICTED GROUPS

ACTUAL GROUP	VICTIMS	NEUTRALS	NUMBER IN SAMPLE
VICTIMS	30 (60.0%)	20 (40.0%)	50
NEUTRALS	15 (30.0%)	35 (70.0%)	50

PERCENTAGE OF CASES CORRECTLY CLASSIFIED = 65.0%

TABLE 5.12 (a)

COMPARISON SAMPLE

DISCRIMINANT ANALYSIS: PREDATORS AND NEUTRALS

GROUP MEANS

GROUPS	SIZE	GROWTH	RETENTION RATIO	PROFIT RATE	CONTROL	GEARING	USE OF EXTERNAL FUNDS	AVERAGE VALUATION RATIO	CHANGE IN VALUATION RATIO	SHAREHOLDER WEALTH INDEX	WARRANTED PROFIT RATE	WARRANTED SHAREHOLDER WEALTH
PREDATORS	£150.0 million	20.7%	0.64	13.9%	9.7%	25.9%	27.4%	0.81	12.5%	14.9%	0.64	0.08
NEUTRALS	£21.5 million	15.9%	0.66	11.8%	27.0%	11.6%	11.4%	1.03	1.3%	9.7%	0.86	0.86

TOTAL SAMPLE = 100

TABLE 5.12 (b)

COMPARISON SAMPLE

DISCRIMINANT ANALYSIS: PREDATORS AND NEUTRALS (Continued)

ANALYSIS 1

VARIABLES INCLUDED IN ANALYSIS = GROWTH, PROFIT RATE, SHAREHOLDER WEALTH, CONTROL, AVERAGE VALUATION RATION, RETENTION RATIO.

VARIABLES EXCLUDED FROM FINAL RESULT BY RAO V TEST = GROWTH, RETENTION RATIO.

STANDARDISED DISCRIMINANT FUNCTION

PROFIT RATE	0.47442
SHAREHOLDER WEALTH	0.20699
CONTROL	- 0.88418
AVERAGE VALUATION RATIO	- 0.58714

EIGENVALUE	= 0.36093
WILKS LAMBDA	= 0.7347919
CHI SQUARED TEST OF SIGNIFICANCE	= < 0.001

CLASSIFICATION RESULTS

PREDICTED GROUPS

ACTUAL GROUP	PREDATORS	NEUTRALS	NUMBER IN SAMPLE
PREDATORS	41 (82.0%)	9 (18.0%)	50
NEUTRALS	17 (34.0%)	33 (66.0%)	50
VICTIMS	21 (42.0%)	29 (58.0%)	50

PERCENTAGE OF CASES CORRECTLY CLASSIFIED = 74.0%

TABLE 5.12 (c)

COMPARISON SAMPLE

DISCRIMINANT ANALYSIS: PREDATORS AND NEUTRALS (Continued)

ANALYSIS 2

VARIABLES INCLUDED IN ANALYSIS = GROWTH, SIZE, PROFIT RATE, CONTROL, AVERAGE VALUATION RATIO, SHAREHOLDER WEALTH, RETENTION RATIO.

VARIABLES EXCLUDED FROM FINAL RESULT BY RAO V TEST = SHAREHOLDER WEALTH INDEX, RETENTION RATIO.

STANDARDISED DISCRIMINANT COEFFICIENTS

GROWTH	0.28755
SIZE	0.48379
PROFIT RATE	0.39034
CONTROL	- 0.69873
AVERAGE VALUATION RATIO	- 0.59407

EIGENVALUE	= 0.45612
WILKS LAMBDA	= 0.6867579
CHI SQUARED TEST OF SIGNIFICANCE	= < 0.001

CLASSIFICATION RESULTS

PREDICTED GROUPS

ACTUAL GROUP	PREDATORS	NEUTRALS	NUMBER IN SAMPLE
PREDATORS	39 (78.0%)	11 (22.0%)	50
NEUTRALS	11 (22.0%)	39 (78.0%)	50
VICTIMS	17 (34.0%)	33 (66.0%)	50

PERCENTAGE OF CASES CORRECTLY CLASSIFIED = 78.0%

TABLE 5.12 (d)

COMPARISON SAMPLE

DISCRIMINANT ANALYSIS: PREDATORS AND NEUTRALS (Continued)

ANALYSIS 3

VARIABLES INCLUDED IN ANALYSIS = GROWTH, CONTROL, AVERAGE VALUATION RATIO, RETENTION RATIO, WARRANTED PROFIT RATE, WARRANTED SHAREHOLDER WEALTH.

VARIABLES EXCLUDED FROM FINAL RESULT BY RAO V TEST = WARRANTED PROFIT RATE, WARRANTED SHAREHOLDER WEALTH, RETENTION RATIO.

STANDARDISED DISCRIMINANT COEFFICIENTS

GROWTH	0.48710
CONTROL	- 0.89435
AVERAGE VALUATION RATIO	- 0.58372

EIGENVALUE = 0.33941
WILKS LAMBDA = 0.74665955
CHI SQUARED TEST OF SIGNIFICANCE = < 0.001

CLASSIFICATION RESULTS

PREDICTED RESULTS

ACTUAL GROUP	PREDATORS	NEUTRALS	NUMBER IN SAMPLE
PREDATORS	38 (76.0%)	12 (24.0%)	50
NEUTRALS	18 (36.0%)	32 (64.0%)	50
VICTIMS	23 (46.0%)	27 (54.0%)	50

PERCENTAGE OF CASES CORRECTLY CLASSIFIED = 70.0%

5.3.3. The Maximisation of Shareholder Wealth

Fundamental to the "managerial" theory of takeover is the view that shareholders lacking the ability to organise effective opposition to the controlling managers of the company sell out to a bidder because this is the only effective way that they can guarantee a proper return to their capital investment. The evidence of the Comparison Sample cast doubt on this, since the amount of ownership control was higher in the case of Victim Firms than amongst the Predators. But since amongst companies with a quotation on the Stock Exchange even a controlling group rarely possesses more than 20% to 25% of the equity, it is therefore open to dissatisfied stockholders to sell out their company. In doing this they would demonstrate their lack of faith in the management of their funds and equally indicate that the capital market effectively penalises users of capital who do not perform with ability.

The issue, however, is not as simple as the foregoing paragraph might suggest. In a perfect capital market an overpriced share cannot survive; shareholders will sell shares in such situations causing the return to capital employed to be brought into equality with the return to be earned elsewhere in the capital market after making allowance for the variations in risk affecting those returns. In such circumstances the equity holders in a firm which was inefficiently managed would therefore not necessarily be suffering any financial penalty. Only if it could be established that they were "locked in" - that is to say, unable to sell their holding

because of some institutional factor - would one be able to substantiate the argument that the large scale of share sales necessary to effect a takeover could depend on there being a large number of dissatisfied shareholders available. One condition which certainly exists is that there are costs involved in making a share sale so that some marginal amount of managerial inefficiency would be tolerated, but only if such shareholders were incurable optimists would they continue to hold shares that were over-valued in relation to the returns to be earned elsewhere in the market. The first expectation is, therefore, that shareholder returns as measured by the shareholder wealth index will not differ significantly between firms.

The second problem to be explored is that although profitability and growth are closely related, the univariate analysis of the preceding chapter showed a much lower association between shareholder wealth and the profitability and growth variables.

Using the Consumer Durable/Non-Durable Sample, a simple linear regression of growth on the rate of return shows that :-

EQUATION 5.1. Growth = 8.05 + 0.17 Return

both parameters being highly significant, with a linear correlation coefficient of 0.73 and an overall significance using the F test of 0.1 per cent.

If on the other hand we render the same treatment on the same sample with respect to the shareholder wealth index, we find :-

EQUATION 5.2. Growth = 11.73 + 0.33 Shareholder Wealth.

Again, both regression coefficients are highly significant and the overall significance using the F test is once more at the 0.1 per cent level, but the coefficient of linear correlation drops to 0.36.

This leads to the inference that, as the profit rate rises, it is not transmitted in equal measure to the advantage of the shareholder. Although correlations represent a two-way system of causation, so that it is not possible to determine by statistical means whether growth is primarily induced by the prospect of high profit or that high profit provides the funds (either directly through retention or indirectly through creating a favourable company image for raising external funds) and it is possible that both factors operate conjointly, we are probably on safe ground in interpreting the growth/shareholder wealth correlation in a single direction. The growth of shareholder wealth for any given level of profitability is much more a policy decision under the control of the directors of a company, and therefore any reduction in that growth can be more directly related to the decisions of the management group that runs the enterprise.

The distinction is of some importance, for it permits the re-establishment of a managerial theory of the firm, though not in the form that it was conceived by Marris. Marris proposed that managerial behaviour could be detected by reference to a growth/profitability trade-off. We can now propose that the essence of managerial type behaviour resides in a growth/shareholder wealth trade-off.

It will be recalled that the shareholder wealth index measures not only the payment of dividends but also the gain in capital arising from the share investment. The distinction is important because there is good evidence that firms lag dividend payments when profitability rises so the lack of high correlation if only dividends were of concern would be anticipated, but the implication is that capital gains also fail to respond to the increased injection of profit. If this is so, it could be deduced that managers, having satisfied their shareholders by paying a return conforming to that required by capital at the given level of risk, either use the excess funds to insure against future difficulties by building reserves or involve themselves in non-fruitful growth expenditure. Since the measure of net assets which is being used for assessing growth would not in fact distinguish between these types of financial activity, it would not be possible to pronounce on the exact nature of the managerial behaviour involved, i.e. to increase the security of the professional manager's position or to engage in "discretionary empire building" activities, but it would make a case for managerial interests being served against those of the shareholder who requires that funds be usefully employed or returned.

The Evidence

Although Table 5.9 (a) has already shown that the gain to shareholders is lower in the case of Victims and Neutrals than for Predators when the average is measured for each category, Table 5.13 reports the result of an analysis of variance (Section A) that one

cannot distinguish the shareholder wealth returns made between the above categories of companies, and the 't' tests (Section B) confirm that at the 5% level of significance one cannot differentiate between these varieties of enterprises taken pairwise.

We can also turn to Table 5.14 for further evidence on this. The Table needs care in its interpretation. It contrasts those firms with high growth rates and low returns to shareholders, with firms making above average returns to shareholders irrespective of growth rate. The high growth rate/low return to shareholders group might be considered to be run by managers who were seeking growth at all costs, "sheer growth maximisers" representing the new model of a managerial type firm.(3)

In contrasting the firms with low shareholder returns and high growth with all other firms, we find that although the rate of return was somewhat higher for our high growth/low shareholder return group, the shareholder was obviously failing to benefit. Of more importance to our immediate purpose is that the discriminant function correctly classified firms at a success rate of about 60% (which is not strikingly high) but that the level of significance of the discriminant function at 0.049 only just achieves acceptability as being statistically significant. In these circumstances we would be justified, remembering that the firms have been specially selected for their possession of high values of the relevant variables 'post hoc', in concluding that the market does

(3) However, as was previously discerned, the average amount of directorial control was higher in such firms though only by a small margin.

approximately achieve an equality of return for investors.

In order to assess whether the rate of growth of firms which requires increasing profitability to sustain increasing growth rates is of equal benefit to shareholders, a series of specifications of growth equations were developed, as will be found in Tables 5.15 to 5.18. On the basis of experimentation, the fitted growth curves of Figure 5.1 (shareholder wealth as a function of growth), and Figure 5.2 (rate of return as a function of growth) were produced. The specification with the highest value of the coefficient of linear correlation and a level of significance of 0.1% was chosen for plotting. It can be seen that while the rate of return follows a quadratic function with increasing return for each per cent increase in growth, the shareholder wealth index follows a linear function with a constant increase in shareholder wealth per unit of growth. It is also apparent from Table 5.16 that an equivalent specification for shareholder wealth as a function of growth with the same level of correlation as the one chosen (i.e. equation 5.16 (c)) implies a quadratic function with a negative coefficient in the squared term. If both functions, the rate of return and the shareholder wealth, were to be differentiated twice, then in the case of the rate of return the result would imply acceleration in the rate of change, while deceleration of the rate of change of the curve would be the result for shareholder wealth.

If we concentrate on the correlation results of Tables 5.15 to 5.18, only that showing the dependence of growth on the rate of return (Table 5.15), where the coefficient of determination for

FIGURE 5.1.

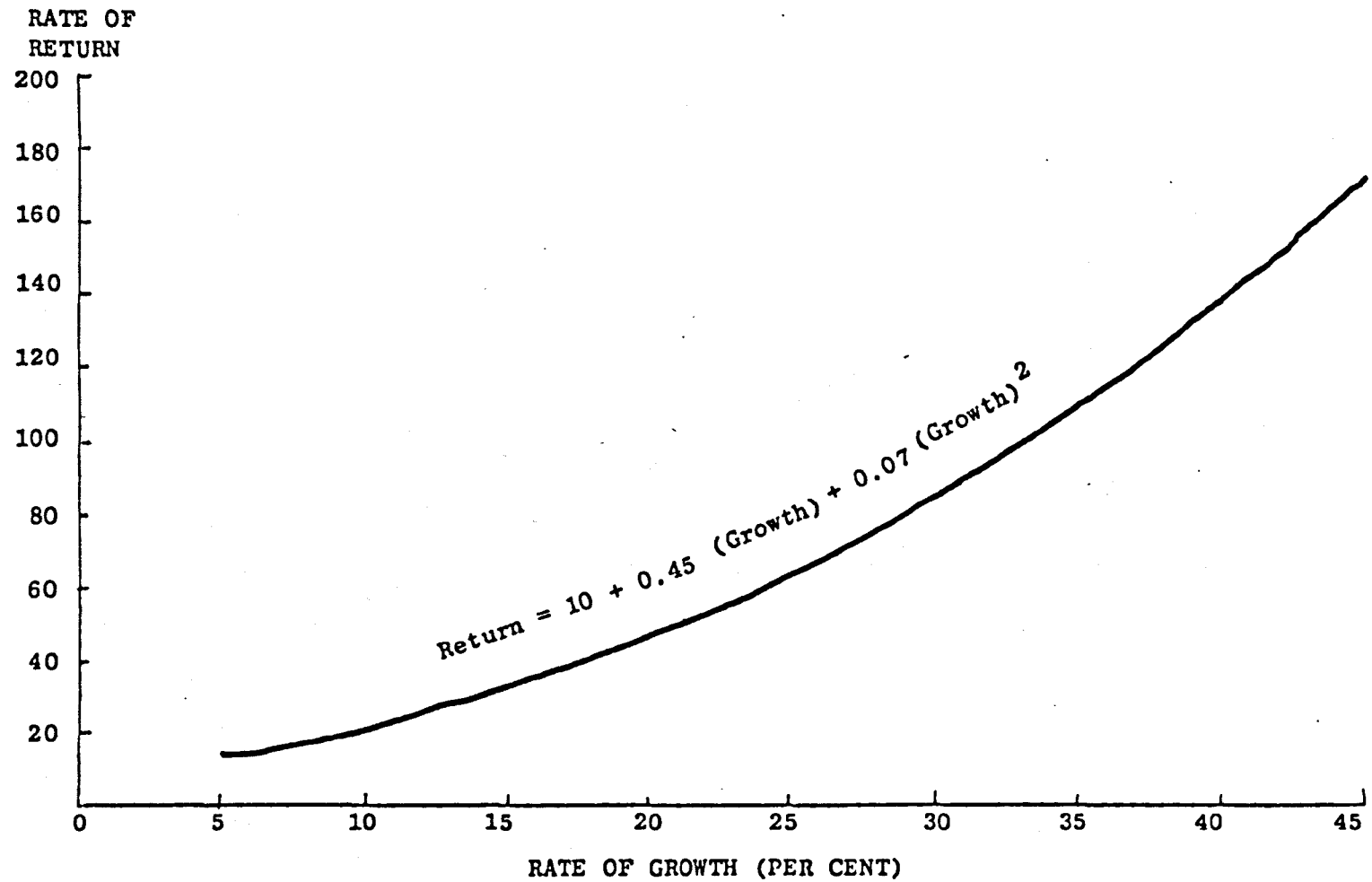
CONSUMER DURABLE/NON-DURABLE SAMPLE

FITTING A CURVE RELATING THE RATE OF RETURN TO GROWTH

USING EQUATION 5.13(c) Rate of Return = $10.0 + 0.45\ (\text{Growth}) + 0.07\ (\text{Growth})^2$

RANGE OF VALUES+ FOR GROWTH VARIABLE	CALCULATED VALUE OF RATE OF RETURN
0%	10.0
5%	14.0
10%	21.5
15%	32.5
20%	47.0
25%	65.0
30%	86.5
35%	111.5
40%	140.0
45%	172.0

+ Only positive values included.



SAMPLE SIZE = 501 FIRMS.

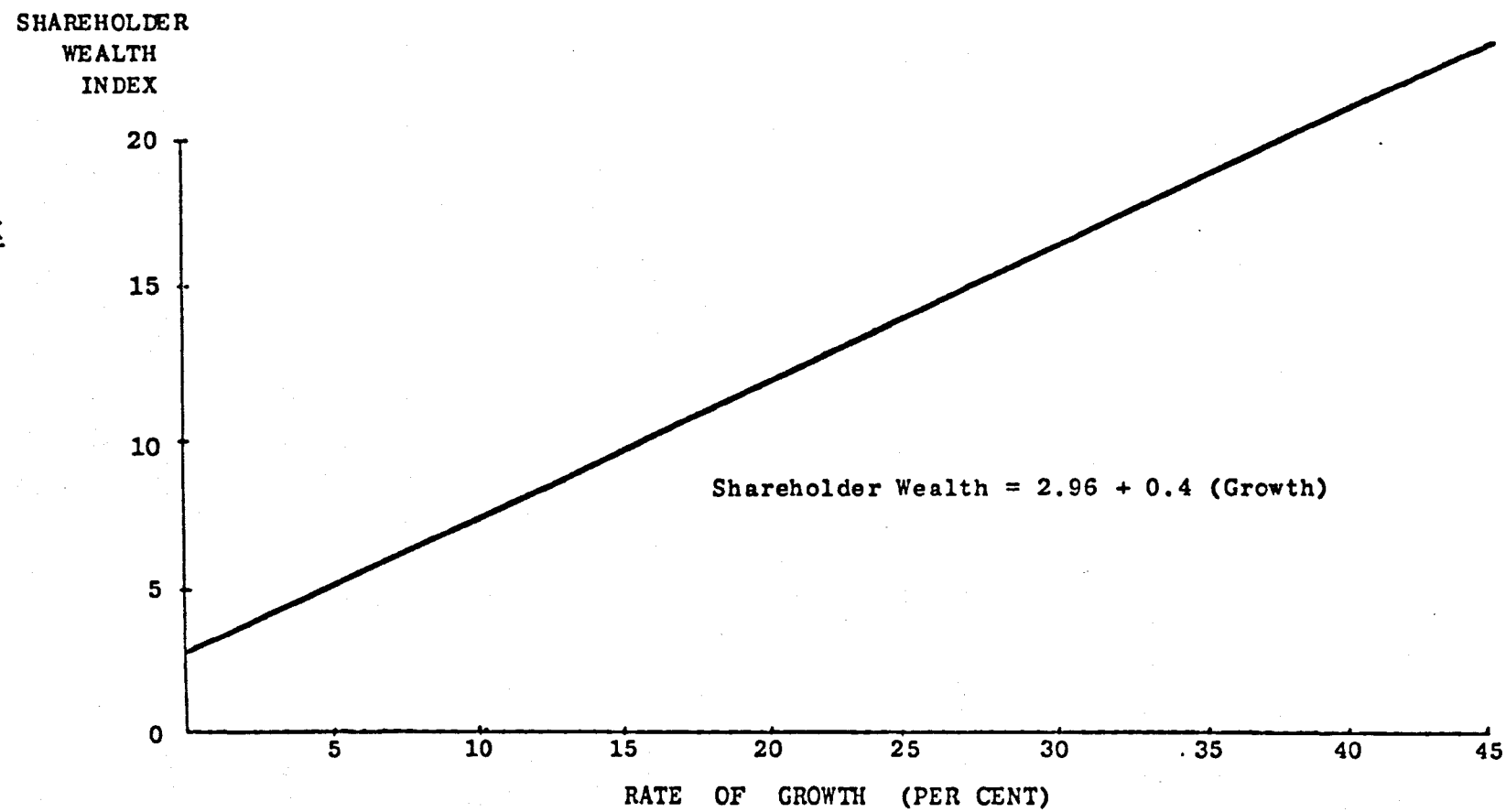
FIGURE 5.2.

CONSUMER DURABLE/NON-DURABLE SAMPLE

FITTING A CURVE OF SHAREHOLDER WEALTH INDEX ON GROWTH

USING EQUATION 5.14(a) Shareholder Wealth = 2.96 + 0.4 (Growth)

RANGE OF VALUES+ FOR GROWTH VARIABLE (V2)	CALCULATED VALUE OF SHAREHOLDER WEALTH INDEX (V5)
0%	2.96
5%	4.96
10%	6.96
15%	8.96
20%	10.96
25%	12.96
30%	14.96
35%	16.96
40%	18.96
45%	20.96



+ Only positive values included.

SAMPLE SIZE = 501

Equation (c) (the one on which the curve of Figure 5.1 was based) reaches 61% and shows the only high explanatory values, whereas the association between shareholder wealth and growth (Table 5.16) cannot obtain a better determination level than 13%. The other Tables (5.17 and 5.18) which deal with warranted rate of return and warranted shareholder wealth, show similar unsatisfactory correlations.

The drawn figures and the tables both reinforce the proposition that whereas profit is closely linked with growth, shareholder wealth is related and positively so, but the association is a weak one, as displayed by the coefficient of determination.

Conclusions concerning Growth and Shareholder Wealth

The evidence confirms the view that shareholders benefit from their investment without statistically significant differences whether their capital is tied up in Predators, Victims, Neutrals, High or Low Growth Firms. There is little reason to believe that shareholders are "locked into" a firm waiting for a bid to release them from their imprisonment and good reason to believe that mobility of funds within the capital market equalises return across that market.

Whereas the results have consistently denied any possibility of a growth/profitability trade-off, there is some reason to believe that shareholders do not gain proportionately from higher levels of "satisfactory" returns for those who hold the company's shares and then treat the surplus as discretionary income, implying the existence of a growth/shareholder wealth trade-off.

But this throws up the paradox previously alluded to. Since the shareholder wealth index was designed not only to capture wealth returned in dividends but also that flow arising from capital gains on the sale of shares, what happened to the profits which do not appear to have been distributed to shareholders? One possible answer is that the year 1978 in which the shares were sold (since it is the Consumer Durable/Non-Durable Sample with which we are dealing) was one in which the stock market cycle, as measured by the Financial Times Index of Ordinary Shares, had not recovered to an extent when the underlying asset value was being properly reflected in the share price. Against this explanation is the fact that for 1969, when the shares were assumed to have been bought, and 1978 when the shares were sold, were both years in which the index was rising and was not at its peak.

However, we do know that the period was one in which inflation reached very high levels, especially in the mid-point of the sample period from 1974 to 1976. It is also very clear that if we consider the variable which was named "rate of return" it requires some adaptation of the meaning of that term to treat it as such, since a true rate of return would involve constant up-dating of the denominator to show the changing asset base on which the profits were earned, whereas the measure was constructed for the Consumer Goods Sample using net asset size in 1970 as the denominator and divided into the average level of pre-tax profits over the nine year period. The growth was calculated, on the

other hand, by determining the compound growth rate in net assets between the start and end of the sample time span. Therefore the growth rate might be considered as an index for adjusting for the rise in monetary values. Not a perfect one by any means, since there would be some rise in net asset values of a real nature, but in a phase of high inflation it would function to some extent in this manner. Therefore, instead of understanding the "warranted rate of return" as a rate of return per unit of growth, it can be thought of as a measure of the real rate of return discounting the effects of inflation. By a similar path of reasoning, the "warranted shareholder wealth index" can be interpreted as a real rate of shareholder return and not an inflationary rate of return. If we consider the equations describing the warranted variables (Tables 5.17 and 5.18) in this way, and noting that the regression coefficients show a negative relationship in every case with changes in growth, we re-formulate the proposition to be that real rates of return and real gains in shareholder wealth decline with growth.

There is no proposition in economics which asserts that the rate of return is at an optimum point where the marginal increase per unit of growth is positive rather than negative. Rather the contrary is true, since we would expect any firm to undertake its most profitable investment opportunity first, its next most profitable second, and so on; so that the rate of return would decline with the growth rate. The cut-off point would arrive where the marginal cost of capital exceeds the marginal increase in "present value" of the investment.

Since in an inflationary era, the "book value" of assets would tend to lag the monetary value of current profits, the rate of return would appear justified at a time when in real terms the return had become not worth while, or even negative.

Marris's theory asserts that the management group who direct the affairs of the firm knowingly drive investment to a point at which the rate of profit declines. This fall in profit must be such that the rate of return (the "real" value as calculated above) actually falls below that which would be expected, causing a revaluation of the market price. The lowering of the market price in relation to book value causes the valuation ratio to fall. The interpretation of the statistical analysis takes a different track. Managers push along the growth curve demonstrating increasing returns in absolute terms as shown in Table 5.15. (and supported by the evidence in Chapter 4 of univariate analysis that for both the Consumer Durable/Non-Durable Sample and the Comparison Sample (predators, victims and neutrals), the correlation between the growth rate and the profit rate has the highest significant correlation ratio than between growth and any other variable). However, the increasing profit rate is illusory, being mainly composed of inflationary gains, and in fact is actually declining (Table 5.17). Since management was using historical cost accounting methods, which do not offer information on the real rate of return, the actual decline portrayed in Table 5.17 was probably not fully understood. The crucial difference is that Marris believed that managers knowingly

permitted the rate of return to fall, whereas the new contention is that they did not appreciate to any marked extent that the rate of return was, in real terms, in decline.(4)

The shareholder wealth index also increases with growth (though at a lower rate than the pre-tax profit rate) and declines in real terms (though at a faster rate over the range of growth rates that would cover most of the firms, i.e. up to about 20%, than the rate of return).

There still remains the problem of what happened to the monetary cash flow to the firm which was increasing at a faster rate than the cash paid out to shareholders, either by way of dividends or in capital gains. The most obvious explanation is that growth firms in an inflationary era would require to absorb more cash in order to maintain their rate of investment (note how in Table 5.9.(a) it is the predators with a higher growth rate who retain more funds than the victims with their lower growth rate) and also to meet rises in current costs of wages, stocks and other items of working capital. The capital market noting that either the dividend rate was not reflecting the rate of profit or becoming aware that inflation required higher returns per £ invested in order to maintain the real rate of return or possibly both, would cause market prices to be less buoyant than the profit rate (in money terms) would appear to demand,

(4) The stockbroking firm of Phillips and Drew estimated that the profits of the 120 largest British companies (excluding enterprises engaged in the Oil Industry and Finance) would, on the basis of the current cost accounting principles of "ED 24", be 35% lower than those reported in 1978 based on traditional accounting methods. (Times, 21 March 1980).

and thus despress the capital gains of shareholders who were offering their shares on the market in 1978.(5)

The totality of the result could be considered as a description of the effects of high inflation in which the shareholders, as the residual legatees of the system, bore the brunt of the costs of surviving in the environment. But there are no inevitable laws which demand that shareholders should be losers. One option open to firms facing difficulties in supplying funds to develop a company is to cut the growth rate and pay out a larger amount of the inflated gains to its equity owners. The fact that firms, in considering a trade-off between maintaining the enterprise's growth rate or compensating its shareholders for the effects of inflation, leads again to the proposition that managerial firms choose to exchange increases in shareholder wealth for maintenance of the growth rate of the business. Whether the finding that managers seek to meet targets that satisfy shareholders and then appropriate excess returns in order to ensure their survival should be termed a growth/shareholder wealth trade-off or a support for the managerial thesis of the firm is largely a matter of how we purport to define these terms. Even if the exact measurement of inflationary effects was not apprehended, it would be clear that the years covered by this study were ones where inflation was reaching historically unprecedented levels and common prudence would suggest that the controllers of the destiny of firms should lay in reserves to

(5) Independent evidence of the fall in real rates of return of industrial and commercial companies can be found in the Bank of England Quarterly Bulletin for June 1980 (3/1980). The real pre-tax profit rate fell from about 9.5% in 1970 to around 5% by 1978.

insure against the difficult financial environment in which they were operating.

5.3.4. Final Summary

If growth and profitability are intimately associated, as both this and the preceding chapter both suggest, then these are not policy options to be bargained one against the other but rather twin aspects of the same problem. If the essence of the managerial theory of the firm is that managers can pursue policies of growth rather than those aimed at maximising the return on capital, then there is little support for such a thesis. Managers can best secure their own positions free from the anxiety of takeover bids by aiming at high profitability and growth, with its pleasurable attributes of power and esteem, will follow in its wake. Since the direction of a statistical association is never certain, it may equally be that the pursuit of growth is the key to increasing profitability. Either way, the profit maximising motive would appear to be the appropirate assumption for the analyses of managerial behaviour.

TABLE 5.13 COMPARISON GROUPS (PREDATORS, VICTIMS, NEUTRALS)

SIGNIFICANCE TEST OF KEY VARIABLES BETWEEN PREDATORS, VICTIMS AND NEUTRALS USING ANALYSIS OF VARIANCE

KEY VARIABLE : SHAREHOLDER WEALTH INDEX.

A. F TEST OF SIGNIFICANCE OF DIFFERENCE BETWEEN PREDATORS, VICTIMS AND NEUTRALS

	DEGREES OF FREEDOM	F RATIO	F PROBABILITY
BETWEEN GROUPS	2	2.1768	0.1170
WITHIN GROUPS	147		

B. T TEST OF DIFFERENCE BETWEEN GROUP MEANS (USING SEPARATE VARIANCE ESTIMATES)

	GROUP A	GROUP B	T VALUE	DEGREES OF FREEDOM	T PROBABILITY
1.	VICTIMS	PREDATORS	- 1.797	82.4	0.076
2.	PREDATORS	NEUTRALS	1.821	90.5	0.072
3.	VICTIMS	NEUTRALS	- 0.632	69.4	0.530

TABLE 5.14 (a). CONSUMER DURABLE/NON-DURABLE SAMPLE

DISCRIMINANT ANALYSIS. TO DISTINGUISH BETWEEN HIGH GROWTH FIRMS[+] MAKING BELOW AVERAGE RETURNS TO SHAREHOLDERS AND FIRMS WITH ABOVE AVERAGE RETURNS TO SHAREHOLDERS[++]

GROUP MEANS

GROUPS	SIZE	CONTROL	TAKEOVER INDEX	RATE OF RETURN	NUMBER IN SAMPLE
HIGH GROWTH	£19.4 million	26.7%	0.73	51.4	79
HIGH AVERAGE RETURNS TO SHAREHOLDERS	£7.0 million	24.0%	0.50	48.8	232

+ HIGH GROWTH FIRMS ARE THOSE WITH AN AVERAGE ANNUAL GROWTH RATE OF NET ASSETS GREATER THAN 14.6% AND WITH AN ANNUAL COMPOUND RATE OF INCREASE IN SHAREHOLDERS WEALTH LESS THAN 8.8 PER CENT.

++ FIRMS MAKING ABOVE AVERAGE RETURNS TO SHAREHOLDERS ARE DEFINED AS THOSE WHICH INCREASE SHAREHOLDERS WEALTH AT A COMPOUND RATE PER ANNUM GREATER THAN 8.8 PER CENT IRRESPECTIVE OF GROWTH RATE.

TABLE 5.14 (b)

CONSUMER DURABLE/NON-DURABLE SAMPLE

DISCRIMINANT ANALYSIS. HIGH GROWTH AND HIGH RETURN (Continued)

ANALYSIS

ALL VARIABLES WERE TESTED FOR INCLUSION IN THE DISCRIMINANT FUNCTION BY RAO V TEST. ALL VARIABLES WERE INCLUDED.

COEFFICIENTS OF STANDARDISED DISCRIMINANT FUNCTION

SIZE	- 0.84583
CONTROL	- 0.39610
TAKEOVER INDEX	- 0.40611
RATE OF RETURN	- 0.11446

EIGENVALUE	= 0.03158
WILKS LAMBDA	= 0.96938
CHI SQUARED TEST OF SIGNIFICANCE	= 0.049

CLASSIFICATION RESULTS

PREDICTED RESULTS

ACTUAL GROUP	HIGH GROWTH	HIGH AVERAGE RETURN	NUMBER OF CASES IN SAMPLE
HIGH GROWTH	33 (41.8%)	46 (58.2%)	79
HIGH AVERAGE RETURN	75 (32.3%)	157 (67.7%)	232

PERCENTAGE OF CASES CORRECTLY CLASSIFIED = 61.1%

TABLE 5.15

CONSUMER DURABLE/NON-DURABLE SAMPLE

THE EFFECT OF GROWTH ON THE RATE OF RETURN

EQUATION			VALUE OF LINEAR CORRELATION COEFFICIENT	R^2	LEVEL OF SIGNIFICANCE
5.15(a)	Return	$= -7\text{-}03^{**} + 3.06^{**}$ (Growth) (2.23) (0.13)	0.73	0.53	< 0.001
5.15(b)	Return	$= -23.1^{**} + 24.9^{**}$ (Log Growth) (4.6) (1.8)	0.53	0.28	< 0.001
5.15(c)	Return	$= 10.0^{**} + 0.45$ (Growth) $+ 0.07^{**}$ (Growth)^2 (2.6) (0.28) (0.007)	0.78	0.61	< 0.001
5.15(d)	Log Return	$= 2.2^{**} + 0.07^{**}$ (Growth) (0.06) (0.003)	0.69	0.47	< 0.001
5.15(e)	Log Return	$= 1.3^{**} + 0.78^{**}$ (Log Growth) (0.10) (0.04)	0.68	0.46	< 0.001

SAMPLE SIZE = 501 FIRMS

* Significant at 5% level.
** Significant at 1% level.

TABLE 5.16

CONSUMER DURABLE/NON-DURABLE SAMPLE

THE EFFECT OF GROWTH ON THE SHAREHOLDER WEALTH INDEX

EQUATION			VALUE OF LINEAR CORRELATION COEFFICIENT	R^2	LEVEL OF SIGNIFICANCE
5.16(a)	Shareholder Wealth	$= 2.96^{**} + 0.4^{**}$ (Growth) (0.8) (0.05)	0.36	0.13	< 0.001
5.16(b)	Shareholder Wealth	$= -1.5 + 4.2^{**}$ (Log Growth) (1.34) (0.52)	0.34	0.12	< 0.001
5.16(c)	Shareholder Wealth	$= 2.8^{**} + 0.43^{**}$ (Growth) $- 0.0008$ (Growth)^2 (1.04) (0.11) (0.003)	0.36	0.13	< 0.001
5.16(d)	Log Shareholder Wealth	$= 1.2^{**} + 0.4^{**}$ (Growth) (0.09) (0.004)	0.32	0.10	< 0.001
5.16(e)	Log Shareholder Wealth	$= 0.66^{**} + 0.45^{**}$ (Log Growth) (0.15) (0.06)	0.32	0.10	< 0.001

SAMPLE SIZE = 501 FIRMS.

* Significant at 5% level.
** Significant at 1% level.

TABLE 5.17

CONSUMER DURABLE/NON-DURABLE SAMPLE

THE EFFECT OF GROWTH ON THE WARRANTED RATE OF RETURN

EQUATION			VALUE OF LINEAR CORRELATION COEFFICIENT	R^2	LEVEL OF SIGNIFICANCE
5.17(a)	Warranted Return	$= 2.8^{**} - 0.012$ (Growth) (0.29) (0.02)	0.03	0.001	0.464
5.17(b)	Warranted Return	$= 5.6^{**} - 1.19^{**}$ (Log Growth) (0.46) (0.2)	0.29	0.08	< 0.001
5.17(c)	Warranted Return	$= 3.4^{**} - 0.10^{**}$ (Growth) $+ 0.002$ (Growth)^2 (0.38) (0.04) (0.001)	0.11	0.01	0.041
5.17(d)	Log Warranted Return	$= 0.75^{**} + 0.003$ (Growth) (0.05) (0.003)	0.04	0.002	0.356
5.17(e)	Log Warranted Return	$= 1.05^{**} - 0.10^{**}$ (Log Growth) (0.09) (0.03)	0.13	0.02	< 0.001

SAMPLE SIZE = 501 FIRMS

* Significant at 5% level.
** Significant at 1% level.

TABLE 5.18

CONSUMER DURABLE/NON-DURABLE SAMPLE

THE EFFECT OF GROWTH ON THE WARRANTED SHAREHOLDER WEALTH INDEX

EQUATION			VALUE OF LINEAR CORRELATION COEFFICIENT	R^2	LEVEL OF SIGNIFICANCE
5.18(a)	Warranted Shareholder Wealth	$= \underset{(0.18)}{0.93^{**}} - \underset{(0.01)}{0.02}$ (Growth)	0.07	0.004	0.137
5.18(b)	Warranted Shareholder Wealth	$= \underset{(0.3)}{1.09^{**}} - \underset{(0.12)}{0.16}$ (Log Growth)	0.06	0.004	0.177
5.18(c)	Warranted Shareholder Wealth	$= \underset{(0.24)}{0.98^{**}} - \underset{(0.02)}{0.02}$ (Growth) $- \underset{(0.0006)}{0.0002}$ (Growth)^2	0.07	0.005	0.312
5.18(d)	Log Warranted Shareholder Wealth	$= 0.14 - \underset{(0.004)}{0.034^{**}}$ (Growth)	0.33	0.11	< 0.001
5.18(e)	Log Warranted Shareholder Wealth	$= \underset{(0.13)}{0.71^{**}} - \underset{(0.08)}{0.44^{**}}$ (Log Growth)	0.38	0.15	< 0.001

SAMPLE SIZE = 501 FIRMS.

* Significant at 5% level.
** Significant at 1% level.

5.4. THE GROWTH OF FIRMS AND A THEORY OF MERGERS

During the course of the analysis, we have been intent on examining the nature of the managerial firm and sought to integrate this with a theory of takeover. We have declined to accept the Marris doctrine of the failing firm as the source of merger activity, but it is necessary to draw some conclusions concerning mergers.

It is evident from Tables 5.6 to 5.8 (which attempt to determine from a restricted number of variables an explanation of growth rates) that growth, as well as being strongly associated with the increase in profits, is also significantly related to takeover activity. This is confirmed by the Discriminant Analyses of Tables 5.1 to 5.5 where high growth rates are an important distinguishing factor in determining whether a firm is a predator. The "sheer growth" group of companies portrayed in Table 5.14 also show the same emphasis on merger activity in achieving their ends.

Tables 5.19 and 5.20 were constructed as linear probability functions identifying the probability of being predators and victims.(6)

A linear probability function is constructed by forming dummy variables; in the instance of Table 5.19, all predator firms were classified as zero, all victims as unity, and neutrals were excluded from the analysis. A multiple regression on these dummy variables was then carried out using different variables in each equation.

(6) Since the same variables were used, an examination of these Tables will show that they are mirror images of each other except for a difference in sign attached to each variable.

These were:-

Equation (a) Growth, Warranted Profit Rate, Warranted Shareholder Wealth.

Equation (b) Growth, Shareholder Wealth, Profit Rate.

Equation (c) Size, Growth, Gearing Ratio, Use of External Funds.

The resulting multiple correlation coefficient is then taken as defining the explanatory power of the variables used, and by analogy the value of "R" is assumed to define (in Table 5.19) the probability of being a victim. In Table 5.20, the procedure was reversed so as to define the probability of being a predator.

In every equation the growth rate was positively associated with being a predator and negatively associated with being a victim. The equations with the highest and most significant value of the coefficient of multiple linear regression were 5.19 (c) and 5.20 (c) where the significant variables were positively related gearing, positively related growth and positively related size as the predator, and negatively related growth, negatively related gearing and negatively related size as the marks of the victim.

The growth rate variable's relationship to being a predator is matched by the importance that that variable assumes in the Discrimination Functions of Tables 5.1 to 5.5 as a factor that always takes on a high value as a standardised discriminant coefficient in identifying predatory firms. The fact that predators are large in size is well proven from previous research into merger activity, although it should be noted that the regression coefficient for this

variable (although statistically significant) is small, and it can be noted from the results of the previous chapter that the high growth firms were below average size for the Consumer Durable/Non-Durable Sample. The interesting variable making its entrance at this stage is the gearing ratio, with the inference that predator firms make more use of borrowed funds than victim companies.

If one considers the group means which occur in Table 5.1 as the first statement concerning the application of Discriminant Analysis to the predators, victims and neutrals, the visual impression of the predators compared with victims is :-

a) they are larger (by a factor of 9 approximately);

b) they grow faster (by a factor of 2 approximately);

c) the amount of directorial shareholding is much less (by a factor of less than a half);

d) they make much more extensive use of leverage (by a factor of almost 3);

e) they make much more use of external sources of funds (by almost 3 times);

f) that although warranted profit rate is somewhat similar, the value of the warranted shareholder wealth index is much less (about one-tenth).

In addition, although the gap is much smaller than the differences quoted above, the retention ratio is higher for predators than victims. A picture starts to emerge of firms seeking to grow at a fast pace who do this by maintaining a close relationship between the rate of

growth of profits and the growth rate, and converts that profit rate into growth by means of an above average retention ratio and also by an ability to call on external sources of capital (both loans and equity). Victims, on the other hand, growing less rapidly and making lower profits, find much more difficulty in calling on the use of funds from outside sources, and in order to maintain a contented set of equity owners are much more moderate in their demands on retaining profits for their own use. Note also that this concern for their shareholders also shows up in maintaining a higher value of the average valuation ratio than predators, and also in the way in which their real returns to shareholders (as indicated by the warranted shareholder wealth index) are maintained at such a high level in comparison with the predator companies.

Some of this ability to raise debt finance and call on new equity cash must derive from the security which size gives to the predators. However, predators do grow at a faster rate and have higher profits, and it may well be that their ability to call on new capital is related to their ability to find more profitable market opportunities. It can be seen from Table 5.1 that the real returns (as measured by the warranted profit rate) of victims and neutrals is higher than that of the predators, despite the fact that the predators have the highest level of absolute average profits. This is most probably due to the fact that inflation, linked to the inability of victims and neutrals to raise money constrains their growth rate, and if we assume that firms tackle investment opportunities

in order of their profitability, this would account for their performance in this regard, since they would have much less of the ravages of inflation to face and repair.

The most obvious difference between victims and predators (and also neutrals) relates to the change in valuation ratio. Table 5.1 shows a large fall in that valuation ratio between the start and the end of the five year period for victims, whereas predators and neutrals show an increase over the period. This fall must reflect a loss of market confidence in the victim firms, resulting in a fall in their share valuation on the Stock Exchange.(7) Since, on the evidence of Chapter 4 we know that we cannot distinguish between victims and neutrals with regard to their average profitability, their average growth rate or their average valuation ratio, this is not evidence for a failing firm performance, but suggests that market difficulties have made the prospects of victim firms less appealing, and moreover that the capital market is sufficiently well informed to predict these difficulties in advance of their occurrence. Equation (b) of Table 5.19 denies that it is a fall in the profit rate that brings about the probability of being a victim; it asserts that it is lack of growth, lack of size and a lack of the ability to borrow money which are the relevant characteristics. Faced then with a decline in

(7) It is known from research in the U.S.A. (Halpern, 84/1973; Mandelker, 140/1974) and in the U.K. (Franks, Broyles and Hecht, 73/1977) that the capital market does anticipate mergers by several months. The Franks et al study also showed that profits had declined prior to the date of the merger. Since our own evidence shows that the victims' average profitability over five years was not significantly different from the non-taken-over companies, the final fall in share price has been taken as a warning of future difficulties. It could, of course, indicate a temporary weakness which is seized upon by predator companies.

market opportunities, victims cannot adapt because they cannot call on the additional funding required for adaptation outside of their own resources. If this is so, then the market predicts future failure ahead of time and makes them liable to takeover. However, larger firms, with their greater reserves, more diverse products and markets and better access to funds, do not have to submit to the takeover discipline.

In order to test the relationship between growth rate, profit rate and the use of external funds, the total 150 firms were examined by means of multiple regression to see which variables were most successful in explaining growth (Table 5.21) and profitability (Table 5.22). Stepwise regression (i.e. variables were introduced in the order in which they contributed most to the overall value of the square of the multiple correlation coefficient) was used in order to indicate the importance of each variable in the total explanation. Tables 5.21 and 5.22 are set out in such a way as to indicate the significance of each regression coefficient. Also shown in the Tables is the value of the standardised regression coefficients which represent each regression coefficient in terms of a standard unit of measure, thus permitting judgement of their relative importance in the equation. The final correlation coefficients of 0.81 for Table 5.21 and 0.78 for Table 5.22 show that these were successful equations for describing their relationship to the dependent variable.

The significant regression coefficients related to growth are shown by Table 5.21 to be:-

(i) Profit Rate

(ii) Use of External Funds.

The similar exercise with Table 5.22 concerning Profitability showed the significant regression coefficients to be :-

(i) Growth

(ii) Gross Retention Ratio (a negative relationship)

(iii) Average Valuation Ratio

(iv) Profit Margin

(v) Use of External Funds (a negative relationship).

If one considers the standardised regression coefficients of Table 5.22 with respect to growth (0.07) and external funds (-0.13) one sees that they play a much smaller part in the explanation of the profit rate than profit (0.60) and external funds (0.37) from Table 5.21 taken in the explanation of the growth rate. The most reasonable inference to be drawn from this circumstance is that growth has a higher dependence on the profit rate (and the use of external funds) than profit has upon the growth rate. In plainer words, that firms grow because they are profitable; they are not profitable because they grow.

The significant negative relationship between profit and the use of external funds, coupled with the high positive relationship between growth and the use of external funds, leads to the conclusion that it is access to external funds that aids growth, although since growth depends heavily on an increasing profit rate, this same profit rate

is the means by which external suppliers of capital can be induced to support the firm. Further correlation analysis indicated that there is a significant difference between Predators who are large and fast growing and the smaller Victims and Neutrals who grew at a slower place in their use of external funding.

One interesting situation to be found in Tables 5.21 and 5.22 is the very small (negative) influence that size has in determining growth and profit. Size appears to be a very useful attribute in protecting against prospective future disaster but to contribute little of positive value to growth or the development of profit.

It was decided, therefore, to eliminate size from the analysis and to see how well profit and external funds survived as predictors of growth. Table 5.23 therefore presents the results of two multiple regressions on the total 150 firms of less and more than average size (average size being £31.5 million). The move was not without its attendant risks, since from the way the sample was constructed from equal groups of predators, victims and neutrals, it could be foretold that many victims and neutrals would now figure in the below average size sample because of their smaller size and the previous statistical work had indicated that they had a lower profit rate and made less use of external funds than the predator firms as a class. However, if the relationship survived, it would count equally as strong evidence that the growth path depends on profits and external funding. So it proved; Table 5.23 shows the expected variables to be highly significant, and moreover the overall equations with a coefficient of multiple linear correlation of 0.81 and an F significance of 0.1% for below average size of firms and 0.78 and 0.1% for above average size companies made them as successful predictive equations as any found during the research.

The lessons to be drawn on growth and merger activity appear to be :-

a) Firms aiming to grow at a fast pace make above average use of mergers to achieve that end.

b) If you seek to grow, then you need to earn increasing rates of profit which will supply the money for growth internally and also make additional sums accessible from external suppliers of capital.

c) Large size will not assist you to be more profitable or to grow faster, but it will protect you from takeover in the event of difficulties arising in a market.

d) If you are small with a lower profit rate and your market declines, then you risk being taken over, most probably because you have not a sufficiency of internal funds or external help to provide another option.

e) Finally, the capital market seems to demonstrate some efficiency in forecasting future market trends. It not only ensures that those making profits are able to draw on additional capital, but also that those firms about to enter into a period of difficult trading conditions, despite an acceptable level of profits to date, are most likely to become takeover victims.

TABLE 5.19

COMPARISON SAMPLE

MULTIPLE REGRESSION

LINEAR FUNCTIONS RELATING PROBABILITY OF DEFINING A VICTIM IN RELATION TO CERTAIN VARIABLES

(a) PROBABILITY OF BEING A VICTIM = 0.726^{**} (0.08) $- 0.014^{**}$ (0.004) (Growth) $+ 0.017$ (0.01) (Warranted Shareholder Wealth) $- 0.004$ (0.03) (Warranted Profit)

R_2 = 0.37720
R^2 = 0.14228
Significance = 0.002

(b) PROBABILITY OF BEING A VICTIM = 0.73^{**} (0.08) $- 0.014^{**}$ (0.006) (Growth) $- 0.003$ (0.002) (Shareholder Wealth) $+ 0.002$ (0.009) (Profit)

R_2 = 0.37481
R^2 = 0.14048
Significance = 0.002

(c) PROBABILITY OF BEING A VICTIM = 0.93^{**} (0.08) $- 0.007^{**}$ (0.002) (Gearing Ratio) $- 0.02^{**}$ (0.004) (Growth) $- 0.0000006^{**}$ (0.0000002) (Size) $+ 0.0004$ (0.002) (External Funds)

R_2 = 0.57418
R^2 = 0.32968
Significance = < 0.001

SAMPLE = 100 FIRMS (RESTRICTED TO VICTIM AND PREDATOR FIRMS)

* Significant at 5% level.
** Significant at 1% level.

TABLE 5.20

COMPARISON SAMPLE

MULTIPLE REGRESSION

LINEAR PROBABILITY FUNCTIONS RELATING PROBABILITY DEFINING A PREDATOR IN RELATION TO CERTAIN VARIABLES

(a) PROBABILITY OF BEING A PREDATOR $= \underset{(0.08)}{0.27^{**}} + \underset{(0.004)}{0.014^{**}}\text{(Growth)} - \underset{(0.01)}{0.017}\text{(Warranted Shareholder Wealth)} + \underset{(0.03)}{0.004}\text{(Warranted Profit)}$

$R_2 = 0.3772$
$R^2 = 0.14228$
Significance = 0.002

(b) PROBABILITY OF BEING A PREDATOR $= \underset{(0.08)}{0.27^{**}} + \underset{(0.006)}{0.014^{**}}\text{(Growth)} + \underset{(0.002)}{0.003}\text{(Shareholder Wealth)} - \underset{(0.009)}{0.002}\text{(Profit)}$

$R_2 = 0.37481$
$R^2 = 0.14048$
Significance = 0.002

(c) PROBABILITY OF BEING A PREDATOR $= 0.07 + \underset{(0.002)}{0.007^{**}}\text{(Gearing Ratio)} + \underset{(0.004)}{0.02^{**}}\text{(Growth)} + \underset{(0.0000002)}{0.0000006^{**}}\text{(Size)} - \underset{(0.002)}{0.0004}\text{(External Funds)}$

$R_2 = 0.07418$
$R^2 = 0.32968$
Significance = < 0.001

SAMPLE = 100 FIRMS (RESTRICTED TO VICTIM AND PREDATOR FIRMS)

* Significant at 5% level
** Significant at 1% level.

TABLE 5.21 COMPARISON GROUPS (PREDATORS, VICTIMS AND NEUTRALS)

MULTIPLE REGRESSION BETWEEN GROWTH (DEPENDENT VARIABLE) AND KEY VARIABLES

KEY VARIABLES IN ORDER OF IMPORTANCE+	VALUE OF MULTIPLE CORRELATION COEFFICIENT	MULTIPLE CORRELATION COEFFICIENT SQUARED	CHANGE IN R SQUARED	SIGNIFICANCE OF CHANGE	ZERO ORDER CORRELATION	VALUE OF B COEFFICIENT	STANDARDISED B COEFFICIENT	SIGNIFICANCE OF B COEFFICIENT
PROFITABILITY	0.72157	0.52066	0.52066	< 0.001	0.72157	1.001	0.6017	< 0.001
EXTERNAL FUNDS	0.79844	0.63751	0.11685	< 0.001	0.51522	0.158	0.3721	< 0.001
CONTROL	0.80186	0.64298	0.00547	< 0.001	-0.02954	0.0577	0.0896	0.101
SHAREHOLDER WEALTH INDEX	0.80537	0.64862	0.00564	< 0.001	0.22270	0.0508	0.074	0.163
PROFIT MARGIN	0.80793	0.65275	0.00413	< 0.001	0.03232	-0.179	-0.0650	0.194
LIQUIDITY	0.81023	0.65647	0.00372	< 0.001	-0.12935	-0.056	-0.0614	0.224
AVERAGE VALUATION RATIO	0.81094	0.65762	0.00115	< 0.001	0.31006	0.643	0.0367	0.503
SIZE	0.81101	0.65774	0.00012	< 0.001	-0.07343	-0.0000009	-0.0119	0.825

+ Using stepwise regression.

TOTAL SAMPLE = 150 COMPANIES

TABLE 5.22 COMPARISON GROUPS (PREDATORS, VICTIMS AND NEUTRALS)

MULTIPLE REGRESSION BETWEEN PROFITABILITY (DEPENDENT VARIABLE) AND OTHER KEY VARIABLES

KEY VARIABLES IN ORDER OF IMPORTANCE+	VALUE OF MULTIPLE CORRELATION COEFFICIENT	MULTIPLE CORRELATION COEFFICIENT SQUARED	CHANGE IN R SQUARED	SIGNIFICANCE OF CHANGE	ZERO ORDER CORRELATION	VALUE OF B COEFFICIENT	STANDARDISED B COEFFICIENT	SIGNIFICANCE OF B COEFFICIENT
GROWTH	0.72157	0.52066	0.52066	0.001	0.72157	0.407	0.0677	0.001
GROSS RETENTION RATIO	0.75559	0.57092	0.05026	0.001	-0.41839	-3.042	-0.2116	0.001
AVERAGE VALUATION RATIO	0.76294	0.58208	0.01117	0.05	0.36489	1.3579	0.1288	0.027
PROFIT MARGIN	0.76967	0.59239	0.01031	0.057	0.11000	0.1877	0.1134	0.034
EXTERNAL FUNDS	0.77703	0.60378	0.01138	0.044	0.25609	-0.033	-0.1293	0.050
LIQUIDITY	0.78030	0.60887	0.00509	0.175	-0.05763	0.0442	0.0806	0.142
SHAREHOLDER WEALTH INDEX	0.78402	0.61469	0.00583	0.145	0.19769	0.0314	0.0761	0.179
CONTROL	0.78420	0.61497	0.00028	0.750	-0.01115	-0.008	-0.0207	0.723
SIZE	0.78426	0.61506	0.00009	0.857	-0.09587	-0.0000004	-0.0088	0.857

+ Using stepwise regression.

TOTAL SAMPLE = 150 COMPANIES.

TABLE 5.23

COMPARISON SAMPLE

MULTIPLE REGRESSION

GROWTH EQUATION FOR FIRMS OF LESS THAN AVERAGE SIZE+

VARIABLES EMPLOYED = PROFIT RATE, USE OF EXTERNAL FUNDS, GEARING RATIO.

$$\text{GROWTH} = \underset{(1.48)}{1.53} + \underset{(0.09)}{1.03^{**}}(\text{Profit}) + \underset{(0.02)}{0.16^{**}}(\text{External Funds}) - \underset{(0.05)}{0.0094}(\text{Gearing Ratio})$$

$R_2 = 0.81286$
$R^2 = 0.66075$
Significance $= < 0.001$

GROWTH EQUATION FOR FIRMS OF MORE THAN AVERAGE SIZE+

VARIABLES EMPLOYED = PROFIT RATE, USE OF EXTERNAL FUNDS, GEARING RATIO.

$$\text{GROWTH} = \underset{}{4.16} + \underset{(0.3)}{0.925^{**}}(\text{Profit}) + \underset{(0.062)}{0.13^{*}}(\text{External Funds}) - \underset{(0.05)}{0.06}(\text{Gearing Ratio})$$

$R_2 = 0.78263$
$R^2 = 0.61251$
Significance $= < 0.001$

+ AVERAGE SIZE OF TOTAL 150 FIRMS WAS £31.5 MILLION.

SAMPLE SIZE = 150.

* Significant at 5% level
** Significant at 1% level.

5.5. SUMMARY OF CHAPTER

The Chapter commences with some critical comments on the limitations of univariate analysis, the principal one being that a strong correlation between two variables, A and B, may be masking an important relationship with C and therefore providing a misleading interpretation of the result. This can happen if C and A are strongly associated and C and B are also closely related; there need be no causal connection between A and B and yet a spurious correlation will result.

Multivariate analysis, by permitting a larger number of variables to enter the calculation, gives a better opportunity of avoiding the difficulty demonstrated in the paragraph above. It allows the inter-relationship between the variables in a theory to be investigated and there is a reduced probability that "n" variables will all represent spurious correlations (though this is not an impossibility). If the sample has been well chosen to represent the characteristics of the population as a whole, then one can have confidence in the predictive powers of techniques such as multiple regression and discriminant analysis. The major difficulty with these techniques is that where inter-correlation exists between the independent variables, the relative importance of their effect upon the dependent variable is a matter of some doubt (i.e. multi-collinearity). The lesson can be drawn that statistical techniques, in themselves, will not effectively answer questions concerning causation; it is only by interpreting significant connections in terms of an explanatory

theory that enables such techniques to be effectively employed.

Section 5.1.1. proposes to override the complexity of the results obtained from Chapter 4 using univariate analysis, by limiting the number of variables examined and by concentrating on three key issues, the resolution of which will provide the means of judging the success of a theory of takeovers related to the theory of the managerial firm. These are:-

a) The proposition that managerial firms sacrifice profitability in order to promote growth.

b) The proposition that firms which become victims to a takeover bid are unsuccessful firms and are so recognised by the capital market.

c) The proposition that firms are taken over because shareholders, finding their returns are unsatisfactory, and despairing of their ability to affect managerial policy directly, sell their holding in the company to predator firms who believe that they can make better use of the assets.

All these propositions are negated in Section 5.3. There is every indication that growth and profitability are strongly and positively associated, and this remains true whether one examines the firms showing high growth characteristics in the Consumer Durable/ Non-Durable sample or the predator companies in the Comparison sample. There seems therefore no grounds for the belief that managers sacrifice profitability to growth.

Although it is conceded that predators and victims differ markedly in regard to their profit performance (victims showing lower returns to capital), since we cannot discriminate between firms who were acquired and companies of similar size who were not taken over, we would not be justified in assuming that it is an inadequate profit performance which led to merger.

Although victims and predators have significant statistical differences with regard to profitability (Table 4.32 of Chapter 4), there is no significant difference (if we use the 1% probability level as our cut-off point) with respect to the growth of shareholder wealth. We further find that one cannot differentiate between firms who were taken over and unacquired companies of similar size by considering how their shareholders fared (Table 4.34 of Chapter 4). Therefore there seems little reason to believe that shareholders sold out their companies because of dissatisfaction with past performance.

However, the analysis showed that although profitability and growth were highly correlated, the relationship between the profit rate and the rate of growth of shareholders' wealth was much less closely associated (although the correlations remained positive). On the basis of evidence indicating that the shareholders' wealth growth increased at a reduced rate compared with the profit rate as growth developed, it was possible to deduce that once shareholders had received a satisfactory return on their funds the additional earnings were devoted to growth. This was characterised as a "growth/shareholder return trade-off". On this basis it was possible to argue that

managerial firms did demonstrate the motive for growth that underlay the theory of the managerial firm. However, in view of the high rates of inflation that occurred during the sample period, this could be interpreted as prudent behaviour, and gave no real opportunity to be considered as a service of managerial interests without advantage to shareholders. It was therefore judged that the Marris insights regarding the managerial firm and its relation to merger activity, in view of the fact that growth and profitability were complements and not alternatives, were not substantiated.

It was possible, on the basis of a fall in the valuation ratio of victims just prior to takeover, to infer that this must be due to a sharp fall in the market valuation of the company and that therefore the capital market identifies victims as enterprises who will be facing difficult future trading conditions.(8) Victim firms could be characterised as firms (not successful on the basis of past performance as in the Marris proposition) who had some probability of becoming unsuccessful in the future. Therefore the capital market does appear to act in a disciplinary fashion towards firms who face difficult prospects and the possibility of not earning an adequate return on the funds entrusted to them.

The relationship between growth and merger activity was re-examined in Section 5.4. Fast growth was shown to be related to increasing rates of profit and also the ability to draw on external

(8) This situation is also compatible with a situation in which victim firms, although not on average unsuccessful during the five year period, have a final unsuccessful year which leads to a drop in share price and their takeover because they are now an inexpensive way of purchasing assets. This would support the "bargain theory" of mergers.

sources of funding. Merger activity figured strongly in fast growth strategies. Size did not seem important to ensuring high profitability or in aiding growth, but was a sure protection against takeover. Victims were acquired because the capital market was predicting their inability to deal successfully with the future and because their size and absence of fast growth/high profitability in the past denied them access to the funds from outside sources that might have permitted their survival as independent entities.

CHAPTER 6

CONCLUSIONS

6.0 THE PURPOSE OF THIS CHAPTER

The aims of the research carried out in this thesis were threefold:

a) To seek to understand why mergers occurred.

b) In order to make the variety of reasons offered to explain merger behaviour form a coherent pattern, it was necessary to relate the behaviour specific to takeover activity to a wider pattern of behaviour. In essence, this meant relating merger occurrences to a theory of the firm, and the theory of the firm chosen for examination was that of the managerial firm. Since the central hypothesis of the managerial firm is that it acts in such a way as to maximise the interests of its controlling management group rather than its shareholders, it was necessary to invest this theorem with more particular structure. The work of Marris, chiefly as embodied in his book "The Economic Theory of Managerial Capitalism" (145/1964) (though with some reference to his later work) was selected as the best (in the sense of most adequate) statement of this theory.

c) To seek to use the Popperian process of testing by refutation, propositions concerning the managerial firm and its relationship to takeover activity as an explicit methodology. However, since this Popperian process is known to be more defective in achieving its aims than Popper first conceived, principally because single hypotheses do not stand along but in fact relate to a wider network of theories and auxiliary assumptions, and any falsifying example is ambiguous as to whether it refutes the hypothesis itself or merely requires adaptations to the auxiliary assumptions,

it was decided to adopt the methodological approach to be found in the writings of Imre Lakatos. The princial Lakatos doctrines are concerned with the division of a research area into a metaphysical unfalsifiable core of basic assumptions and a protective belt of auxiliary hypotheses which are open to attack, and the belief that a theory beset by anomalies either can be classified as progressive (i.e. increasing in content) or degenerative (i.e. becoming increasingly trivial). Linked to these tenets was the view that theories are never considered in isolation but are always being contrasted with alternative theories. It was hoped by this means to gain greater insight into the strengths and weaknesses of the managerial theory of the firm.

Section 6.1 summarises the findings which have already been set out in Chapter 5 and adds some interpretive comment. Section 6.2 deals with the relationship of the findings of this research programme to other relevant published research. The next phase of the chapter looks at the methodological perspective and seeks to evaluate the value of this approach to research in connection with an economic topic.

Some comments are made on the implications for public policy towards industry and commerce with respect to the regulation of mergers in the United Kingdom in the next section of the chapter. Finally, some proposals are made for further research arising from the findings.

6.1. SUMMARY OF RESEARCH FINDINGS

One difficulty in carrying out a statistical investigation of a complex activity is that at the termination of the research one is faced with a mosaic of relationships, some revealing themselves to be statistically significant at varying levels, and others lacking this blessing. In order to make sense of the results, it is necessary to do two things. The first is to demonstrate that the evidence can be related in a coherent manner, and this is done by exploring the extent to which it confirms or disconfirms an overall theory. The second is to show that the implications are supported by other findings of independent research. This sub-section seeks to undertake the first of these tasks and the relation of the results to other research work is examined in the next section of the report.

The main results can be grouped into four major areas, which are:-

a) The Efficient Capital Market. There appears to be justification for the view that in the United Kingdom the capital market operates with reasonable efficiency. Not only does it work so as to ensure that firms which are showing themselves able to exploit their assets so as to ensure an increasing rate of profit are supplied with additional capital support, and that firms which are finding more difficulty in maintaining an adequate profit flow are not able to draw on external sources of credit,

but also it performs its function of valuing the future profit prospects of firms with some degree of success and signals by means of a falling share price predictions of difficulties ahead.

There must, however, remain some doubt as to the extent to which an efficient capital market defined in information terms is also an efficient capital market as an allocative device. In common with the accepted view to be found in the literature, the above conclusions rely on this identity. Since accounting data is the main source of information on firms, and as we know that such data has numerous imperfections, and especially so in a period of high inflation, it may be that allocative mechanism is being distorted by information deficiencies.

b) The Managerial Firm. The concept of the firm motivated to benefit its salaried managers rather than the best interests of its shareholders is a theoretical one since it attempts to imply motive on the basis of perceived actions. Although there seems to be no evidence that managers abuse their position by using the funds entrusted to them in order to grow at the expense of earning adequate returns on their investments, there is justification for the view that shareholders do not benefit from profit growth in proportion to that growth. There is some problem with this proposition insofar as the high levels

of inflation occurring during the time span studied in this research may have been the source of abnormal managerial behaviour, but on balance, for the reasons advanced in Chapter 5 that managers preferred to reduce their return to shareholders rather than accept low or even negative rates of growth, I believe that the effect is a real rather than a transitory characteristic. The interpretation of this is most probably that the growth/shareholder wealth function is not to be conceived as a continuous trade-off, but rather a step function, where the security of management initially lies in ensuring that shareholders receive an adequate compensation for the funds invested and the risks of the market in which those funds are deployed, but that, as profits rise beyond this point, managers feel free to seek growth for the benefits of size which it confers. It might be argued that since size endows a firm with greater security by reason of larger reserves, better access to borrowing facilities, and the insurance against individual product or market failures that diversification brings, this security is of benefit to shareholders, and could be recognised as not inimical to their interests. But this argument is not theoretically correct. Except for the very smallest investors (and they are known to be a declining breed over the past decade), the firm will serve its

shareholders best if it creates, along with other firms, a variety of risk/return situations. Not only will this permit the investor to guarantee his own security by devising a portfolio of holdings whose risk (measured in terms of the variance of returns) can be reduced to a level as low as that achieved by the firm, but also the investor, using his own funds, can determine the risk/return trade-off most appropriate to his personal situation. There does, therefore, appear to be a conflict of interest between the interests of the dominant management group in a company and the shareholders who ultimately possess legal rights as owners.

c) The Function of Takeovers. Two key factors have emerged about mergers. The first is that firms that fall victim to takeovers do not do so because their profit rate has fallen below that of companies of a similar size who were not taken over (though their profit rate is significantly below that of the predators who took them over) but rather because the market signalled by means of a falling share price that their future prospects were in doubt. The second is that takeovers appear to be a normal part of the growth process, normal in the sense that it does not appear to arise only in certain exceptional circumstances but to be uniformly employed by firms engaged in growth. One of the most striking pieces of evidence in the research

was that of Table 4.15 (Chapter 4) where, by means of a Kruskal-Wallis Analysis of Variance test, it was shown that, for the Consumer Durable/Non-Durable sample, although there were significant differences between industrial categories in relation to size, growth rates, returns to shareholders and rates of return, there was no significant difference in the amount of takeover activity undertaken. This statement concerning the constancy of takeover activity in relation to a firm's investment strategies does not represent a denial of the fact brought out in Chapter 1 that merger activity tends to cluster in relation to certain phases of the stock market price cycle but that over the total period constancy persists.

d) The Marris Theory of the Managerial Firm

Overall, the Marris formulation of a theory of the managerial firms seems to be partially supported; the discrepancies in his theory are ones of detail, not striking at the roots of the perception. This research does not support his concept of a growth rate/profit rate trade-off, but certainly indicates that there is a tension between the interests of managers and those of shareholders. Support cannot be found for his view of victims of takeovers as being firms suffering from exhaustion through excessive growth, but there are indications that victim firms belong to a class of companies not making exceptional profits

themselves and facing uncertain prospects. His contention that an efficient capital market restrains the growth ambitions of managerial firms does not seem to be proven, but there are signs that firms are highly concerned with their security, either by carefully restraining their use of external funds and even the amounts retained when they are not of large size, or by seeking the security of size itself by devoting profits, in excess of those needed to satisfy shareholders, to the growth process. There is also evidence that the capital market is sufficiently efficient with regard to its distribution of funds to firms that will make the best use of them and its guidance offered to predators to select firms for takeover that may be in process of becoming unsafe instruments for the deployment of capital in the future. On balance, Marris's vision of the workings of an industrial society which he entitles "Managerial Capitalism" would appear to be reasonably well confirmed.

6.2. COMPARISONS WITH OTHER RESEARCH STUDIES

The second means by which the validity of the research results may be checked is by contrasting them with other research studies that have been carried out in relation to the same subject matter.

6.2.1. Comparison with Major Relevant Research Studies

Two major studies on the characteristics of victims and predators were undertaken and published just prior (in the case of Singh) and during (in the case of Kuehn) the time when research was carried out for this thesis. Both were statistically based studies and made use of univariate and multivariate techniques such as were employed in this research. Despite obvious differences in methodology, time spans, industrial coverage, and different ways of approaching the problems, they represent the most direct comparison with this research and their overall results are therefore of interest. These studies were those of Ajit Singh "Takeovers, the Stock Market and the Theory of the Firm"(198/1971), updated by a further article in the Economic Journal for 1975 on "Takeovers, Economic Natural Selection and the Theory of the Firm" (199/1975), and D.Kuehn's "Takeovers and the Theory of the Firm" (118/1975).

6.2.1.(1) The Findings of Singh compared

Singh saw the task as one of considering the economic and financial characteristics of taken-over

firms in five industries (Non-electrical Engineering, Electrical Engineering, Food, Drink, Clothing and Footwear) limited to quoted firms in each industry, in order to measure the extent of the discipline which takeovers (or their threat) represented for firms quoted on the Stock Market. The ten variables used were similar, but not identical, to those used in the Comparison sample (Predators, Victims and Neutrals) of this study, and the time period covered was 1948 to 1960. In addition, a more limited study was made of the differences between acquired and acquiring firms, and also a brief examination was made of whether the amalgamated firms produced by merger suffered a decline in profitability in the two years following the merger.

Where Singh's study can be compared most clearly with the present work, it is comforting to note that despite variations in the population studied and the time sampled, the results are broadly similar.

Thus, with respect to the comparison of acquired and non-acquired firms, he writes (page 151, 198/1971) :-

"There was so much overlap between the characteristics of the taken-over and the surviving firms that it would lead to a high degree of misclassification if these characteristics were used, either singly or simultaneously, to discriminate between them, although the degree of misclassification would be less than on random allocation".

Again, Singh's verdict on the differences between acquiring and acquired firms echo our own (page 166, 198/1971) :-

"There are large differences between the characteristics of the acquiring and acquired firms on both a univariate and a multivariate basis. If one were given a list of equal numbers of acquiring and acquired firms, it would be possible to allocate these firms to their respective groups on the basis of their observed characteristics with a fairly high degree of accuracy".

Singh's ultimate conclusions (pages 151 and 152, 198/1971) are worth quoting at length since they support in most material aspects the conclusions of this research and differ only in the interpretation.

Singh reports :-

"The Stock Market, through its take-over mechanism is a rather imperfect disciplinarian, particularly with respect to large firms. It provides a measure of discipline for small firms; for example the data suggests that small firms with below-average long term profitability records are able to appreciably decrease their chances of acquisition only by raising the rate of profit to above average for the industry. However small firms which already make above average profits are not forced or encouraged by the takeover mechanism to increase their profits still further.

As far as the medium-sized and large firms with low profitability are concerned, the results suggest that the best way for the firms to appreciably reduce their probability of being taken over might well be to increase their size rather than their rate of profit. In general it appears possible for the medium-sized and large firms to maintain their rate of profit, or even to lower it, and yet increase their chances of survival, provided

that they can achieve a sufficient increase in size. These conclusions go against the motivational requirements of the orthodox theory of the firm, and in fact provide positive support for the behavioural postulates of the new managerial theories of the firm. Many of these theories suggest that managers for various reasons prefer to increase the size of the organisation for which they work rather than to increase their rate of profit. The results of this study indicate that takeover mechanism, rather than being a constraint on managerial discretion, may in fact also encourage them in the same direction."

There can be no quarrel with the view that size protects against being taken over. This study also confirms that size protects a certain amount of inefficiency. Although the Comparison sample (Predators, Victims and Neutrals) indicates that predators are large, dynamic firms growing faster, earning better profits, and paying their shareholders more lavishly than either the victims or neutrals, this sample relates to a special type of large firm (one which has the capacity to take

over a quoted victim) and on which the characteristics are identified "ex post". If we turn to the Consumer Durable/Non-Durable sample, we find that the firms of above average size have below average growth, earn on average a rate of return which is only two-thirds of the overall mean, and offer a below average return to their shareholders, (see Table 4.21, Chapter 4) which justifies the opinion that size defends some inefficiency.

If we consider the Consumer Durable/Non-Durable sample and take into account that victims drawn from within that sample are statistically significantly smaller than continuing companies (despite the fact that in the Comparison sample we are unable to discriminate between neutrals and victims on the basis of their profit record) and if we consider the two findings (Table 4.20, Chapter 4) that growth and profitability are strongly correlated and in addition that there is no significant distinction in age between victims and continuing companies, thus implying that victims have a long term record of not attaining high profit (which would lead to high growth and therefore greater size), we would then accept Singh's view that below-average long term profitability is a factor in being overcome in a merger bid.

The differences in interpretation arise because of the results of the rather more detailed study of the relationship between the growth rate and the profit rate. The verdict of this research is that the two are closely related, showing strong correlations both for small and large firms, and the effect of size on this relationship has been demonstrated to be extremely tiny. On this basis and the ability of the Stock Market to predict future difficulties with respect to smaller size firms, the opinion has been ventured that the Market is reasonably efficient. If a firm does not make a high rate of profit, it does not appear that it will maintain a high rate of growth. This is at variance with the Singh position that:-

> "Managers prefer to increase the size of the organisation for which they work rather than to increase their rate of profit". (Page 152, 198/1971).

The statement, on the basis of the present research, would be reformulated to read:-

> "Managers, after ensuring a satisfactory return to shareholders, prefer to increase the size of the firm rather than to seek further increases in shareholder wealth".

Since Singh had no equivalent variable to the shareholder wealth index (his variable measuring the percentage increase in gross dividends misses out the element of capital gain involved), he was not in a position to see the matter in this light.

In strict theory one must accept Singh's judgement that the market is imperfect since the return to shareholders is below average for high sized firms (see Table 4.21, again in Chapter 4). Although high sized firms show greater stability in earnings and returns to shareholders, and also in growth, as is shown by the coefficients of variation for these variables in Table 4.21, this stability does not confer any benefit on the investor who can construct (using capital market theory) his own portfolio of equivalent stability. However, the difference in terms of increase in shareholder wealth between average sized firms and above average sized firms is not such as to envisage that the takeover mechanism is an appropriate instrument for action. The contrast is between the "fine tuning" that would be required from takeover activity to iron out the tendency of large firms to have below average profit rates and the use (in practice) of the "blunt instrument"

of takeover to seek these adjustments with its amalgamation of disparate organisations, with all the uncertainty and disturbance that this will cause, reinforced by the conclusion of most research workers (especially Meeks, 153/1977) that there is little reason to believe that the resultant joint firm will have the ability to improve the rate of profit earned. Singh himself does not demur from this latter conclusion when he states:-

> "It is therefore, on balance, very unlikely that the reorganisation of the firm's assets which takes place through the takeover mechanism leads to a more profitable utilisation of these assets".
> (Page 166, 198/1971).

To summarise the two points of view: Singh believes that the evidence for the managerial firm is strong and that there is a resultant emphasis on growth at the expense of profit. This research asserts that there is sufficient evidence for the managerial firm (defined as one that places management interests over those of the firm's shareholders once reasonable security has been attained) and that there is equal support for the position that such managers, if not profit maximisers in the strict

sense of the term, nevertheless show a proper regard for the increase in profits required to sustain the growth rate.

Singh also made a follow-up study of the 1967-1970 "takeover boom" (199/1975) and came to the conclusion that acquiring companies, in contrast to acquired companies, were on average "bigger, more profitable, faster growing, more liquid and more highly geared". With the exception of the liquidity variable, all other judgements are confirmed in this research (see Table 4.24). His conclusion that average profitability declined for taken over companies in the two years prior to being taken over is not susceptible to comparison because data on two year pre-takeover profitability was not collected in this research, but it is not at variance with the finding of this study that the fall in the valuation ratio over the five year period is the only significant ratio of the three valuation measures used in this study; which fall was attributed to a share price decline prior to takeover which would be very probably related to a decline in profits. His conclusion on multivariate analysis which was based on a discriminant function that size and profitability were important to

distinguish between victims and predators is also supported in this study. Singh points out that growth was a more important factor in his 1955-1960 study than profitability for discriminating between acquired and acquiring, but the establishment in this research of the strong link between growth and profitability leads to the position that because of the high correlation between these two variables, the results are in fact similar, and the differences detected by Singh must be ascribed to the problem of multi-collinearity.

6.2.1.(2) The Findings of Kuehn compared

Kuehn (118/1975) has carried out the other major statistical study that can be directly compared with this research, since its aim was to determine the difference in the level of a range of variables (roughly similar to those used by Singh and in this research) between "raiders" and "victims", and in the process to develop a theoretical model of takeovers and subject it to test. His main statistical methods were: linear probability analysis, probit analysis and regression. The period covered was 13 years from 1957 to 1969, and dealt with a population of all United Kingdom quoted firms (excluding a number of industry groups

dealing with commodities, utilities, foreign trading and finance) yielding a total of 3,566 companies.

A major effect was made by Kuehn to demonstrate that the valuation ratio had a statistically significant inverse ratio to the probability of being taken over. This is not a result vindicated in this research, and is also at odds with the results of Newbould (166/1970) who found little relationship between the valuation ratio and the probability of takeover in studying 74 acquisitions occurring in 1967 and 1968, or Singh (198/1971) who found a statistically significant but weak relationship. Singh points out (199/1975) that in coming to this conclusion Kuehn did not compare like with like, since he used data on the valuation of taken over and surviving firms which were not related to corresponding time periods. Kuehn however comes close to agreement with the judgement of this research that the fall in the valuation ratio has some explanatory value when he comments:-

> "It would appear from this that the performance of the firm immediately prior to the bid, whether in absolute terms or relative to the industry performance in that year, more often offers the best indicator of whether or not the firm is taken over."
> (Page 102, 118/1975).

Kuehn finds the retention ratio and the liquidity ratio not to be important in deciding between predators and victims, as in this research. His statement that firms making low profits lack discretion over the retention level "because of the necessity of servicing the preferred equity" is corroborated by the data analysis of this research, although I would prefer to connect the behaviour with the necessity of maintaining a good "market image" against the dangers of merger. He suggests that the presence of high liquidity in some firms which would make them attractive merger candidates for some predators is swamped by the way in which low liquidity is related to low rates of profit, and hence the variable is without significance.

The contention that growth maximisation leads to lower rates of profit which is a central issue of the Marris proposition finds some support from Kuehn. This strikes directly at the finding of this research and so it is necessary to examine this result more closely. He stated the position:-

> "As profit maximisers, comparable firms would be expected to achieve direct rates of growth consistent with the availability of profitable investment opportunities.

Identifying this availability with a normal declining marginal efficiency of capital schedule appropriate to the opportunities available within the industrial setting, net investment would cease when the rate of return equalled the cost of borrowing. The 'raider' as a growth maximiser on the other hand would be expected to undertake raids in excess of that warranted by profitability".
(Page 134, 118/1975).

If one examines his verdict on the relationship with regard to multiple regression (page 100, 118/1975) he both admits the correlation and demonstrates, in my opinion, his error in reasoning :-

"Returning to the first three regressions, there the profit rate and growth rate are significant, it can be seen that increasing both will reduce the predicted probability of takeover. Because of the recognised correlation between profits and growth they will, in general, both tend to move together as they influence the probability of takeover. The empirical

correlation is by no means perfect however, for as Marris has argued high rates of growth may involve the sacrifice of profits so that the two can be inversely related. To the extent that this trade off between growth and profitability occurs, one can interpret regressions 1 to 3 as indicating the choice of high growth and low profits or low growth and high profits as a means of reducing the probability of takeover and providing security".

The regression equations to which he refers (page 92, Table 4.2,118/1975) are ones in which the statistical significance and size of the growth and profit regression coefficients differ in their importance from equation to equation. Kuehn's error seems to fall into two parts:

a) Instead of testing the relationship directly he assumes on the basis of "a priori" theorising that it exists. I can find no evidence that he did test the direct relationship in his report.

b) Secondly, he confuses the inevitable effects of multi-collinearity with an expected result. If one places two highly inter-correlated

variables into a regression equation, then the effect is that one will capture most of the variation with the dependent variable robbing the other variable of its proper (but unknowable) relationship with the dependent variable. If one then interprets the result as one in which one variable will have importance and another not in describing the function, one is not revealing an inverse relationship between the two variables but only the inevitable effect of multi-collinearity.

He also repeats what I am treating as a basic error in misunderstanding multi-collinearity, when he turns to probit analysis, the same view that "both profits and growth are highly significant in explaining whether or not firms get taken over" (page 121,118/1975). I believe that his dissenting judgement can be overruled. On the other hand, in his final chapter (Table 6.1, page 132, 118/1975) he produces statistical evidence that "raiders" have both high growth rates and low profit rates in relation to the median for the industry (or industries) in which the raider operates.

Although I can find no basic error in this analysis, it is possible to make a number of points to distinguish the conclusion from my own. First,

he is dealing with "raiders" which he defines as firms that over the thirteen year period (1957-1969) made at least three major (i.e. involving quoted firms) takeovers. The results of this study derive from considering all 501 firms engaged in the Consumer Goods trade or predators which are defined as firms which took over a quoted firm in 1977 or 1978. It may be that firms involved in constant major takeover activities have in fact a different profile and may in fact sacrifice profit to growth, unlike their more staid brethren.

Secondly, his method is to state a profile of the "raider" with various predictions of the expected characteristics in relation to 4 variables, i.e. growth rate, profit rate, valuation ratio and the retention ratio. In respect of the valuation ratio, which he expected to be low (in relation to the industry median) because of the low profitability and the retention ratio which he expected to be high (in relation to the industry median), his results refuted his theoretical predictions and had to be explained by bringing auxiliary reasons for the contraditions into account.

Finally, when he made his comparison between the 117 raiders and the industry medians of the 3,566 United Kingdom public quoted companies which

represented his total sample, he found the difference to be zero (he was using a non-parametric sign test) and not statistically significant. It was only when he excluded all firms which failed to survive the thirteen year period that his negative profitability result was attained and then only at a numerical level which was exactly on the boundary to the 5% level of significance. It follows, therefore, that there is some probability that the result was not in fact significant but merely the product of random variation which will produce an erroneous result in one case in twenty.

6.2.2. Research Studies in Growth, Profitability and Size

Although the relationship between the growth, profitability, size nexus was not the foremost problem considered in this research, a great deal of evidence on their interdependence arose in the process as a by-product, and it will strengthen the conclusions if it can be demonstrated that other research substantiates the findings.

The evidence that size is a defence against takeover has been dealt with at length in the preceding section and should not detain us further. The clearest picture of the above average sized firm and its characteristics is to be found in Table 4.21 of Chapter 4, and in order to present the outcome in a form that is easy to grasp the comparisons with average firms are set out below in table 6.1 :-

TABLE 6.1

FIRMS OF ABOVE AVERAGE SIZE

(Drawn from the Consumer Durable/Non-Durable sample)

Characteristic	Mean Value for Large Firms: Above Average (+) Below Average (-)	Stability of Average for Large Firms: Above Average Stability (+) Below Average Stability (-)
Size	+	+
Growth	-	+
Control	-	-
Takeover Frequency	+	+
Shareholder Wealth Growth	-	+
Rate of Return	-	+

Table is summary of results of Table 4.21, Chapter 4

Large sized firms, in terms of net assets (the size measure) are obviously more alike than the general run of firms and make more use of takeover as a medium of growth with greater regularity. Although they earn below average profits, grow at less than average rate and serve their shareholders less well, against this must be balanced the greater stability of profits, growth and returns to shareholders. The fact that Directors hold a lower proportion of wealth in such firms is well known and is also brought out in the table via the control variable.

In the light of these results, there would be no reason to demur from Eatwell's verdict in surveying a considerable amount of American and British work on the size/profitability association (62/1971) when he writes:-

> "The profitable, growing corporation may expect to encounter slightly lower profit rates as it moves into higher size classes: but the certainty of profitability will usually be increased and could reinforce the expansionary process".
> (Page 398, 62/1971).

This is also the conclusion of Meeks and Whittington (152/1976 and 151/1975) and Samuels and Smyth (183/1968), although a not-proven verdict was returned by Singh and Whittington (197/1968).

With respect to growth, a similar situation seems to obtain. Growth rates are higher for firms of below average size (which is also the judgement of Meeks and Whittington (152/1976)) but the larger firms have greater stability of growth rates.

It is necessary to distinguish again the fact that in the Comparison sample (Predators, Victims and Neutrals) the predators, who were generally of large size, were earning higher rates of return and achieving a faster pace of growth than the neutral and victim firms, who were representative of the smaller size of quoted company. The Consumer Durable/ Non-Durable sample are much more representative of the general

situation by reason of the fact that insofar as it dealt with larger firms, these companies were drawn from the total population in the given industrial sectors, whereas the other sample was a "post hoc" collection of firms who were in fact on average much bigger (£150 million as against £106.7 million) and by demonstrating their ability to make one major takeover in 1977 or 1978 (major in the sense that the victim was a listed company) were probably more successful than their more docile relations.

The overwhelming impression of Table 6.1 is of the stability (i.e. lowered variability) of large firms for the important group of variables connected with profits, growth, shareholder return and merger activity. Such steadiness would appear to be direct example of the benefits of being large enough to operate a diversified range of product and market activities.

One further illustration of the gains from size can be discerned if one considers the fact that in the case of the Consumer Durable/Non-Durable sample the larger firms are able to maintain a level of growth rate only 14% below the average on the basis of a profit rate 38% below average, or that with reference to the Comparison sample a growth rate which is 30% greater than the average for neutral firms is sustained on a difference of only 18% between mean profit rates, points to the fact that the larger firms have access to external funds not enjoyed by the smaller companies, presumably due to the greater security of return which they offer.

6.2.3. The Control Variable

The thesis that there is a separation of ownership from control in the public joint stock company is related to the observation that the ownership of shares tends to be widely dispersed with no individual or group accounting for more than a small percentage of the voting stock and thus yielding to the Board of Directors effective control of the company. The Directors' grip on the affairs of the company is further strengthened by their monopoly of knowledge of intimate details of the company's business and the costs and difficulties of the individual shareholder to organise succssfully a revolt against current management policies.

The factor plays an essential role in the formulation of a managerial theory of the firm, and it is used by Marris to provide the moving force behind merger activity, since it is his contention that the isolated shareholder, despairing of his ability to institute a "palace revolution", sells shares to potential bidders as the only possible constraint on inefficient management.

The elegant simplicity of the picture as originally presented by Berle and Means (39/1932) has become contorted by the evidence of the past thirty years that the role of the individual investor has steadily diminished and been replaced by that of the financial institutions (i.e. Insurance Companies, Pension Funds, Investment and Unit Trusts) which

has been shown to occur both in the United Kingdom and also, to a lesser extent, in the United States. The evidence for this statement can be found in Moyle (162/1971) and King (111/1977). Owing to beneficial tax legislation, the importance of Pension Funds as owners of ordinary shares has become of increasing importance. A new twist has been added to the tale by a recent contention of Minns (158/1980) that even the size of the ownership stakes by the financial institutions does not really reflect the real concentration of control, since it tends to be in the hands of a limited number of financial advisers. For example, he argues that Banks own 0.7% of the total of equity shares available but by reason of their financial services actually control 17.6%, and that Pension Funds which possess 16.8% of the total equity shares traded in the United Kingdom Stock Market because of their use of financial agencies actually control only 5.6% of that sum. (Minns, page 41, 158/1980).

Even though there is general agreement that individual shareholders are impotent to affect directly managerial decisions, that large firms have a widely dispersed ownership of their equity capital and that there has been a decline in standing of the personal investor, there is little agreement as to the implications of this in the literature. There is dispute as to the percentage of ownership of shares required for control and estimates can be found as low as 3% (Gordon, 81/1961) and as high as 20% to 30% (Florence, 72/1961).

It has been argued that Directors have a class interest in supporting profit maximising behaviour, either directly by means of interlocking directorates, or because of social conditioning (Baran and Sweezy, 34/1967). It has also been pointed out that even a small holding of shares by Directors could represent opportunities for increasing wealth much greater than that offered by means of normal emoluments (Lewellen, 131/1969). There is also considerable doubt as to how active Financial Institutions are in enforcing their will as against remaining passive investors.

This study is not constructed in a way which can throw a great deal of light on this problem. The control variable in both samples is limited to a measurement of the extent of directorial possession of voting shares, and it therefore offers only limited evidence on the issue since no statistics were collected of other ownership interests, such as the holdings of Banks, Pension Funds, Investment and Unit Trusts, Insurance Companies and other industrial or commercial firms. The study supports the fact that as firms grow in size the amount of directorial influence on the voting shares declines. It agrees with the conclusions of Radice (178/1971) which were based on a much more comprehensive definition of ownership, that firms with a larger amount of directorial control were faster growing and earned better rates of return.

On the larger question relating the control parameter to the sources of managerial motives and the extent of constraint placed upon them by any given percentage of ownership influence, one inference is possible. If firms, as we have asserted, pursue profit maximisation as an end but not shareholder wealth maximisation, then if Institutional power over firms is as large as the statistics would encourage us to believe, Institutions tend to be passive investors, insofar as they obviously value the security of adequate returns over the desire to ensure that the additional returns from high growth be shared more equitably with them.

6.2.4. The Efficient Capital Market Hypothesis

An efficient capital market has been defined by Fama (66/1970) as one where share prices always fully reflect available information on a firm. The theory, on the basis of extensive empirical research, has gained a broad level of acceptance as a description of the major Stock Markets existing in the U.K. and the U.S.A.

The results of this research have aroused no quarrel with this view; the inference that profitable firms enjoy better access to external funds and that the Stock Market predicts uncertain prospects, thus assisting in identifying potential victim firms, lend support to the contention that the capital market transmits information efficiently, certainly

at the level of publicly available knowledge.[1]

The only form of dissent has been to cast doubt on the usefulness of mergers as a means of "fine tuning" of the economy in order to equalise returns to shareholders (subject to the appropriate circumstantial risks) and also to raise some worry about how that information is used. It appears that security of return may be more important than the maximisation of return than previous theorising has supposed. If we accept that the problem of uncertainty has been the principal cause of revision in the theory of the firm, and that it is therefore necessary to discard some of the belief in equilibriating forces necessary to the working of a perfect capital market, an adjustment demanding more emphasis on security does not seem unlikely.

(1) If the publicly available knowledge (mainly accounting information) is not adequate to define efficient and inefficient firms, then the results do not follow, fund flows will be distorted, and victims wrongly chosen. The research however was not constructed in a way that permits an opinion to be passed on this issue.

6.3. THE METHODOLOGICAL DEBATE: CONCLUSIONS

This thesis was written not only with the purpose of explaining merger behaviour and necessarily therefore examining a specific theory of the firm which would provide a framework to orientate the explanation, but also with a view to considering certain theories of scientific methodology in relation to the manner in which theories are confirmed or disconfirmed. The theories of scientific methodology are those to be found in the seminal works of Popper, Lakatos, Kuhn, Putnam and Feyerabend. At its most general level, the arguments of Popper, Lakatos and Putnam are that one can develop rational arguments which will assist in the discarding of existing theories and the introduction of new ones; Kuhn and Feyerabend dissent from this view and believe that no rational methods of manipulating theory change exist since theories are in essence incommensurable. The greater part of Chapter 2 of this thesis was given up to the task of examining the manner in which the managerial theory of the firm represented an improvement in analysis of the behaviour of firms as against the portrayal of the firm in neo-classical form. There are no algorithms available to guide in that task, since as has already been pointed out, there is no justification for believing that any theory is absolutely true, since all known theories have been subject to later revision, this leads to the central idea in the literature of "increasing verisimilitude", but this is a probability concept. Probability depends for its existence on the concept of proportions, and since to produce a ratio which would demonstrate the number of cases in which the theory was true as against the proportion in which it was

false would demand knowledge of "other worlds", and as we have only this one universe to work with, the project is outside our grasp. To quote Pierce (page 500, 168/1932) :-

> "It is nonsense to talk of the probability of a law, as if we could pick universes out of a grab-bag and find in what proportion of them the law held good".

Therefore the method used was to seek to define and clarify the assumptions behind the managerial theory of the firm and contrast them with alternative assumptions of neo-classical theory. The argument was structured in terms of Lakatos's prescriptions of how to proceed rationally in order to act as a midwife to scientific change. Lakatos had taken Popper's falsification strategy, which has generally been acknowledged to be inadequate to its task, since it lacks an efficient criterion for judging whether an anomaly has been the source of refutation of a hypothesis or whether it has been successfully dealt with by an "immunizing" change in the auxiliary assumptions. The Lakatos moves were to recognise that a theory does not stand in isolation but lies within a network of supporting theories which in turn depend upon a metaphysical (i.e. unverifiable) assumption concerning the nature of human behaviour, how an economy operates, or the way in which society functions. He therefore deduces that a theory must always be investigated in terms of an alternative theory, and from this "competition" of theories, to decide whether progress in understanding can be made or not.

The issue therefore resolves itself into whether theories can be rationally compared and a decision made as to their value. It is here that the "theories are incommensurable" debate has broken out, with

Kuhn (119/1962) and Feyerabend (68/1975) as principal champions of the argument that all language statements are theory laden and therefore the meaning of terms shifts between theories, thus defeating any attempt at comparison. The argument goes too far in so much as not only does it preclude any attempt to decide between rival theories, but that it also effectively defeats any attempt at scientific activity, since if no theories can be compared, then any theory must be as equally valid as any other. Moreover it must be remembered that in the study of scientific change which has provided the material for the debate, many centuries often intervene between competing paradigms. The changes in eocnomic institutions over quite short period of time and the lack of any generally accepted "holistic" theories as found in the physical sciences, coupled with the imprecision of language in the social sciences, probably make this argument of less relevance to an economic study. The question therefore remains - are there any criteria by which we can distinguish between theories?

One difficulty with the problem is that most of the work on this subject has been done in terms of changes of "paradigm" in the physical sciences. The only major work, for example, of comparable standing to Kuhn's "The Copernican Revolution" (120/1957), which makes an assessment of theory change within a defined historical period in economics, is Shackle's "The Years of High Theory 1926-1939" (189/1867). Shackle attempts to trace the changes brought about from the heyday of neo-classical theory ruled by attempts to demonstrate the importance of equilibriating mechanisms to the present time which is dominated by the problems of

uncertainty.[2] But Shackle's work is full of unanswered questions as to why paradigm change came about. Thus in a passage, typical of many in the book, he points out with reference to the development of the theories of imperfect competition (pages 68 and 69, 189/1967) :-

> "It would be fascinating to discover in what precise way the time was ripe, what hint or stimulus there was in the previous run of published ideas or in history at large, which could stir these unknowingly concerted reactions. The dilemma had been expressed by Cournot and by Marshall. Ninety years after Cournot and forty after Marshall, it now suddenly gave rise to Mr.Harrod's intense and brilliant struggle to break out of the perfectly competitive prison, and to Mrs.Robinson's and Mr.Kahn's swift and splendid exploitation of the break."

When Lakatos seeks to describe a criterion for assessing the worth of a theory, he uses the idea of a progressive or non-progressive research programme. A research programme is said to be progressive "as long as its theoretical growth anticipates its empirical growth, that is as long as it keeps predicting novel facts" (Lakatos, page 112, 122/1978). It is unprogressive "if its theoretical growth lags behind its empirical growth, that is as long as it gives only 'post hoc' explanations" (Lakatos, page 112, 122/1978).

The verdict of this thesis on the basis of the statistical testing of the managerial theory of the firm and in particular Marris's version

(2) I am indebted to Dr.J.C.Dodds of Sheffield University for pointing out to me in personal conversation that the discussion of Chapter 2 relating to changes in the theory of the firm should be seen in a wider context of change in economic theory which is outlined by Shackle in the work quoted.

of the theory, has been that the managerial theory stands up well to testing and is not disconfirmed, to use Popperian terminology, although it does not accord precisely with the details of the Marris model. If we consider the arguments of Chapter 2, a different aspect of the picture emerges. In comparing the theory of the managerial firm with the firm as portrayed in perfect competition, it gradually becomes clear that Marris was writing in a modern idiom but was intent upon restoring the equilibriating mechanism of the theory of perfect competition. This was done, not by attempting to demonstrate that competitive forces restrained firms from monopolising markets and drove out inefficient firms which would have been impossible to substantiate in the face of overwhelming evidence against, but by finding in the capital market a mechanism that rewarded profit maximisers and penalised non-profit maximisers, and thus reinstated the competitive struggle leading to equilibrium by other means.

A strong case can be made for the view that Marris was involving in a non-progressive research programme. If we accept the assumption that Marris was basically engaged in the battered but still extant neo-classical research programme, and that the central tenet of that programme (i.e. Lakatos's hard core) is a belief that there is a balance of forces involved in the economic operations of a firm (or market, if that is the subject matter) which will permit a situation of equilibrium to be determined and open to quantitative forms of analysis, then a number of propositions can be deduced.

In the first place, it would seem to follow that there is nothing in that programme which would predict from its theoretical structure

the empirical opinions on the clash of interest between managers and shareholders or the way in which managers would guide the policy of a firm in their own interests. The neo-classical theory treats firms as dimensionless points in the system and its very success is built on the recognition of a series of constraints which demand that issues such as the efficiency (or lack of it) of the management group or the organisational bargaining of special interest groups (as outlined, for example, by Cyert and March (56/1963)) should not be allowed to intrude. But in fact the theory was under the pressure of increasing anomalies; firms did seem to exist in large numbers who could use size, monopoly power in markets, and bargaining manoeuvres within oligopolistic structures to avoid to some extent competitive pressures and to exhibit behaviour which departed form the ideal of profit maximisation. If in Lakatos's language "theoretical growth was tending to lag behind empirical growth", then it was necessary to find "post hoc" explanations. Marris therefore proposed two moves to recover the ground lost and regain the advantage for the neo-classical programme. The first of these was to substitute growth maximisation for profit maximisation as a central motive underlying the behaviour of enterprises. Had this move succeeded, then the optimising calculus of the neo-classical theory of the firm might have been re-invigorated, but this move failed for the reason, established in this thesis and also reported in a wide number of research studies, that growth and profit are so inter-related that they must be treated as con-joint factors. Growth was not one factor, but two (i.e. the profit/growth partnership) and the symbiotic relationship between

the two factors could not be disentangled in ways which would permit a simple constraint factor to emerge. His second move was surprisingly successful; this was to move the equilibriating mechanism from the hurly-burly of competition in the market place to the capital market, which does seem to operate with many of the characteristics of a "perfect market" in performing its function of collecting and disseminating information and using that information to value firms, and would still appear, on the basis of current research, to merit description as efficient. Nevertheless, it would seem to be fair to judge that in the terms of Lakatos's theory of progress in knowledge, these tactics did not arise from predictions of the neo-classical theory, but were adjustments to that theory of an "ad hoc" nature.

The fact that Marris was still attempting to make sense of the neo-classical theory of the firm almost forty years after Sraffa (204/1926) had driven a hole in it well below the waterline, seems a useful illustration of Shackle's thesis (189/1967) concerning the long periods of time necessary for theory change to occur in economics. One can also understand Marris's commitment to a general theory of such elegance and such simplicity which has yet to be replaced with anything which commands acceptance over so wide a body of theoretical and practising economists. Shackle (page 69, 189/1967) expresses the dilemma perfectly :-

> "And the end result of all these efforts on both sides of the Atlantic was not so much to build as to destroy. The prison was laid in ruins but nothing was put in its place. This account (i.e. perfect competition) of industries and their

mutual relations, and of the factors of production and their pay, a general account applying to the whole economy and answering all questions about prices, outputs and incomes, had now been left behind, not without many a backward glance. In its place had been put a theory of the firm. Realism had been served, but elegance, simplicity and generality had been lost to a degree which was at first scarcely realised. In 1939 Professor Hicks described the result of all the new work as 'the wreckage of the greater part of economic theory'." Page 84, Hicks, 94/1939).

Evaluating this method of interpreting Marris's theory of managerial capitalism, can we then agree that Lakatos has provided economic research with an instrument which will permit theory change to take place in a rational manner and that by employing this method we can increase the rate of progress in understanding economic phenomena? Sadly, we must conclude that there is no justification for making such a claim.

There are special factors operating in economic theory which make the straightforward transfer of Lakatos's methodology, based as it is on the physical sciences, problematic. One of these is that the subject matter of economics is not fixed and unchanging, as in the natural sciences, but subject to incessant change and adaptation. Economic society is in constant flux and therefore there can be no growth of knowledge about that society comparable with the growth of knowledge about, say, planetary motion. It is perfectly possible that the theory of perfect competition and competitive equilibrium was an adequate

description of industrial activities in 1880 and fails to be so in 1980 because the subject matter has changed out of all recognition. The small business of the late 19th Century may well have been restricted by binding constraints which have no meaning for the larger types of company which currently have Stock Market quotations and who are difficult to characterise adequately because their larger magnitude gives them a wider range of behavioural options. Linked with this is the difficulty that a social science must study the meaning of activity and interpretation changes equally with the social reality that it represents. However, this may be special pleading; there is even stronger ground for rejecting the Lakatos thesis, and this is similar to the one advanced against Lakatos by other scientific researchers.

If we accept that the Achilles heel of equilibrium theory is the assumption of perfect knowledge by the participants, then it is possible to point to a number of research programmes in economics that are attempting to grapple with the enigma of uncertainty in ways which would earn the approbation of Lakatos as being progressive.

With some difficulty in classification, but not without adequate reasons to justify the taxonomy, it is possible to discuss three major ways in which the problem of uncertainty and the firm is being tackled in current research programmes in economics.

a) Programmes based on the measurement of uncertainty.(2)

The research known as the Capital Asset Pricing Model is the

(2) Note that no laxity of terminology is involved. I am not confusing the distinction made famous by Professor Knight (113/1921) between the (i.e. outcomes known but only on a basis of probability) and uncertainty (i.e. impossible to foresee outcomes in a way which will allow probabilities to be attached to them). I am referring to the measurement of generalised uncertainty.

exemplar of this approach.

b) Programmes based on the proposition that firms of sufficient size can be insulated from the effects of uncertainty. This is the rationale behind work on the large firm engaged in monopolistic competition and safeguarded by barriers to entry. It also covers the research into the organisational structure of firms which enable them to deal with technological, product and market change (the M-Firm, Diversification Theory). At its most extrmee, this type of programme is illustrated by Galbraith's techno-structured corporation (Galbraith, 79/1967).

c) Programmes based on developing strategies to deal with uncertainty. Such programmes begin with the assumption of "bounded rationality" which is defined by Simon (page 14, 196/1961) as behaviour that is "intendedly rational but only limitedly so", and then goes on to develop theories of how managers/firms arrange their activities in a sequence which will allow the effects of uncertainty to be controlled to some extent. An example of this approach can be found in "Markets and Hierarchies" (Williamson, 228/1975).

All these programmes offer possibilities of important developments in the near future and they all contain many predictive consequences which have yet to be empirically tested. They are therefore progressive research programmes. But in 50 years time when economic theory is under review, which will have proved to be successful and which failures? And can we be sure that some form of equilibrium reasoning will not again

be dominant in our understanding of the behaviour of firms? The essence of an approach based on the concept of equilibrium is to determine constraints which effectively limit the range of possible actions and thus permit optimum situations to be determined within the area of restriction. Can we be sure, granted that the present constraints used in equilibrium theory seem inadequate for their task, that another theorist may arise who will find a novel set of constraints that may be adequate for that purpose? Although it seems unlikely that this will be so, since we have no means of making that judgement with certainty, we therefore have no means of declaring that present and seemingly progressive research programmes are superior means of describing economic reality. The position is similar to the argument developed by Popper in "The Poverty of Historicism" (170/1957) where he pointed out that historical prophecy was not possible because in order to achieve it we would have to predict future knowledge, which by its very nature is unpredictable.

In judging the Lakatos hypothesis to be untenable, it must be stated that the explicit definition of theory conflicts does appear to be a useful research tool. Many of the insights of this thesis into Marris and the "managerial firm" paradigm would not have been gained without the advantage of that perspective.

6.4. IMPLICATIONS FOR PUBLIC POLICY

The concerns of public policy to which this research has relevance are those relating to the effects of increasing size of firms on the potentiality for gaining monopoly power and the question of merger profitability "per se".

The evidence that mergers are implicated in the increasing concentration of British markets into the hands of a decreasing number of large firms is fairly extensive (see for example, Aaronovitch and Sawyer (27/1975), Hannah and Kay (86/1977)). Although in considering the effect on size of profitability, there is no clear indication that size causes large decreases in profitability (see Whittington, 222/1980) the thrust of United Kingdom legislation on industrial structure is based on the premise that the profitability of large firms is related to anti-competitive practices and therefore requires that such firms be monitored, and if necessary that their conduct be changed under threat of the issue of a statutory order by Parliament if compliance is not assured.

The findings with regard to the Consumer Durable/Non-Durable sample is that large firms are less profitable than average, have lower growth rates and make lower returns to their shareholders. They also make almost three times the use of mergers (either measured by size or frequency) as normal firms. Firms making above average returns or growing at above average rates of increase are all considerably smaller and make no more than average use of mergers in achieving their ends.

If the aim is therefore to promote a greater amount of dynamic activity in the economy, then there appears to be a good case for continuation of a policy of extensive scrutiny of merger activity. This is reinforced by the other result of this thesis in demonstrating that once size is achieved, the takeover mechanism becomes increasingly ineffective in penalising inefficient performance. However, Government has other interests than in the encouragement of an efficient industrial sector and large firms are less vulnerable to both takeover and other forms of failure. Therefore it would be necessary to accept (as does the 1973 Fair Trading Act) that the maintenance of stable employment in the United Kingdom is also of concern, and large firms by their ability to avoid disaster make a contribution. In coming to a final conclusion, one must therefore decide between the need for dinamic change in the economy as against the need for stability. On balance, it is probably that the need for structural adaptation in U.K. industry would be judged of greater value than stability, which would most probably be of a short term nature.

The question of whether mergers are in general unprofitable forms of activity has been much influenced by the work of Meeks (153/1977). His conclusions play a central part in the attitude adopted by the Government Green Paper "A Review of Monopolies and Merger Policy" (15/1978) which preceded the introduction of the Competition Bill 1979 by the incoming Conservative Government. Meeks' conclusion that mergers did not in general result in improvements in profitability was based on 30 years of research, which had been tending to move in favour of a

negative verdict on the possibility of mergers improving efficiency as shown by the rate of profit. Further support for this proposition can be found in Cowling et al (54/1980) where the conclusion was that "efficiency gains from mergers are in general not found". To attempt to argue for a more moderate position on the profitability via merger thesis may seem presumptuous in the face of such a weight of evidence, but although this study was not focussed on the problem directly, there is some light shed on the question of merger activity as an ongoing constituent of the growth of firms which does tend to promote a less critical view of the relationship between merger activity and economic efficiency. It is necessary first to point out that Meeks' conclusion and that of supporting studies is mainly based on the takeover of quoted companies by quoted companies, whereas, though this may be true of the Comparison Sample used in this study, it was not true of the Consumer Durable/Non-Durable Sample, which also included takeovers of private companies not listed on the Stock Exchange. The conclusion of this thesis is therefore applicable to a wider population.

Secondly, the results of Chapter 4 do confirm that the larger size of firm made more extensive use of merger activity in its growth strategy and at the same time earned a below average profit rate, so that insofar as mergers promote size, and size is related to some drop in efficiency, there can be no dissent.

However, certain contrary conclusions can be discerned against the general condemnation of merger activity. These are :-

a) Table 4.15, Chapter 4 - that although there were significant differences between the 30 industrial categories with respect to each of the variables used in the analysis (which included the rate of return and the return to shareholders), the one exception to this rule was that of the Takeover Index for which there were no significant differences between categories as a whole, which implies that takeover activity is a component of investment/growth strategies which is independent of the industry's prosperity or decline.

b) Table 4.20, Chapter 4 - that takeovers are significantly related to growth rates and growth rates are equally significantly related to increasing profits.

c) Table 4.22, Chapter 4 - that firms with high growth rates (which were typically smaller than average size) made above average use of mergers and earned above average rates of return.

d) Table 4.24, Chapter 4 - that firms with an above average record of takeover activity earned an above average rate of return.

My interpretation of these results which are contrary to the general conclusion that mergers are inefficient means of growth, takes the following form. Merger activity is a normal constituent of growth policies. Confirmation for this view can be found in Aaronovitch and Sawyer (28/1975) who found that the overall growth rate of firms increased with the proportion of growth attributed to acquisitions, and also Meeks (page 65, 153/1977) who reports that "a more rapid rate of growth by acquisition in fact went hand in hand with a higher rate

of growth by new investment". Therefore, if we accept that growth and profitability are intimately related, and if we acknowledge that merger activity is a normal part of the growth process, then we cannot make any sweeping condemnation of the efficiency of merger activity.

If this line of reasoning is correct, then it is also possible to relate it to Meeks' conclusion and to distinguish it from the conclusion of this study.

Meeks' population consisted of all but the smallest U.K. quoted companies existing during the period 1948-1971 who made a takeover during the years 1964 to 1972. Data was collected for firms making a takeover for three years prior to the merger and for as many years as possible after the merger (i.e. up to 1972 at the latest) on financial performance. Any firm which made a second takeover, was itself acquired or otherwise failed, was withdrawn from the record in the year prior to the event. The result is that firms which are acquisition-intensive are omitted from the analysis since the post-acquisition profit experience is only calculated up to the year prior to the second acquisition. Thus the analysis covers roughly one-third of the cases of takeover available.

If we accept that growth is associated with increased merger activity, and that both are associated with profitability, then it seems possible that Meeks' final conclusion is derived from a method of analysis which unwittingly but nevertheless systematically excluded the most profitable companies from consideration. If we take the Aaronovitch and Sawyer verdict just quoted "that the overall growth rate of firms increased with the proportion of growth attributable to acquisition", then the method may also have ensured that the order

of withdrawal of profitable firms from the account was such that the most profitable were withdrawn first.

Therefore the final recommendation on public policy would be that insofar as merger activity increases the size of firms and as a result industrial concentration and monopoly practices, then, subject to the Government's other consideration relating to the stability of employment and the need for large units to compete in international markets, such activity should be subject to firm scrutiny with a need to perceive a net advantage to the public interest before being permitted. However, where size and monopoly considerations are not at issue, there should be no overall condemnation of merger activity as such.

6.5. RECOMMENDATIONS FOR FURTHER RESEARCH

With respect to the methodological issues raised by the "growth of knowledge" debate, I believe that the Popper criticism already quoted in Section 6.3., that it is impossible to define criteria for holding one theory to be superior to another unless we can predict the growth of knowledge itself, is ultimately damning to the Lakatos hypothesis on progress in knowledge. However, such an opinion does not mean that there is no value in the comparison of theories explicitly and of their underlying metaphysical (i.e. hard core) assumptions. Although we are left unable to assess whether the theory of change represents progress or not, it would seem that such a procedure would lead to a more rapid replacement of theories. In view of Shackle's conclusions in the "Years of High Theory" (189/1967) that many of the inconsistencies of the neo-classical position had been exposed often fifty to a hundred years before those inconsistencies finally were generally recognised and used to adapt the body of economic knowledge, it would seem to be useful to make further studies of the process of theory growth, decline and overthrow as has been done to some extent with reference to the physical sciences.

In respect of the theory of the firm, it does seem probable that the work of Marris (and also Baumol (36/1962) and J.H.Williamson (223/1966) and others) insofar as it is based on theories of partial-equilibrium, does represent a "non-progressive" research programme. Therefore there is a need to examine the firm in a much more dynamic context in which growth in the face of uncertainty is a much more dominant consideration. Insofar as the development of work on

diversification and the actions of firms under the constraints of "bounded rationality" is developing currently, this would seem to hold out the prospect of more promising results.

If we are to develop a more adequate theory of merger activity, certain immediate research problems can be identified:

a) The present theory of the growth of the firm is based on "steady state" assumptions. Once the management of the enterprise has decided certain policy variables, then they are assumed to remain unaltered for the period under consideration. We know that this makes mathematical modelling more tractable, but it is not confirmed by observation of how decision makers act in practice. There is a constant adjustment of policies as the intermediate results of those policies become available. Decision makers learn, and this learning process modifies the actions required to achieve given ends; the ends themselves also become subject to adjustment as experience grows concerning their attainability.

The firm is faced with limited information of varying quality and search processes are expensive if the quantity or quality of that information must be increased.

We have little actual knowledge of the sequential paths governing the implementation of strategy by companies. But this and other research indicates that mergers are a tactical manoeuvre and we need therefore to relate takeover decisions to larger patterns of strategic development by businesses if we are to increase our understanding of takeover.

b) Newbould, in his study "Management and Merger Activity" (166/1970) made the interesting suggestion that the purpose of mergers was to reduce "environmental uncertainty". The hypothesis deserves more attention. If it were possible to devise an adequate general measure of the level of uncertainty facing the firm, it might be possible to relate the forms of growth (i.e. internal investment or takeover) to the quantitative impact of uncertainty on the workings of the firm. Marris stressed the importance to the management team of maintaining their personal security of position, but by defining this in terms of a growth/profitability trade-off directed research effort into a "cul de sac". Now that it can be recognised that growth and profitability are not two functions but a single related function, the question of security and development should be reconsidered. How much growth is necessary to maintain security? Is there an optimum rate of growth? If in fact, as seems to be the case, the best method of assuring security is to grow in size, are there strategies which take uncertainty into account in achieving this? If growth is not "steady state" but occurs in spurts followed by consolidation, how do these changes in pace work out in practice? With regard to the provisions of funds to the firm, how do firms divide their available funds between maintenance of existing situations and new investment?

c) The managerial theory of the firm is in need of revision. Conceived in terms of individual investors, it is now apparent that most personal funds are channelled into investment via

intermediaries such as pension funds, insurance companies, unit trusts, etc. The question of how such institutions manage their funds and the effect on the autonomy of the managerial group who control the firm demands more research attention than it is receiving.

d) The wealth maximisation hypothesis which is the underlying foundation of most financial theory requires further consideration. The evidence of this thesis that investors are dealt with on the basis of providing adequate and satisfactory returns and using surplus funds (after "satisficing" shareholders) for managerial purposes, and the general evidence that large firms attract the bulk of investment cash despite their known inability to earn the highest levels of return suggest that the security of the investment has to be given more attention than the wealth maximisation hypothesis has implied. There is abundant evidence to show that institutional investors who have the resources to analyse and monitor investments in ways denied to the personal investor, put the largest part of their funds into the bigger firms.

e) Some more effective way of grappling with oligopolistic interdependence has to be found. The present theory of the firm relies on the assumption that the firm must adapt itself to future circumstances, but these future circumstances are the product of the aggregated activity of these same individual firms. What is ideally required is some means of analysing the institutional shape that occurs in different markets (which goes

beyond measures of market share held by the largest 'n' firms) taking into account the totality of quoted and unquoted firms that make up the market and also the effect of multi-product firms who are only partially committed to that market. From such a model could develop theories of change and adaptation which would permit growth (by internal and external means) to be integrated within the theories.

The final conclusion must be that the present state of research into merger behaviour has provided a very adequate account of the causes of individual takeovers and the characteristics of the firms involved. To make further progress in understanding mergers, we need to relate that activity to the wider circumstances arising in what Downie (59/1958) has called the "competitive process". Only when we can identify those factors which control the growth of firms, and are able to relate those factors to the tactical choices between internal and external methods of expansion, can we be assured of further growth in our understanding of merger behaviour.

6.6. SUMMARY OF CHAPTER

The purpose of this chapter is three-fold. First, it provides final conclusions on takeover activity and the theory of the managerial firm. Secondly, it contrasts these findings with the conclusions of other research. Finally, it seeks to assess the value of Lakatos's approach to theory development.

6.6.1. Merger Behaviour and the Theory of the Managerial Firm

The proposition that the managerial firm has a strong interest in growth (and in achieving the security that size brings) is accepted on the evidence of this research. What is not accepted is that there is any justification for the view that growth is promoted at the expense of profit, the two factors are strongly and positively related. Having achieved a level of satisfaction in terms of shareholder return, it is the funds surplus to this requirement that are invested in growth (or in "organisational slack" in the case of larger firms). The fact that this does not seem to distress shareholders or is seen as a conflict of interest further suggests that investors have a stronger inclination to be satisfied with security of return rather than the search for high return presumed by the dominant theory of finance.

Also rejected is the view that victims are to be identified with unsuccessful or failing firms. Although not

highly successful, the difficulties which lead to their fate appear to be related to doubts about their future prospects, not their past performance.

Growth, merger activity and profitability are all positively related. Since the percentage of merger activity rises in proportion to the growth rate, it is proposed that merger activity should be seen as part of a normal pattern of investment strategy, or to put the matter in another form - the important issue is why firms seek to grow, not why they seek to merge.

Predator firms are able to secure the use of external funds more easily than victim firms. Victim firms are identified by the securities market. Both these findings support the idea of an efficient capital market. But the fact that larger firms, despite mediocre profit records and the fact that excess funds after earning a satisfactory return are committed to growth, both cast doubt on the efficient market proposition. It is therefore argued that the capital market may be efficient in information terms but not necessarily so as an allocative mechanism.

6.6.2. Comparison with Other Research Findings

There is broad agreement with Singh's conclusions (198 and 199/ 1975) that it is not possible to distinguish acquired and non-acquired firms by means of their financial

characteristics, also that size protects against takeover. There is some dissent from Singh's conclusion that profit is sacrificed to growth in the managerial firm.

Kuehn's belief (117/1972) in a profit/growth trade-off is also at variance with the results of this research, as is his conclusion that the valuation ratio provides a means of discriminating between victims and predators.

There is general confirmation of the views found in a number of research studies that size is related to lower profit and growth rates, but that these rates also become more stable as size increases.

Just as there is no evidence for a profit/growth trade-off in favour of growth in the managerial firm, there appears to be no justification for a profit/growth trade-off in favour of profit in firms with a high degree of owner control. In both cases a positive correlation dominates.

6.6.3. The "Growth of Knowledge" Debate

The Lakatos proposition 122/1978) that theories are best developed as rivals and their conflicts explicitly determined does seem a valuable approach to theory development. A number of insights into the theory of the managerial firm were gained by considering the explanations offered by Marris (145/1964) as a contrast between the older neo-classical theory of the firm and a rival managerial theory.

However, no support could be offered to the main Lakatos proposition that it was possible to decide between the value of theories on the basis of their progressiveness (i.e. ability to predict novel results). Although the theory of the managerial firms, as outlined by Marris, did appear to have many of the characteristics of a non-progressive research programme in that it added a number of "ad hoc" adjustments to what was basically a neo-classical theory, it was not possible therefore to agree that newer theoretical approaches would eventually prove superior. One reason for this was the fact that the subject matter in economics changes in ways not evident in the physical sciences, which cast doubt on the concept of "knowledge growth" in the social sciences. More fundamentally, the inability to predict where future knowledge will lead (as Popper, a key "growth of knowledge" theorist, himself pointed out (170/1957)) implies that there can be no final verdict on the ultimate value of any theory.

6.6.4. The Public Policy Issue

The evidence that size is related to average performance in profit terms and therefore the possibility that welfare loss is arising from concentration in markets was agreed on the basis of this research.

There was, however, less support for present assumptions of public policy that mergers are in general unprofitable.

In the first place, the research did indicate that profitability and growth and merger activity were all associated. In the second place, a general finding that mergers were neither more nor less profitable than any other form of investment activity should not lead to any specific discrimination against takeovers (except insofar as monopoly position is strengthened, as is agreed in the first paragraph). Since Meeks had produced a major research study (153/1977) indicating that mergers were negatively related to profitability, it was necessary to seek to distinguish Meeks's findings from those of this study.

6.6.5. Suggestions for Further Research

With regard to the development of the "growth of knowledge" methodology, it is evident that further research into theory development in economics could be valuable, both in clarifying the research process and also in aiding the faster acceptance of new, fruitful theories.

The major requirement for an increased understanding of merger behaviour is to develop theories which will successfully relate the growth of the firm to its market and take into account the inter-relationship between firms under conditions of uncertainty and oligopolistic rivalry.

APPENDIX A

DEFINITION OF VARIABLES EMPLOYED IN SAMPLE OF 1,047 FIRMS COVERING 30 CATEGORIES OF CONSUMER DURABLE AND NON-DURABLE GOODS COMPANIES IN STOCK EXCHANGE LISTINGS

A. INDUSTRIAL CATEGORY.- Each company with a quotation on the London Stock Exchange is assigned to a category. This assignment is made according to a list of headings prepared by the Institute of Actuaries. These classifications are published in the Stock Exchange Weekly Official Intelligence which also records new companies and changes of classification.

The main heads of classification between 1970 and 1980 (prior to 1970 and post 1980 the classification system was somewhat different) were:-

Fixed Interest

Convertibles

Water Works

Capital Goods

Consumer Goods (Durable)

Consumer Goods (Non-Durable)

Other Groups

Financial Group

Commodity Group

Overseas Currency Equity Group.

From these main headings all companies contained in the "Classification of Securities" section of the Stock Exchange Year Book for 1970 relating to consumer goods were selected as a sample for examination. This involved firms drawn from the following 30 sub-heads:

CATEGORY	STOCK EXCHANGE GROUP NUMBER	NUMBER OF FIRMS IN EACH CATEGORY
Consumer Goods (Durable)		
Light Electronics, Radio and TV	35	42
Radio and TV Rental	36	6
Floor Covering	37	22
Furniture and Bedding	38	32
Household Appliances	39	20
Kitchen and Tableware	40	21
Motor Components	41	46
Motor Distributors	42	53
Motor Vehicles	43	21
Consumer Goods (Non-Durable)		
Breweries	45	38
Wines and Spirits	46	21
Hotels and Caterers	47	40
Leisure	48	72
General Food Manufacturing	49	60
Milling, Flour, Confectionery	50	13
Food Retailing	51	44
Newspapers and Periodicals	52	18
Publishing and Printing	53	40
Packaging and Paper	54	51
Departmental Stores	55	29
Furnishing Stores	56	12
Stores: Mail Order	57	9
Stores: Multiple	58	50
Clothing	59	102
Cotton and Synthetic	60	27

CATEGORY	STOCK EXCHANGE GROUP NUMBER	NUMBER OF FIRMS IN EACH CATEGORY
Consumer Goods (Non-Durable) - Continued		
Wool	61	39
Miscellaneous Textiles	62	59
Tobacco	63	9
Footwear	64	38
Toys and Games	65	13
	TOTAL NUMBER OF FIRMS	1,047

The variable"category"refers to the headings within the Consumer Goods (Durable and Non-Durable) Group.

B. SIZE - This is defined as the value of Net Assets as calculated in the 1970 accounts. Net Assets is defined as Fixed Assets net of depreciation plus current assets minus current liabilities. Intangibles were included.

C. GROWTH RATE - This is calculated as the compound growth rate calculated over the seven years between the net asset value in the 1970 accounts and the net asset value in the 1978 accounts.

D. CONTROL - This is defined as the percentage of total voting capital held by the Directors of the company as reported in the Director's Report contained in the Company Accounts for 1970. All Directorial holdings of less than 10% were counted as having a zero control value in the Consumer Durable/Non-Durable sample. For further details of how this was calculated, see the text dealing with this variable in Appendix E.

E. TAKEOVER INDEX - An index was constructed based on the cost of acquisition of three types of firms :-

(a) Companies quoted on the Stock Exchange

(b) Private Companies not listed on the Stock Exchange

(c) Foreign Companies (i.e. those located outside the United Kingdom and Eire).

In order to do this the value of 143 firms which had been acquired by firms within the sample during the years 1973 or 1974 was established. By restricting the examples to the two years stated, it was hoped to limit the distorting effect of inflation on the calculation of cost of acquisition. The 143 companies comprised 39 quoted firms, 86 private firms and 18 foreign firms.

In determining the purchase price, share offers were reckoned at the average of the annual high/low price of the share during the year and loan stock offers at the par value of the stock. Where an offer involved options of either cash or shares or stock it was always assumed that cash was preferred to shares and shares to loan stock. Dealing and underwriting costs were entirely ignored. Occasionally an offer made for a private firm involves the promise of further payments depending upon whether profit forecasts are achieved. It was not possible to take these into account.

Once the acquisition price of the 143 enterprises had been determined, an average value was worked out for each of the three types. These averages were then converted into an index by treating the average value of a quoted company as unity and then assigning an index value to the other two types in the proportion that their average value had to the average value of quoted company. The indices generated were :-

TYPE OF COMPANY	AVERAGE VALUE OF ACQUISITION FOR A FIRM OF GIVEN TYPE	INDEX
Quoted	£9,155,296	1
Unquoted	£629,905	0.069
Foreign	£4,481,626	0.49

The number of takeovers of each type which were made by each firm in the sample during the years 1970 and 1978 were then multiplied by the appropriate index and the total of such outcomes were taken as a weighted guide to the amount of takeover activity undertaken by each firm within the period.

The formula for this operation may be set down as :-

$$C_q V_q + C_u V_u + C_f V_f = \text{TAKEOVER INDEX}$$

C_q = Number of quoted companies taken over

C_u = Number of unquoted companies taken over

C_f = Number of foreign companies taken over

V_q = Index value of quoted company acquired

V_u = Index value of unquoted company acquired

V_f = Index value of foreign company acquired.

F. SHAREHOLDER WEALTH INDEX - This is measured as the discount rate which equalises a £1,000 investment in the ordinary shares of each company and the time value of dividends received and a final capital gain (or loss) on sale of the shares. It was assumed that the shares of each company were bought at the average of the high/low price in 1969 qualifying for dividend payment in 1970 and in each year until and including 1978 in which year the shares were supposed to be sold at the average high/low price of the share in that year. The dividends received were taken at their gross and not their net value. Scrip shares were considered to become eligible for dividend in the year following issue. Rights issues were always taken up and were paid for by the dividends received in the year in which the Rights were offered (often creating a negative cash flow), as in the case of Capitalisation issues dividends were not credited until the next accounting year.

A fuller description of the Shareholder Wealth Index will be found in the "Definition of Variables employed in a sample of 150 Companies comprising Victims, Predators and Neutrals".

G. RATE OF RETURN - The pre-tax profits shown in the accounts reported at the end of each firm's accounting year in the years 1970 to 1978 inclusive and an average taken. Pre-tax profits are defined as profits net of depreciation and amortisation, Directors' emoluments and auditors' fees and after debenture interest, bank and loan interest (both paid and received) have been taken into account.

The average value of pre-tax profits was then expressed as a percentage of the value of net assets for each company as calculated in the 1970 accounts. Net assets have been previously defined.

H. AGE - This is the number of years which have elapsed since Public registration of each company in the sample until the year in which the company was taken over or failed between 1970 and 1978 or in the case of continuing companies until 1978. It was considered that since companies are born (i.e. are publicly registered) in a continuous manner and in a random fashion, and that each company had an equal chance of vanishing through takeover or failure in each year of the sample period, this was a fair method of assessing whether there was an age dependency factor in the probability of being taken over or failure.

Failure was assumed to occur in the year in which the Stock Exchange quotation was withdrawn. Although a quotation may be cancelled for a variety of reasons related to failure of a company to comply with the Stock Exchange Listing Agreement (for example, a failure to

issue accounts within six months of the year end) it was possible in almost every case to ensure that the companies were later taken into receivership and reorganised by reason of insolvency or liquidated. One factor which distorts the usefulness of this measure is that companies may exist for many years as Private Companies before seeking Public Registration. Therefore the number of years recorded since registration is not synonymous with the total life of a company. It is also a common practice to register a company after reorganisation thus commencing the counting process at that point. However, reorganisation can be accepted as the creation of a new entity and the realisation that it is the life of such entities that is being measured.

A total of 8 variables were defined with respect to the sample of 1,047 companies being the total of companies in the Durable and Non-Durable Consumer Goods Categories.

APPENDIX B

LIST OF COMPANIES DRAWN FROM 30 CONSUMER DURABLE AND NON-DURABLE CATEGORIES

TOTAL NUMBER OF COMPANIES = 1,047

SOURCE: STOCK EXCHANGE YEAR BOOK 1970.

LIGHT ELECTRONICS, RADIO AND TV

A.B. Electrical Components

Advance Electronics

Amplivox

A.P.T. Electronics

Audio Fidelity

Automatic Light Controlling Company

Bonochord

Brayhead

Broxlea Holdings

B.S.R.

Bulgin A.F. & Co.

Celestion Industries

Clifford and Snell

Colvern

Cray Electronics

Dallas (John E.)

Decca

Derritron

Diamond Stylus Co.

Electrocomponents

Electronic Machine Co.

Ever Ready Co.

Farnell Electronics

Highland Electronics

Huntleigh Investments

International Computers

Kode International

Marconi International

Muirhead

Oliver Pell Control

Pantiya Electronics

Plessey Company

Pye Holdings

Racal Electronics

Rednor

Sangamo Weston

Sound Diffusion

Thorpe, F.W.

Thorn Electrical Industries

Ultra Electrical Industries

Unitech

Westford Electrical.

RADIO AND TV RENTAL

British Relay Wireless and TV

Electronic Rentals

Rediffusion TV

Robinson Rentals

Wigfall (Henry).

FLOOR COVERING

A.W. Securities

Blackwood Morton & Sons

Carpets International

Gaskell (Bacup)

Gripperod Holdings

Halstead (James)

Hardura Group

Homfray & Co.

Lancaster Carpet and Engineering

Mackay (Hugh) & Co.

Nairn Williamson

Naylor T & A.

Plushpile

Readicut International

Shaw Carpets

Stoddart Holdings

Tomkinson Holdings

Trafford Carpets

Victoria Carpets

Witter (Thomas) & Co.

Worth (Bond) Holdings

Youghal Carpets.

FURNITURE AND BEDDING

Austin (f.) Leyton

Barget I.

Beautility

Bluestone & Elvin

FURNITURE AND BEDDING (Continued)

Dunster, John J.

Dykes, J. Holdings

Elson & Robbins

Fertleman B. & Sons

Gomme Holdings

Greaves & Thomas

Hensher (Furniture Trades)

Jentiques Holdings

Kraft Production

Lawrence, Frederick

Lebus, Harris

Liden Holdings

Melody Mills

Minty

Nathan, B. & I.

New Equipment

Parker Knoll

Peerage of Birmingham

Peerless Built-in Furniture

Relyon P.B.W.S.

Rogers (Guy)

Stonehill Holdings

The Times Veneer Co.

Toothill, R.W.

Uniflex Furniture

Walker & Horner

Wrighton, F. & Sons

Yatton Furniture.

HOUSEHOLD APPLIANCES

Associated Sprayers

Burco Dean

Croydex Rubber

Dimplex Industries

Dreamland Electronics

Plastocraft Products

Flavel, Sidney

Friedland, Doggert

Goblin (B.V.C.)

Hoover

Kleen-e-ze Holdings

Lec Refrigeration

Parkinson Cowan

Pifco Holdings

Rippingilles

Rosedale Industries

Sadia

United Gas Industry

Valor Company

Wilkins and Mitchell.

KITCHEN AND TABLEWARE

Allied English Potteries

Billam, J.

Bulpitts (Swan)

Clough (Alfred)

Denby Ware

Doulton & Co.

Goldman (H.) Group

KITCHEN AND TABLEWARE (Continued)

Hawker Marris

Judge International

Myott & Son

Paul W.H.

Poole & Gladstone China

Prestige Group

Richards Bros.

Spong and Co.

Staffordshire Potteries

Viners

Wade Potteries

Wedgwood

Wood & Sons (Holdings)

Wood, Arthur & Son.

MOTOR COMPONENTS

Abbey Panels

Airflow Streamlines

Amalgamated Transport Services

Armstrong Equipment

Associated Engineering

Automotive Products

Avon Rubber

B.B.A. Group

Bluemel Brothers

Britax Excelsior

British Tools and Pressings

Brown Brothers and Albany

MOTOR COMPONENTS (Continued)

Chloride Electric

Clayton Dewandre

Clear Hooters

Coventry Hood

Dunlop Holdings

Edbro Holdings

Gailey Group

Griffiths Bentley

Harmo Industries

Hazell (Quinton)

Hallam Sleigh & Cheston

Herman Smith

Holt Products

Kangol

Robinson G.A.

Lucas (Joseph)

Miles Redfern

Miller, H. & Co.

Moss Engineering

Newman Granger Industries

Oldham & Son (International)

Philblack

Silentbloc Holdings

Sheepsbridge Engineering

Standard Tyre Company

Tecalemit

Terry Herbert

Triplex Holdings

Turner Manufacturing

MOTOR COMPONENTS (Continued)

Willenhall Motor Radio

Wingard

Woodhead (Jones) & Sons

'W' Ribbon Holdings

Zenith Carburetter.

MOTOR DISTRIBUTORS

Adams & Gibbon

Alexander Holdings

Appleyard Group

A.R. Holdings

Attwood Garages

Braid Group

Bristol Street Group

British Car Auction

Buist (Charles)

Caffyns

Camden Group

Clarke (George) Motors

Colmore Investments

Cowie, T.

Davis (Godfrey)

Dutton Forshaw

Dorada Holdings

Emray

Gates (Frank G.)

Glanfield (Lawrence)

Godfreys

Hanger Investments

MOTOR DISTRIBUTORS (Continued)

Harrison T.C.

Hartwell's Group

Henleys

Hollingdrake Auto Co.

Jenkins & Purser Holdings

Jessup Holdings

Kenning Motor Group

King's Motor

Kirby's

Lex Service Group

Manchester Garages

Mann & Overton

Mann, Egerton & Co.

Martin Walter Group

Massey (Robert B.)

McCairn's Motors

Pennine Motor Group

Peterborough Motors

Pride & Clark

Quick (H. & J.) Group

Reynolds (W. & J.) Holdings

Rix, Oliver

Scottish Automobile

Skipper C.G. Holdings

Tate of Leeds

Thomson Reid

Wadham Stringer

Western Motor Holdings

MOTOR DISTRIBUTORS (Continued)

Wilmot-Breeden Holdings

Willment (John) Automobile

Young, H. (Motors).

MOTOR VEHICLES

A.C.Cars

Anthony Carrimore

Atkinson Lorries

British Leyland Motor Corporation

Burden Investments

Caravans International

Chrysler U.K.

Crane Fruehauf Trailers

Dennis Motor Holdings

Duple Motors

Dyson R.A. & Co.

E.R.F. Holdings

Fodens

Group Lotus Car

Peak Trailers

Plaxtons (Scarborough)

Reliant Motor Group

Seddon Diesel Vehicles

Thomson T-Line Caravans

Weeks Trailers

York Trailer Company.

BREWERIES

Allied Breweries

Associated British Maltsters

Aylesbury Brewery

Baird (Hugh) & Sons

Bass Charrington

Boddington's Breweries

Border Breweries (Wrexham)

Brickwoods

Brown (Matthew) & Co.

Buckley's Brewery

Burtonwood Brewery (Forshaw)

Cameron, J.W. & Co.

Cardiff Malting Co.

Clark (Matthew) & Sons

Courage

Davenports Brewery

Devenish

Greenall Whitley & Co.

Greene King & Sons

Guiness (Arthur) Son & Co.

Hardys Kimberley

Higsons Brewery

Holt, Joseph

Hull Brewery & Co.

Mansfield Brewery Co.

Marston, Thompson & Evershed

Morland

Plymouth Breweries

BREWERIES (Continued)

Scottish and Newcastle Breweries

Tollemache & Cobbold Breweries

Truman Hanbury

Vaux & Associated

Watney Mann

Webster (Samuel) & Sons

Whitbread & Co.

Whitbread Investment Co.

Wolverhampton & Dudley Breweries

Young and Co.'s Brewery

WINES AND SPIRITS

Allied Vintners Investments

Amalgamated Distilled Products

Bell (Arthur) & Sons

Chaplin Holdings

Distillers Company

Ellis & Co. (Richmond)

Emu Wine Holdings

Gale Lister & Co.

Highland Distilleries Co.

Hill Thomson & Co.

International Distillers and Vintners

Invergordon Distillers

Macallan-Glenlivet

Macdonald Martin Distilleries

Sandeman, George G. Sons & Co.

Seager Evans

WINES AND SPIRITS (Continued)

Smith, Stephen & Co.

Teachers Distillers

Tomatin Distillers Co.

United Distillers

Williams & Humbert Group.

HOTELS AND CATERERS

Angus Steak House

Arden & Cobden Hotels

Associated Hotels

Berni Inns

Butlins

Caister Group

Centre Hotels (Cranston)

Clydesdale Commonwealth Hotels

Court Hotels (London)

Curzon House Investments

De Vere Hotels & Restaurants

Ditchburns

Epicure Holdings

Golden Egg Group

Grand Metropolitan Hotels

I.O.M. Holiday Centre

Kensington Palace Hotels

Leisure and General

Mario & Franco Restaurants

Maxims

Mount Charlotte Investments

Myddleton Hotels and Estates

HOTELS AND CATERERS (Continued)

Norfolk Capital Hotels

North M.F.

Old Swan Hotel (Harrogate)

Palace (Torquay)

Pontins

Prince of Wales Hotel

Queen's Modern Hotels

Ritz Hotel

Rowton Hotels

Savoy Hotel

Scotia Investments

Scott's Restaurants

Sheffield Refreshment House

Stewart & Wright

Trust House Forte

Vydra Restaurants

Warner Holidays

Wheeler's Restaurants.

LEISURE

Anglia T.V. Groups

Arbiter & Weston

Associated Leisure

Associated Television

Barr & Wallace Arnold Trust

Black & Edgington

Boosey & Hawkes

Brighton & Hove Stadium

LEISURE (Continued)

Bristol Stadium

British Cinematograph Theatres

British Lion Holdings

Caledonian Associated Cinemas

Chepstow Racecourse

Coral, J.

Dixons Photographic

Dryad

Dumpton (Thanet) Greyhounds

Electrical & Musical Industries

Ewer (George) & Co.

Gibbons, Stanley

Gloucester & Cheltenham Greyhounds

Glasgow Pavilion

Gnome Photographic

G.R.A. Property Trust

Granada Group

Grampian Television

Hackney & Hendon Greyhounds

Herndale Group

Herrburger Brooks

Highgate Optical & Industrial

Hill (William) Organisation

High Gosforth Park

Howard & Wyndham

Humphrey Holdings

Hurst Park Syndicate

LEISURE (Continued)

Johnsons H.P.L.

Kursaal Company

Ladbroke Group

London Entertainments

London Pavilion

Madame Tussauds

Management Agency & Music

Mark Lane

Magnolia Manufacturing

Mecca

Musical & Plastic

Photax (London)

Photopia International

Photo-Me-International

Piccadilly Theatre

Pleasurama

Reeves & Sons

Rivoli Cinemas

Romford Stadium

Samuelson Film Service

Scottish Ice Rink

Scottish Television

Southend Stadium

Stigwood (Robert) Group Holdings

Totalisator & Greyhound

Trident Television

20th Century Cinemas

LEISURE (Continued)

Tyne Tees Television

Ulster Television

United Industries and Developments

Westward Television

Webb, Joseph & Co.

Wimbledon Stadium

Windsors (Sporting Investments)

Winsor & Newton

Wilson Peck

Zetters Pools.

GENERAL GOOD MANUFACTURING

Adams' Butter

Adams (Durham)

Anglia Ford Group

Armitage Brothers

Associated Fisheries

Barr (A.G.) & Company

Bassett (George) Holdings

Bibby J. & Sons

Bovril

Bowyers (Wiltshire)

British Canners

British Sugar Corporation

Brooke Bond Leibig

Cadbury Schweppes

Carter Penguin

Cavenham Foods

GENERAL FOOD MANUFACTURING (Continued)

Chambers & Fargus

Colborn Group

Consolidated Commercial Group

Crossfield & Calthorp

Danish Bacon Company

Eastwood, J.B.

Feedex

F.M.C.

Gill & Duffus Group

Goldrei Foucard & Son

Hazlewoods (Proprietary)

Highgate & Job

Jameson Chocolate

Lees, John J.

Lockwood Foods

Lovell, G.F. & Co.

Lyons, J. & Co.

Manbré & Garton

Martin (John) of London

Maynards

Meat Trade Suppliers

Midland Cattle

Mills, (A.J.) Holdings

Molassine Company

Needlers

Nichols (J.N.) Vimto

O.P.Chocolate

Oriel Foods

GENERAL FOOD MANUFACTURING (Continued)

Paterson, R. & Sons

Pauls & Whites

Rachelle (Soft Drinks)

Robertson Foods

Rowntree Mackintosh

Scots Meat Products

Scotscros

Smithfield & Zwanberg

Squirrel Horn

Tate & Lyle

Taverner Rutledge

Thornbers Holdings

Tizer

Unilever

Vincent (Harry)

Waller & Hartley

MILLING AND FLOUR CONFECTIONERY

Associated Biscuit Manufacturers

Associated British Foods

Avana Group

Carr's Milling Industries

Clark's Bread Company

Fox's Biscuit

French, J.W.

Hughes (Bernard)

Park Cake Bakeries

Rakusen, Lloyd & Sons

MILLING AND FLOUR CONFECTIONERY (Continued)

Ranks, Hovis, McDougall

Spillers

United Biscuit (Holdings)

FOOD RETAILING

Allied Suppliers

Associated Dairies

Associated Food Holdings

Baxters (Butchers)

Bishop's Stores

Brierley's Supermarket

Cartier's Superfoods

Clifford's Dairies

Clover Dairies

Cullens Stores

East Kilbride Dairy

Edwards (Louis C.) & Sons

England, J.E. & Sons

Fitch Lovell

Fisher (Albert) Group

Fruit & Product Exchange

Gateway Securities

Hinton, Amos & Sons

International Stores

Kinloch Provisions

Kwik Save Discount

Lennons Supermarket

Lidstone

FOOD RETAILING (Continued)

Mathews Holdings

Melias

Moores Stores

Morgan Edwards

Morris & David Jones

Morrison (William) Supermarkets

Northern Dairies

Nurdin & Peacock

Peek, Winch & Tod

Pricerite

Pyke (W.J.) Holdings

Richardson (Arthur) & Son

S. & K. Holdings

Simons & Co.

Stocks (Joseph) & Sons

Tesco Stores

Unigate

Upward & Rich

Wallis, F.J.

Watson & Phillip

Wheatsheaf & Distributors Trading

Wright's Biscuits.

NEWSPAPERS AND PERIODICALS

Associated Newspapers

Beaverbrook Newspapers

Berrow's Organisation

NEWSPAPERS AND PERIODICALS (Continued)

Birmingham Post and Mail

Bristol Evening Post

Brittain Press

Daily Mail and General Trust

Dalton's Weekly

East Midland Allied Press

Home Counties Newspapers

Liverpool Daily Post & Echo

News of the World

Parsons, F.J.

Pearson Longman

Portsmouth & Sunderland News

Thompson Organisation

United Newspapers

Webster Publications.

PUBLISHING AND PRINTING

Associated Book Publishers

Ault & Wilburg Group

Benn Brothers

Black, A.&.C.

Bristol & American Film Holdings

British Printing Corporation

Causton, Sir Joseph

Clay (Richard) & Co.

Coates Brothers & Co.

Collins (William) & Sons

PUBLISHING AND PRINTING (Continued)

Cradley Printing Company

Deanson Holdings

Eden Fisher Holdings

Ferry Pickering Group

Fine Arts Developments

Fleming, A.B., Holdings

Gordon & Gotch Holdings

Harrison & Sons

Hawthorne Baker

Hindson & Andrew Reid

Hope Thomas & Sankey Hudson

Letraset

Lonsdale Universal

Lowe & Brydon

McCorquodale & Co.

Morgan Grampian

Morrison & Gibb

Oxley Industries

Penguin Publishing

Pyramid Group (Publisher)

Routledge & Kegan Paul

Sharpe, W.N.

Solicitors Law Stationery

Stott Brothers

Tridant Group Printers

Universal Printers

Usher Walker

PUBLISHING AND PRINTING (Continued)

Wace Group

Watmough's Holdings

Wilson Brothers

PACKAGING AND PAPER

Alliance Alders

Associated Paper Mills

Beatson, Clark & Co.

Blagden & Noakes

Bowater Paper Mills

British Sidac

British Sisalcraft

Brittains

Bunzl Pulp and Paper

Canning Town Glass Works

Capseals

Chapman & Co. (Balham)

Clyde Paper & Co.

Cropper (James) & Co.

Culter Guard Bridge

Delyn

Dickinson Robinson Group

Dixon (Peter) & Son

Dolan Packaging

East Lancashire Paper Mills

Eucalyptus Pulp Mills

Finlay, Wm. (Belfast)

PACKAGING AND PAPER (Continued)

Frith, W.G.

Galloway (John) & Co.

Heenan Beddow

Howard Tenens Service

Inveresk Paper

Jackson's Bourne End

Makin, J. & J. Paper Mills

Metal Box

Metal Closures Group

Mono Containers

Noble, W.J. & Sons

North West Rubber Co.

Oliver Paper Mill

Portals Holdings

Redfearn Natural Glass

Reed and Smith Holdings

Reeve Angel International

Reed International

Rockware Group

Smith (David S.)

Smith Stone & Knight

Smurfit (Jefferson) Group

Somic

Sommerville (Wm.) & Son

Tillotson & Sons

T.P.T.

PACKAGING AND PAPER (Continued)

Transparent Paper

Waverley Cameron

Whitley, B.S. & W.

DEPARTMENTAL STORES

Army & Navy Stores

Beattie (James)

Bentalls

Bourne & Hollingsworth

Bremner & Company

Brown, Muff & Co.

Cattle's Holdings

Chiesmans

Crowden & Keeves

Debenhams

Dingle, E.

Elys (Wimbledon)

Evans & Owen (Drapers)

Fortnum & Mason

Gamage, A.W.

Goldberg, A. & Sons

Grant Brothers

Hill (R.Wylie) & Company

House of Fraser

Liberty & Company

Macowards

DEPARTMENTAL STORES (Continued)

Owen, Owen

Parrish, J.T.

Peck (Joseph) Holdings

Sturla, George & Sons

Stavot Zigomala & Co.

Telfer & Company

Upton, E.

Wade's Department Stores

FURNISHING STORES

Cantors

Court Brothers (Furnishers)

Hardy & Co. (Furnishers)

Heal & Son Holdings

Henderson-Kenton Holdings

Kean & Scott

Maple & Company

Medminster

Midlands Ideal Homes

New Day Holdings

Peters (John) (Furnishing)

Williams Furniture

STORES: MAIL ORDER

Brown, N. Investments

Empire Stores (Bradford)

Freemans (S.W.4.)

STORES: MAIL ORDER (Continued)

Grattan Warehouses

Halwins

Henry, A. & S.

Myers, John & Company

Queen Street Warehouses

S. & U. Stores.

STORES: MULTIPLE

Ada (Halifax)

Amalgamated Stores

Baker, C.

Baker's Household Stores (Leeds)

Boots Pure Drug

British Home Stores

Burton Group

Caird, A. & Sons

Ciro Pearls

Combined English Stores

Curry's

Doland, George

Evans (Outsize)

Henry Showell

Forbuoys

Foster Brothers Clothing Co.

Ford Martin

Gieves Group

Great Universal Stores

STORES: MULTIPLE (Continued)

Helene of London

Hepworth, J. & Sons

Ingersol Group

Lloyd's Retailers

Lyons & Lyons

Marks & Spencer

Martin the Newsagent

Menzies (John) Holdings

Michael John (Savile Row)

Midland Educational Co.

Moss Brothers

Mothercare

Northern Goldsmith Company

Owen & Robinson

Panto, P. & Company

Dorothy Perkins

Preedy (Alfred) & Sons

Ratner's (Jewellers)

Reed (Austin) Group

Rivlin (I.D. & S.) Holdings

Samuel, H.

Smith, W.H. & Son

Stanwood Radio

Stone, J. & F.

Time Products

Turner, W. & E.

United Drapery Stores

STORES: MULTIPLE (Continued)

Walker (James), Goldsmith and Silversmith

Wassall, J.W.

Weston (Stanley) Group

Woolworth (F.W.) & Co.

CLOTHING

Albion

Aquascutum & Associated Companies

Atkins Brothers (Hosiery)

Bairns Wear

David (William) & Co.

Beales (John) Associated Companies

Bear Brand

Bickley, J. & S.

Blackman & Conrad

Boardman Marden

Body Cote Holdings

Bolton Textile Mill

Booth & Co.

Brigray Group

Buckingham, J.H.

Campari

Casket (S.) Holdings

Cohen & Wilks (Holdings)

Collet, J.

Collier, S. & Co.

Compton, J. Sons & Webb

CLOTHING (Continued)

Corah, N.

Cornell Dresses

Cope Sportswear

Davenport Knitwear

Dennis Day

Dent, Fownes

D.M.Holdings

Ellis & Goldstein Holdings

Emu Wool Industries

Executex Clothes

Fairdale Textiles

Firmin & Sons

Gaunt (Rowland)

Gelfer, A. & J.

Goodkind, W. & Sons

Goodman Brothers & Stockman

Hall & Earl

Harrott & Company

Hawtin

Henriques (Arthur)

Highlights Sports

Hine Parker

House of Lerose

House of Sears (Holdings)

Howard, H.R. & Sons

Ingram, Harrold

Johnson & Barnes

Joncraig Holdings

CLOTHING (Continued)

Junitex

Kayser Bondor

Kunick Philips

Ladies Pride Outwear

Lawtex

Lee Cooper Group

Loveys, John & Co.

Lowe (Robert H.) & Co.

Macanie (London)

Mackinnon of Scotland

Marshall (Thomas) Investments

Maxlim Maternity

Mellins

Miller, F. Textiles

Montfort (Knitting Mills)

Moore, W. & Osborne

Nottingham Manufacturing

Paradise, B.

Pasolds

Pawson, W.L. & Son

Pittard, C.W.

Polly Peck Holdings

Pullman, R. & J.

Radley Fashion & Textiles

Ramar Textiles

Raybeck

Reliance Hosiery

CLOTHING (Continued)

Robinson & Pickford

Selincourt

Sherman, Samuel

Sidroy

Silhouette (London)

Massey (Simon)

Simpson, S.

Spencer (Banbury)

Spencer, George

Spirella Group

Staflex International

Steinberg & Sons

Stirling Knitting Co.

Stone-Dri

Strong & Fisher Holdings

Sumrie, C. & M.

Tern-Consulate

Towles

Trutex

Universal Underwear

Wallis & Co. (Costumiers)

Williams (Ben) & Co.

Wilson, Mandleberg

Wood Bastow Holdings

Woolley Sanders Holdings

Yates (William) & Sons

COTTON AND SYNTHETIC

Ash Spinning

Barber Textiles

British Enkalon

Carrington Viyella

Clover Croft & State

Courtaulds

Crosses & Heatons

Ellenroad Ring Mill

Era Ring Mill

Fairfax Jersey Group

Fothergill & Harvey

Haighton & Dewhurst

Heath, G.H. & Co.

Highams

Hollas Textiles

Jackson & Steeple

Lancaster, D.M.

Oldham Twist

Peel Mill (Holdings)

Qualitex Yarns

Richards

Shaw & Marvin

Uttley, William

Vita Tex

Werneth Ring Mills

Whitworth & Mitchell Textoral

Inter-city Investment Group

WOOL

Aire Wool

Allied Textile Companies

Bellami Knitwear

British Mohair Spinners

Bulmer & Lumb

Clough, Robert

Crowther & Nicholson

Crowther, John & Sons (Milnsbridge)

Dawson (Joseph) Holdings

Early (Charles) & Marriot (Witney)

Emsley, John

Extract Wool Holdings

Foster (John) & Sons

Haggas, John

Hield Brothers

Hirst & Mallinson

Hirst, George H.

Illingworth Morris & Co.

Ingham (George) & Co.

Jerome, S. & Sons (Holdings)

Kaye & Stewart

Keith & Henderson

Kynock, C. & G.

Leigh Mills Company

Mallinson (George) & Sons

Moorhouse & Brooke

Nova (Jersey) Knit

WOOL (Continued)

Parkland Textiles

Pearson & Foster (Bradford)

Sanderson, Murray & Elder

Sirdar

Taylor, C.F.

Texture Jersey

Winterbottom, Strachan & Playne

Woolcombers Holdings

Wormalds, Walker & Atkinson

West Riding Worsted & Woollen Mills

Yorkshire Fine Woollen Spinners

MISCELLANEOUS TEXTILES

Airborne Industies

Bensons Hosiery

Berisfords

Bond Street Fabrics

Bright (John) Group

British Cotton & Wool

British Trimmings

Broadley, J.B.

Bury & Masco Holdings

Byard Holdings

Caird (Dundee)

C.B.R. Jersey Holdings

Coates Patons

Cook & Watts

Copydex

MISCELLANEOUS TEXTILES (Continued)

Customagic Manufacturing

Denby, William

Dura Mills

English Calico

Fogarty, E. & Co.

French (Thomas) & Sons

G.R.Holdings

Hardman (Thomas) & Sons

Hicking, Pentecost & Sons

Horsfall, John C. & Sons

Hyman, I. & J.

Jonas Stroud Holdings

Jute Industries

Leeds & District Dyers and Finishers

Lister & Co.

Lowland Drapery Holdings

Marling Industries

Moderna Industries

North (James) & Sons

Old Bleach Holdings

Olympia (Redacre)

Pickles, William & Co.

Qualitex

Reed, William & Sons

Rexmore

R.F.D. Group

R.K.T. Textiles

MISCELLENEOUS TEXTILES (Continued)

Scapa Group

Scott & Robertson

Scottish, English & European Textiles

Shiloh Spinners

Small (John C.) & Tidmas

Smallshaw (R.) Knitwear

South Mills Textiles

Spencer, Turner & Baldero

Sperati, C.A.

Stibbe, G. & Co.

Storey Brothers & Company

Stroud Riley Drummond

Tissus Michels Holdings

Vantona

West Cumberland Silk

Wilkinson Warburton

Worthington, A.J. Holdings

TOBACCO

British American Tobacco

Carreras

Dunhill, Alfred

Gallaher

Imperial Tobacco

Siemssen Hunter

Sobranie Holdings

Tobacco Securities Trust

Verellen

FOOTWEAR

Allied Leather Industries

Allebone & Sons

Barrow Hepburn & Gale

Brevitt

British Chrome Tanning

Britton (G.B.) & Sons

Chamberlain Phipps

Dinkie Heel Company

Elbief Company

Ever Rest Shoes

Farmer, John

Garner, James

Headlam, Sims & Coggin

Ingle, W.L.

K Shoes

Lambert Howarth Group

Lanca

Lennards

Liverpool Shore Company

Lotus

Maden & Ireland Group

Metzer, A. & H. Holdings

Mount Row Holdings

Mowatt (William) & Sons

Newbold & Burton Holdings

Norvic Shoes

N.S.F. Footwear

FOOTWEAR (Continued)

Oliver (George) Footwear

Phillips Patents Holdings

Rayne, H. & M.

Sagar, W. & J. Holdings

Stead & Simpsons

Stylo Shoes

Tebbit Brothers

Timpson (William)

Ward (George) Holdings

Wearra Shoes

White (John) Footwear

Wood, W. & Son

TOYS AND GAMES

Airfix Industries

Berwick Tempo

Church & Co.

Chad Valley

Cowan de Groot

Dunbee Combex Marx

Lesney Products

Lines Brothers

Mettoy Company

M.Y.Dart Co.

Randall, J. & L.

Spear, J.W. & Sons

Waddington (John).

APPENDIX C

FIRMS LISTED IN 1970 STOCK EXCHANGE YEAR BOOK AS INDEPENDENT, NON-FOREIGN COMPANIES

THE DESTINY OF FIRMS WITHIN EACH CATEGORY 1970-1978

STOCK EXCHANGE CATEGORY NUMBER	35	36	37	38	39	40	41	42	43	45	46	47	48	49	50
ORIGINAL NUMBER IN CATEGORY IN 1970	42	6	22	32	20	21	46	53	21	38	21	40	72	60	13
NUMBER OF FIRMS EXCLUDED FROM SAMPLE because															
(a) They turned out to be subsidiary companies.	3	2	-	1	1	3	3	2	3	-	4	4	4	1	1
(b) They were reorganised, failed to produce accounts for at least 1 year in the period, changed category, or first became public in 1970 and did not produce accounts as a public company until 1971.	4	-	-	-	1	-	2	1	-	-	-	-	4	1	1
REVISED NUMBER IN SAMPLE	35	4	22	31	18	18	41	50	18	38	17	36	64	58	11
Number taken over or merged	10	1	5	6	7	6	19	19	7	12	7	14	25	24	4
Number in receivership or listing cancelled	2	-	2	1	2	1	1	1	-	-	1	-	2	1	-
NUMBER OF FIRMS SURVIVING OVER PERIOD	.23	3	15	24	9	11	21	30	11	26	9	22	37	33	7

FIRMS LISTED IN 1970 STOCK EXCHANGE YEAR BOOK AS INDEPENDENT, NON-FOREIGN COMPANIES

THE DESTINY OF FIRMS WITHIN EACH CATEGORY 1970-1978

STOCK EXCHANGE CATEGORY NUMBER	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65
ORIGINAL NUMBER IN CATEGORY IN 1970	44	18	40	51	29	12	9	50	102	27	39	59	9	38	13
NUMBER OF FIRMS EXCLUDED FROM SAMPLE because															
(a) They turned out to be subsidiary companies.	1	5	-	4	1	2	-	3	8	4	4	3	2	3	-
(b) They were reorganised, failed to produce accounts for at least 1 year in the period, changed category, or first became public in 1970 and did not produce accounts as a public company until 1971.	1	1	-	-	-	-	-	1	2	2	1	-	-	-	-
REVISED NUMBER IN SAMPLE	42	12	40	47	28	10	9	46	92	21	34	56	7	35	13
Number taken over or merged	18	4	10	13	9	3	3	11	19	10	9	17	2	11	2
Number in receivership or listing cancelled	2	-	-	2	2	-	1	1	13	2	2	3	-	5	1
NUMBER OF FIRMS SURVIVING OVER PERIOD	22	8	30	32	17	7	5	34	60	9	23	36	5	19	10

APPENDIX D

SAMPLE OF VICTIM, PREDATOR AND NEUTRAL FIRMS

(Victims and Predators were participants in a takeover in 1977 and 1978)

(SOURCE: INVESTORS CHRONICLE ANNUAL REVIEWS)

VICTIM FIRMS

Ace Machinery Holdings
Alginate Industries
Anglo-Swiss Holdings
Ash Spinning
Avery Group
Best & May
John Bright Group
Campbell and Isherwood
C.G.S.B.Holdings
Clifford & Snell
Customagic Manufacturing
Dartmouth Investments
Dutton Forshaw Group
Dyson, R.A.
E.M.I.
F.P.A. Construction
Farm Feed Holdings
Francis G.R.Group
Goldrei, C.H.Foucard & Sons
Gough Brothers
Harris Lebus
Harrison & Sons
Hawthorne Baker
Hudson Print Group
John Haggas
Johnson-Richards Tiles
Knott Mills
Leisure Caravan Company
Lindsay & Williams
Lennon Brothers
Lockhart, Alfred
Madame Tussauds
Myddleton Hotels
Newey
Newman Granger Industries
Samuel Osborne
Parker Timber
Pontins
Pride & Clark
Park Farms
Orme Developments
Randall, J. & L.

APPENDIX D (Continued)

Reed and Smith	Siemssen Hunter
Spillers	Silhouette
Sheepsbridge Engineering	Simons & Company
Sanderson Kayser	Spink & Son.

ACQUIRING FIRMS

Associated Communications	Dawson International
Arthur Guiness	Dunlop Holdings
Aurora Holdings	Ferguson Industrial Holdings
Armstrong Equipment	Fenner, J.H. & Company
Allied Breweries	Guest Keen & Nettlefolds
Associated Dairies	Gibbons Dudley
Associated Paper	Glass and Metal Holdings
Associated Engineering	Greenall Whitley & Co.
B.T.R.	Grand Metropolitan
Bullough	Hawker Siddley
Bowater Corporation	Hanson Trust
Barratt Developments	H.A.T.Group
Berisford, S. & W.	Heywood Williams Group
Comet Radiovision Services	Imperial Group
Carclo Engineering	Johnson & Firth Brown
Comfort International	Letraset International
Crown House	Ladbroke Group
Central Manufacturing & Trading	McKechnie Group
Coral Leisure Group	Norcros
C.H.Industrial	Pearson, S.
R.Cartwright Holdings	Alfred Preedy

APPENDIX D (Continued)

Benjamin Priest

Rank Organisation

Ransom, Hoffman & Pollard

Raybeck

Rockware Group

R.F.D. Group

Simon Engineering

Tesco Stores (Holdings).

NON-ACQUIRED/ACQUIRING FIRMS

Allebone & Sons

Anglia Television

Arden & Cobden Hotels

Audio Fidelity

Baker's Household Stores (Leeds)

Beales, John

Boddingtons Brewery

Buckley's Brewery

Chepstow Racecourse Co.

James Cropper

Delyn

Decca

Empire Stores (Bradford)

Firmin & Co.

Diamond Stylus

Gomme Holdings

Gripperods Holdings

Grattan Warehouse

Gates, Frank G.

Hawker Marris

Herman Smith

Hicking Pentecost

Joseph Holt

I.C.L..

K Shoes

Kwik Save

Ladies Pride

Lidstone

John J. Lees

Lister & Company

Mansfield Brewery

Maynards

Marks & Spencer

Melody Mills

Morland & Co.

Moss Engineering Group

Mothercare

G.Olivers Shoes

Panto, P.

Rowntree Mackintosh

APPENDIX D (Continued)

Routledge & Kegan Paul

Sanderson, Murray & Elder Holdings

Shiloh Spinners

F.W.Thorpe

Towles

E.Upton

Viners

Wolverhampton & Dudley Brewery

Young & Co.'s Brewery.

APPENDIX E

DEFINITION OF VARIABLES EMPLOYED IN A SAMPLE OF 150 COMPANIES COMPRISING VICTIMS, PREDATORS AND NEUTRALS

CATEGORY

The firms were divided into three groups, each group consisting of fifty companies quoted on the London Stock Exchange. For ease of reference, the groups have been named "Victims", "Predators" and "Neutrals". These are defined as follows:-

(i) Victim Firms - These are quoted firms which were acquired during 1978 or 1979. Companies are only treated as acquired when the bid has been successful and the offer declared "unconditional". As a result, a few of the bids were first made in the latter part of 1977 but qualified for inclusion by gaining 51% or more of the voting stock in 1978. As a further result, offers made in 1979 not completed until 1980 were not eligible for selection. Financial and Property Companies were excluded on the grounds that their asset structure differed significantly from that of Industrial and Commercial Companies, thus destroying any possibility of consistent interpretation. Also eliminated were offers for Water Works, Mining, Oil and Plantation categories of firms, as were takeovers by Companies engaged in International Trading and Foreign Firms (though this did not debar enterprises based in Eire). The acquisition of outstanding minorities such as the Phillips bid for the 39% it did not own in Pye Holdings, or the 33% of White Child and Besey not controlled by Arthur Guiness, which occurred in 1979, were not accepted into the sample.

In defining "takeovers" no distinction was drawn between mergers and non-agreed bids, since in practice the division between willing and unwilling "victims" is not a secure one. The convention adopted in this case is that the smaller company (defined by net asset value) is considered to be the "victim". In practice, the number of mergers are a very small proportion of amalgamations; out of the 306 cases of amalgamation analysed in the consumer goods sample, only three were identified as mergers, i.e. less than 1%.

A certain number of acquisitions take place each year where a company becomes insolvent and is taken into receivership and the "shell" of the original company is then sold. Such acquisitions were ignored.

The list of victims was drawn from the Annual Review of Takeovers and Mergers published in the first issue of the new year of the Investors Chronicle in 1979 and 1980. This list comprises all the successful bids for control of quoted companies occurring in the year immediately preceding the issue. The 50 victim companies were randomly drawn, subject to the availability of five years of accounts preceding the year of takeover being on microfilm at the Company Registry in Cardiff (i.e. for firms taken over in 1979, accounts had to be available from 1974 to 1978 inclusive, and for firms acquired in 1978 there had to be a complete sequence of accounts from 1973 to 1977 inclusive). Accounts for the year in which the takeover was consummated were not included, in the first place because such accounts (when available) involve special factors relating to the amalgamation of corporate identities,

and in the second place because the study was not concerned with the value placed upon an acquired firm by an acquiring firm but rather on the question of whether an acquired firm invited "takeover" by reason of its behaviour or performance prior to that event.

(ii) Predator Firms - These are quoted firms which made successful acquisitions during the years 1978 and 1979. The definitions governing when a "takeover" is classified as successful and the type of companies and takeovers eligible for inclusion in the sample is as set down for victim firms.

The list of predators was taken from the Annual Review of Takeovers and Mergers to be found in the first issues in each January of the years 1979 and 1980 of the Investors Chronicle. The list covers takeovers that have occurred in the year immediately preceding the stated issues of the periodical. The 50 predator companies were randomly drawn from these lists, subject to the availability of five years' of accounts preceding the year of takeover on microfilm at the Company Registry in Cardiff (i.e. for firms making acquisitions in 1979, accounts had to be available for the five year period 1974 to 1978, and for firms making a takeover in 1978 then the accounts must cover the time from 1973 to 1977). The reasons why the year of takeover accounts were not analysed is as stated under the heading "Victim Firms".

(iii) Neutral Firms - These are quoted firms which have neither been subject to takeover or involved in making an acquisition during a five year period, either over the time span 1973 to 1977 or 1974 to 1978, and in both cases continued to exist as separate entities in 1978 and 1979. Unsuccessful bids were ignored

for purposes of this classification. The purpose of permitting two overlapping sequences is to maintain close comparison of companies in this group with the years analysed for victim and predator companies. In fact, 31 neutrals were analysed over the span of time 1973 to 1977 and 29 over the period 1974 to 1978. This compares with an average of 28 for the earlier period and 32 for the later period with regard to the predator and victim groups.

The purpose of this group is to provide a control sample in order to match the variables analysed for the other two categories.

The neutrals selected were all independent companies and not subsidiaries of any other business corporation. As with the other types of classification, companies engaged in Finance, Property, Mining, Oil, Plantations and International Trade were excluded, as were Foreign Firms and Water Works.

In order to be certain that no takeovers had occurred within this sample, it was derived on a random basis from the appropriate subset of companies contained in the collection of "continuing companies" (1970 to 1978) where the analysis of the amount of takeover activity had already been made. Insofar as all these companies were listed on the United Kingdom Stock Exchange, they represent a fair comparison with other types of company that were more actively engaged in the takeover situation.

On the other hand, since absence of acquisitions was defined to preclude not only the absorption of other quoted companies but also private companies (and therefore the smaller firms), the neutral enterprises were possibly more static in outlook

and performance than would have occurred if only the takeover of other quoted firms had been the criterion. However, the number of companies with such distaste for acquisitions is by no means as limited as might be thought. A computation involving the first 10 categories of the 30 categories in the consumer goods sample showed that 44% of the continuing companies so included were of this nature.

A. SIZE

This is measured in terms of net assets. The net asset value of the company as calculated in the annual balance sheet was recorded for each year of the five year period and the average value over this time was used as a measure of size.

Net assets consist of the book value of a company in a given year defined as fixed assets net of depreciation plus current assets minus current liabilities. Intangibles (goodwill, copyrights, patents and trademarks) have been included.

B. GROWTH RATE

This is calculated as the compound growth rate of net assets over the five year period. The formula used was :-

$$FV = PV \times (1 + g)^n$$

FV = Final value of net assets in fifth year.

PV = Initial value of net assets in the first of the five year period.

n = Number of years over which the compounding took place: in this calculation n = 4.

g = The growth rate which is such as to ensure the equality of the equation is achieved.

The formula equation was solved for g for each of the 150 companies.

C. RETENTION RATIO

This is equal to net profits after tax minus preference and ordinary dividends. This is the amount of net profit which a business decides to reinvest in its activities and not to distribute to its shareholders. It was divided by profit after tax (i.e. the sum available for distribution).

Net profit after tax is equal to profits net of depreciation and amortisation and director's emoluments and minus payments of tax, interest on loans and payments to minority interests. Extraordinary items (such as the costs of reorganisation, or the payment of compensation following an accident) have not been excluded on the basis that the exceptional nature of these items becomes less so when averaged over five years.

This ratio is a five year average. One difficulty in calculating this ratio is that in years in which a company reports a loss after tax the retention ratio becomes negative. In such cases the years of negative retention ratio were ignored since Marris's theory assumes that the retention ratio is a policy decision to opt for either high or low retentions. Since there is no discretion to implement this decision during years of negative retention, such years were ignored and the average is based on less than five years.

D. GROSS RETENTION RATIO

This is made up from the addition of the amount provided for depreciation in the accounts to the retention ratio (previously defined). The depreciation shown in the notes to the accounts is not the same as that allowed by the Inland Revenue for taxation

purposes. The tax regulations lay down the amounts of depreciation which may be claimed as capital allowances in the first and subsequent years of the asset's life. As a result, there are timing differences between the depreciation amounts shown in the accounts and the actual sums retained by the business. Nevertheless, in principle the system is so arranged that over the life of the asset the calculated and permitted rates of depreciation should coincide. Therefore, since this composite variable is averaged over a five year period, it should give an approximate estimate of the resources available to a firm that are internally generated.

E. DIRECTORIAL CONTROL

Under the Companies Act the Directors of a business must disclose their holdings of shares and debentures in that business. The number of voting shares in the company was taken from the Directors Report for the last of the five years being analysed (i.e. 1977 or 1978, as appropriate). The total was then calculated as a percentage of the total voting capital in order to indicate the amount of control over the company's affairs which the Directors held as a body.

In some cases the votes for differing classes of the equity vary. Where this was so, the holding of each class of the equity in the possession of the Directors was weighted by the number of votes available to each share and then expressed as a percentage of the total number of votes attributable to all classes of voting shares.

F. PROFIT RATE

This is derived from dividing a five year average of net profit after tax by a five year average of total shareholders funds.

Net profit after tax is defined as profits net of depreciation and amortisation, directors' emoluments, interest, tax and minority interests. Exceptional items were also deducted when they occurred.

Total shareholders' funds consists of the issued share capital of the company and its accumulated reserves. Preference shares were included, as were minority interests. This figure is sometimes referred to as "capital employed".

G. GEARING

This is calculated as the ratio of a five year average of long term loans divided by a five year average of total shareholders' funds. Long term loans comprise debentures, unsecured loans and mortgages. Total shareholders' funds is as stated previously.

H. EXTERNAL FUNDS

This is a measure of the firm's reliance on external sources of capital. The net increase in capital arising from the issue of ordinary and/or preference shares, debentures and long term loans contracted over the five year period was totalled. Net in this context refers to the fact that this total was reduced if any payback of these funds took place. This sum was expressed in terms of the value at the time of issue of these funds and was then divided by the value of net assets at the start of the five year sequence. Other sources of external funds exist, notably bank overdrafts and trade credit, which are normal sources of working capital. They are not, however, the normal means of supplying capital for long term investment and so were not included in testing a theory about the growth of productive capacity. It is clear, nevertheless, that

the parameter is only an approximate guide to the dependence of the firm on external funds.

I. AVERAGE VALUATION RATIO

This is defined as the market value of the company taken as an average for the first and last of the five years, divided by net assets at book value, averaged over the first and last of the five years. The market value in the chosen years is calculated as the number of equity shares in issue times the average level of share price during the year. This level is determined by taking the price of the share (or shares where more than one class exists) at its highest and lowest values of the year as reported in the pertinent numbers of Investors Chronicle, and finding the mean of the two values. Although all classes of equity capital (including non-voting shares) was incorporated in this calculation, preference shares were excluded. Net assets are as previously explained, and are based on the book values to be found in the yearly accounts.

J. VALUATION RATIO CHANGE

Having calculated the valuation ratio, this statistic is used to produce the percentage change in this ratio between the first and last of the fiye years, according to the formula :-

$$\text{Last Year Value} = \text{First Year Value} \times (1 + r).$$

where r is the rate of change between the two values expressed as a percentage.

K. FINAL YEAR VALUATION RATIO

This is the valuation ratio (as previously defined) for the final of the five years (i.e. 1977 or 1978, depending on the run of

years specified). This measure in the case of victim and predator firms is that occurring just prior to the takeover situation of the following year.

L. SHAREHOLDER WEALTH INDEX

For the purpose of assessing the change in wealth of the shareholder over the five year period, the following procedure was adopted.

It was assumed that for each firm in the sample a representative shareholder held a £1,000's worth of shares. Where more than one class of shares existed, the ones chosen were the class of voting share of which the greatest number had been distributed. This rule was amended in a few instances where the voting shares were few in number and obviously held by the Directors to maintain control (this occurs, for example, with companies holding television franchises) when the non-voting shares were substituted. In determining the number of shares purchased, the price of each share was taken as the average of the high and low value attained during the year immediately preceding the start of the five year period. No allowance was made for dealing costs and fractions of shares (to one place of decimals) were permitted.

These shares were then allowed to accumulate dividends over the full five year period. At the end of the five years, the shares held were sold on the basis of the average high/low price reached in the ultimate year of the five year sequence. The gross dividend was used rather than the net dividend on the grounds that the tax credit represents an increment of wealth to the shareholder, despite the fact that it is in non-cash form. This involves the further assumption that the representative shareholder is paying tax at at least the basic rate.

Scrip issues were dealt with by adding the proportionate increment in shares in the year in which they were distributed but dividends were not assumed to be earned until the next accounting year after distribution. In the case of Rights Issues, it was presumed that they were purchased by using the dividends attributable to the original holding of shares in the year that the rights shares were offered, even if this then led to a negative value of dividends in that year. All rights were taken up. As with scrip shares, the new rights shares were not considered eligible for dividends until the following accounting year.

The increase in the shareholder's wealth was then prepared by use of the formula :-

$$-\text{£}1{,}000 + \frac{D_1}{(1+r)}1 + \frac{D_2}{(1+r)}2 + \frac{D_3}{(1+r)}3 + \frac{D_4}{(1+r)}4 + \frac{D_5 + FV}{(1+r)}5 = 0$$

D_n = the total gross dividend payable on eligible shares in the year n.

FV = the value of the holding in the fifth year calculated by multiplying the number of shares by the average high/low stock market price of the shares in that year.

r = the rate of return at which the wealth flows must be discounted in order that the present value of the accumulated wealth flows will exactly equal the £1,000 of initial investment. The value of "r" for each firm transformed into a percentage is used as the shareholder wealth index.

M. PROFIT MARGIN

This is measured by dividing a five year average of trading profit by a five year average of the value of turnover.

Trading profit is determined by deducting from income received operating costs, selling and administrative costs, depreciation, directors' remuneration, hire of plant and auditors' fees. Also excluded are interest received on loans, investment income and regional development grants, but includes interest to be paid on loans. Unfortunately, this variable is not required to be disclosed by either the Companies Acts or the Stock Exchange Listing Agreement. As a result, the way in which it is used in accounts is subject to enormous variation and requires very careful examination to ensure comparability of treatment.

Turnover is the total amount receivable by the company in the ordinary course of business for goods sold or services supplied. Internal sales within a group are excluded. As a result, turnover may be used as a surrogate for external sales.

N. LIQUIDITY

This is calculated as trade debtors, cash, bank balances and deposits, less trade creditors, other creditors, accrued expenses, current taxation, proposed dividend, bank overdrafts and short term loans averaged over a five year period divided by a five year average of total shareholders' funds.

In all, a total of 15 variables were defined with respect to the predators, victims and neutrals sample of 150 companies. Three of these variables which relate to the valuation ratio are, however, only three different ways of seeking to use the same concept and to discover whether one of its forms (i.e. its value in the year just preceding takeover or its average value over a five year period or

its percentage change over the five years preceding takeover) might serve as the better index for indicating the probability of takeover. The retention ratio and the gross retention ratio also were included with the purpose of assessing which variable of the two best measured the internal flow of funds.

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ADDENDA

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