The effect of financial variables on the cost of capital in Australia

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THE EFFECT OF FINANCIAL VARIABLES ON THE COST OF CAPITAL IN AUSTRALIA

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SUBMITTED IN FULFILMENT OF THE REQUIREMENT FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

1ST SEPTEMBER 1975

I, Walter Stephen van der Mye, declare that this thesis ("The Effect of Financial Variables on the Cost of Capital in Australia") does not contain work or material which I have previously submitted for any other university degree or similar award.

ABSTRACT

THE EFFECT OF FINANCIAL VARIABLES ON THE COST OF CAPITAL IN AUSTRALIA

WALTER STEPHEN VAN DER MYE   1ST SEPTEMBER 1975

The objective of this thesis was to determine by regression analysis the effect of financial variables on both the equity and average capitalization rates within a sample of industrial firms in a less developed capital market and to interpret the results in the context of opposing theoretical positions. The thesis uses previously untested models in developing measures of the investors required rate of return and additionally investigates whether, the effect of the financial variables is partially a function of the level of business risk.

In the process of seeking to achieve the above stated objective, previous work on the subject both at the theoretical and empirical levels was reviewed and the following three hypotheses were presented for testing:

First, the ratio of debt to equity has no effect on either the equity or average capitalization rates for firms with equivalent degrees of business risk;

Second, the earnings retention rate has no effect on either the equity or average capitalization rates for firms with equivalent degrees of business risk;

Third, the relative effects of leverage and earnings retention on either the equity or average capitalization rates for firms are not dependent upon the level of

business risk.

Regarding the research methodology used in this thesis let us commence by outlining the basis for selecting the firms to be incorporated in the statistical analysis. Following a three-stage process designed so as to achieve a sample of firms exhibiting a high degree of homogeneity among such factors as freedom from government regulation and the absence of any major capital reconstruction and yet a high degree of heterogeneity among factors such as growth trends, cost and demand patterns and the relative influences of economic cycles, 220 firms covering 11 industries were selected for analysis. Then to ensure that the data inputted into the analysis was comparable on both a firm-to-firm and year-to-year basis a system of standardized procedures was introduced and the development of a computerized data bank of individual firm statistics followed.

The statistical analysis employed in this thesis revolved around a series of regression equations in which the equity and average capitalization rates were the dependent variables. Estimates of the equity capitalization rates for each sample firm for each cross-section year were based on the non continuous-growth dividend model of share valuation, the risk-index model of share valuation and the capital-market model of share valuation. While estimates of the average capitalization rates were based on the calculated equity capitalization rates, market value weights for ordinary equity, book value weights for senior securities and current yields for senior securities. The independent variables included estimates of the market value debt leverage ratio, preferred share leverage ratio, retention, size, industry grouping and business risk for each firm. Business risk classes were defined by grouping the sample firms into four quality groups based on a calculated numerical measure. Finally, the cross-section years were those of 1963-1972 inclusive.

In the first part of the analysis where risk was incorporated as a variable, stable statistically significant parameters were found measuring the influence of leverage, retention and size on the cost of capital. More specifically, first it appears that there are substantial cost advantages to be gained by increasing leverage in the range within which most of the leverage ratios lie. There was strong evidence however, that beyond a certain point further increases in the leverage ratio will lead to increases in the overall cost of capital. Thus these results cast doubt on the Modigliani and Miller hypothesis concerning the invariance of a firm's cost of capital to changes in its capital structure. Second, the regression results also suggest a consistency with the traditional theory that investors have a preference for current dividends, that is, they are prepared to sacrifice some return for an early resolution of uncertainty. Finally, from the regression results it is also possible to conclude that the cost of capital for small industrial firms is greater than that for large industrial firms.

In the second part of the analysis, concerning the question of whether the effect of financial variables on the cost of capital is partially a function of the level of business risk the answer was in the affirmative. Thus it appears that the lower the level of business risk the closer investors become to being indifferent with regard to both the debt financing and retention policies of firm's.

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INTRODUCTION

"The concept of the cost of capital has been the subject of considerable controversy, and there is a great need for empirical research to improve the factual basis of our knowledge on the subject."[1] Since Gordon made this statement in 1961, an appreciable amount of empirical research has been conducted in an effort to determine the 'true' effect of such factors as leverage, dividend policy and size on the cost of capital. Yet to date, the reported results are so inconclusive, that they offer little in terms of either resolving conflicting theoretical propositions or, aiding the decision makers. Part of the difficulty encountered in such research, derives from the inherent difficulties of attempting to identify *ceteris paribus* effects in any open market. All econometric studies would seem to encounter these problems, but another part of the difficulty seems to arise from shortcomings in the studies themselves. Before stating the objective of this thesis, three general shortcomings existent in the prior empirical studies concerning the influence of financial variables on the cost of capital will be examined.

Most notably only several studies (the best known being

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1. Myron J. Gordon, "Variability in Earnings - Price Ratios: A Comment", American Economic Review, 52 (March 1962), 203.

those of Brigham and Gordon[2] and Miller and Modigliani[3]) investigate the simultaneous effect of financial variables on the cost of capital. The importance of adopting a simultaneous approach when investigating the effect of financial variables on the cost of capital can be seen by considering an empirical study employing regression analysis in order to determine the impact of leverage on the cost of capital. Since there are several heterogeneous factors likely to cause variation in a firms cost of capital besides leverage, the possibility of bias casting doubt on the meaning and validity of the study arises if these factors are not somehow taken into account. Several of the more important factors which should be considered in any such study have been listed by Barges[4] as follows: (1) Business Risk; (2) Degree of Market Imperfection; (3) Dividend Policy; (4) Errors of Measurement and (5) Size. Although this discussion has been confined to considering empirical studies concerning the impact of leverage on the cost of capital, it applies equally well to other studies regarding the impact of, for example, dividend policy and size on the cost of capital. In fact

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2. Eugene F. Brigham and Myron J. Gordon, "Leverage Dividend Policy and the Cost of Capital", Journal of Finance, 23 (March 1968), 85-103.

3. Merton H. Miller and Franco Modigliani, "Some Estimates of the Cost of Capital to the Electric Utility Industry, 1954-1957", American Economic Review, 56 (June 1966), 334-91.

4. Alexander Barges, The Effect of Capital Structure on the Cost of Capital (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1963), 24-26.

Van Horne when discussing empirical studies in dividend policy has commented as follows, "While more empirical work needs to be done on the effect of dividend policy on share price, a simultaneous approach to the problem is likely to yield the most meaningful results."[5]

Second, most of the empirical studies that have examined the question of valuation and the cost of capital, have relied on data from the electric utility industry.[6] Several reasons have been put forth for this choice. First, an empirical determination of the effect of leverage on the cost of capital requires that the capitalization rates of firms with homogeneous business risk but differing financial risk be compared.[7] In the past it has been assumed that if the sample of firms used in a cost-of-capital study consists of those which are members of the same industry, then homogeneity of business

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5. James C. Van Horne, Financial Management and Policy (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 2nd Edition 1971), 257.

6. Brigham and Gordon, "Leverage, Dividend Policy and the Cost of Capital, *op. cit.*; Z. Lew Melnyk, "Cost of Capital as a Function of Financial Leverage", Decision Sciences, 1 (July-October 1970), 327-56; Merton H. Miller and Franco Modigliani, "Some Estimates of the Cost of Capital to the Electric Utility Industry, 1954-1957", *op. cit.*; Franco Modigliani and Merton H. Miller, "The Cost of Capital, Corporation Finance and the Theory of Investment", American Economic Review, 48 (June 1958), 261-97; J. Fred Weston, "A Test of Cost of Capital Propositions", Southern Economic Journal, 30 (October 1963), 105-12; among others.

7. Briefly, business risk is that element of uncertainty arising from the nature of the firm's asset structure - including both the purposes for which the assets are used and the efficiency and effectiveness with which they are utilized. On the other hand, financial risk is that element of uncertainty arising from the inclusion of fixed commitment financing in the firm's capital structure.

risk could be achieved. Based partly on this point, Miller and Modigliani justify selecting their sample of firms from the electric utility industry as follows, "the component firms are remarkably homogeneous in terms of product, technology and market conditions."(8) Second, electric utilities as a result of regulation employ unusually uniform accounting standards and furthermore have earning patterns and rates of return which are reasonably stable over time. In completing their argument for support of their choice of the electric utility industry as the one to be used in their study, Miller and Modigliani make use of this point as follows:

> "In addition, as a by-product of regulation, substantially uniform accounting conventions (down to even such small, but often annoying, details as choice of fiscal year) are followed throughout the industry. In the years studied, moreover, earnings have been highly stable with few of the wide swings in year-to-year reported earnings due to strikes, cyclical or competitive shifts in demand, write-offs of assets, mergers and the like that often render the published earnings figures virtually meaningless in more sprawling and less sheltered sectors."(9)

However, the electric utility industry has been deemed by many researchers to be inappropriate from which to draw conclusions regarding shareholder responses to financial risk. For instance, it has been argued that:

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8. Miller and Modigliani, "Some Estimates of the Cost of Capital to the Electric Utility Industry, 1954-1957", *op. cit.*, 334-35.

9. *Ibid.*, 335.

> ". . . the very process of regulation might make the appropriate formulation of valuation or cost of capital equations different from those which are appropriate for non-regulated industries."(10)

The theoretical debate concerning the effect of leverage on the equity capitalization rate of electric utility firms has centered around the following two questions, (1) what does regulation imply for Modigliani and Miller's Proposition 2 ? and (2) how does leverage affect the equity capitalization rate in practice?

A common test of the effect of leverage on the equity capitalization rate is to correlate some measure of this rate with a measure of firm leverage. The theoretical basis for this test is Modigliani and Miller's Proposition 2 which in the tax-corrected version(11) states:

$$(i\text{-}1) \qquad K_e = K_e^* + (1-\tau)(K_e^*-r)V_D/V_S$$

where K_e is the equity capitalization rate, K_e^* is the equity capitalization rate for non-levered firms in a given risk class, r is the interest rate on debt obligations, τ is the marginal corporate tax rate and V_D/V_S is the debt/equity ratio measured in market terms. The corresponding test equation, assuming the K_e^*, r and τ are all constant for a cross-section of firms is:

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10. Edwin J. Elton and Martin J. Gruber, "Valuation and the Cost of Capital for Regulated Industries", Journal of Finance, 26 (June 1971), 661.

11. Franco Modigliani and Merton H. Miller, "Corporate Income Tax and the Cost of Capital: A Correction", American Economic Review, 53 (June 1963), 433-43.

$$K_e = a_o + a_1 V_D/V_S \quad \text{(i-2)}$$

Concerning the first question, Modigliani and Miller use their 'after-tax' version, while Brigham and Gordon use the 'before-tax' version. That is, Modigliani and Miller contend that the coefficient of the leverage variable, a_1, in Equation (i-2) is an estimate of $(1-\tau)(K_e^*-r)$ while Brigham and Gordon contend instead that it is an estimate of (K_e^*-r). Both these points of view have been analyzed in considerable detail by Elton and Gruber and they conclude that the Modigliani and Miller 'after-tax' version of Proposition 2 is theoretically correct.

Despite some degree of theoretical agreement on the first question, the same cannot be said of the second and in the opinion of Robichek, Higgins and Kinsman, "a_1 cannot be considered as estimate of either (K_e^*-r) or $(1-\tau)(K_e^*-r)$ regardless of whose view of regulation holds."(12) In reaching their opinion they rely on the assumptions required to derive Proposition 2 and the nature of the regulatory process. The basic assumptions underlying Modigliani and Miller's derivation of Proposition 2 are outlined fully in Chapter 1 to follow and thus will not be stated here. However, the following special assumptions used in the original derivation are of particular relevance to their discussion in question: (1) r, is constant over all degrees

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12. Alexander A. Robichek, Robert C. Higgins and Michael D. Kinsman, "The Effect of Leverage on the Cost of Equity Capital of Electric Utility Firms", <u>Journal of Finance</u>, 28 (May 1973), 355.

of leverage; (2) the expected earnings steam is constant and does not vary with leverage; (3) K_e is given by the earnings/price ratio; and, in the tax case, (4) the effect of taxes on the value of the firm is equal to τD. Of the four assumptions Robichek, Higgins and Kinsman comment that:

> ". . . the validity of assumption (2) is at the heart of the Modigliani and Miller and Brigham and Gordon debate. Assumption (4) is a difficult one either to accept or reject on empirical grounds. But, there is ample evidence that assumptions (1) and (3) do not hold in practice. The average rate of interest on debt varies noticeably with the degree of leverage employed by electric utility firms. Also, as noted above, it is a well-known, theoretical point that K_e will be correctly measured by the earnings/price ratio only if $r=K_e$ or if the expected earnings stream is constant over all time periods. Neither of the two conditions is likely to exist for electric utility firms."(13)

Regarding the nature of the regulatory process, Proposition 2 was derived for unregulated firms where the shareholders bear essentially all the risks of income variability and bankruptcy. Keeping this in mind, if as Wippern has suggested:

> ". . . the regulatory agencies appear to have a significant influence over the financial structure adopted by firms in this industry. It is, therefore doubtful whether fixed commitment financing exposes the electric utility shareholder to financial risk in the same manner and/or to the same extent as the shareholder of a non-regulated firm,"(14)

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13. Robichek, Higgins and Kinsman, "The Effect of Leverage of the Cost of Equity Capital of Electric Utility Firms", *op. cit.*, 355.

14. Ronald F. Wippern, "Financial Structure and the Value of the Firm", Journal of Finance, 21 (December 1966), 621

then it is unlikely that Proposition 2, in any of its variants will hold exactly for unregulated firms.

The implication of the preceding discussion is that a unique interpretation of the theoretically-derived leverage coefficient, a_1 is not justified in practice, but that the ultimate test of leverage propositions for regulated firms must be empirical. That is, the results should be considered as simply measuring the effect of the leverage variable on the equity capitalization rate and should not be interpreted as a test of either form of Proposition 2. This situation has led Van Horne to comment, "Additional empirical studies particularly studies dealing with industries other than the public utility industry are needed."[(15)]

Finally, nearly all the empirical studies in the area of valuation and the cost of capital have been carried out in highly developed and efficient capital markets. However, it is possible that while theories of valuation in a perfect market may be reasonable approximations of reality for highly developed and efficient capital markets, alternatively in a developing economy, where the capital market is not well organized and market imperfections are far greater than in a developed country, the more traditional approach to valuation may be applicable. The above remarks have received support from the results of two empirical studies carried out in what could well be regarded as less developed capital markets. In the first study covering ten Australian retailing firms over the years 1954 to 1963

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15. Van Horne, Financial Management and Policy, *op. cit.*, 222.

inclusive, Wright, Young and Barton concluded that, "for the Australian retailing industry, and for the period covered by the study, the Modigliani-Miller hypothesis is not valid. This implies that the Australian capital market was sufficiently imperfect to inhibit the investor behaviour envisaged by Modigliani and Miller."(16) In the second study Rao and Litzenberger presented the results of a comparative analysis between 28 Indian utilities and 77 American utilities over the years 1962 to 1966 inclusive and they concluded that:

> ". . . the results for the American utilities are consistent with the Modigliani-Miller thesis that after allowing for the tax advantage of debt financing the cost of capital is independent of capital structure. These results for the American utilities provide a useful benchmark in comparing the relative efficiency of the Indian capital market. The results for the Indian utilities are inconsistent with the Modigliani-Miller independence hypothesis and support the more traditional approach to valuation that moderate amounts of debt will lower the firm's cost of capital."(17)

Taking these three general shortcomings into account the objective of this thesis may be stated as follows; 'to determine by regression analysis the effect of financial variables both on the equity and average capitalization

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16. F.K. Wright, I.C. Young and A.D. Barton, "The Effect of Financial Structure on the Market Value of Companies", Australian Economic Papers, 5 (June 1966), 34.

17. Cherukuri U. Rao and Robert H. Litzenberger, "Leverage and the Cost of Capital in a Less Developed Capital Market", Journal of Finance, 26 (June 1971), 777.

rates within a sample of industrial firms in a less developed capital market, and to interpret the results in the context of opposing theoretical positions'. The thesis uses previously untested models in developing measures of the investors required rate of return and additionally investigates whether, the effect of the financial variables is partially a function of the level of business risk.

OUTLINE AND ACKNOWLEDGEMENTS

Chapter 1; develops the theoretical framework, including the importance of the cost of capital to firm decision making and the relevant theories of leverage, dividend policy and business risk. Additionally, three hypotheses are presented for empirical testing. All three of these hypotheses are stated as indifference hypotheses and as such it is not argued that they are valid as stated, but only that they are stated in testable form.

Chapter 2; summarizes several of the more important previous empirical studies which have undertaken to test in one way or another the impact of leverage and/or dividend policy on the cost of capital. Most of the studies evolved from Gordon's early attempts to test the effect of dividends on share price. Only a few have dealt with both leverage and dividends. Furthermore, attention is given to three deficiencies which exist in the models which have been used in the prior studies.

Chapter 3; describes the way in which the firms to be subjected to analysis were selected and additionally how the data on which the analysis depended was collected and standardised so as to achieve comparable data inputs into the empirical models.

Chapter 4; presents the models (estimating equations) to be employed in the testing of the three hypotheses presented in Chapter 1, together with the measurement procedures used in determining the values of the variables included in the models.

<u>Chapter 5</u>; examines the results of the analysis, firstly where business risk is included as a variable in the models and secondly within business risk classes.

<u>Chapter 6</u>; traces the development of the thesis and states the conclusions arrived at regarding the effect of leverage and dividend policy on the cost of capital, together with their implications for theory and further research.

Since commencing my doctoral thesis many people have given me encouragement and it is not appropriate to name them all here. However, I cannot let the opportunity pass to record that I am deeply grateful to Esso (Australia) Limited, the Australian Mutual Provident Society, Trans Australian Airlines and the Sydney Stock Exchange Limited for their financial support. Furthermore, to Mr. R. Mitchell, Head of the School of Operations Research, Canberra Institute of Advanced Education for assisting in the development of the numerous computer programs necessary to establish a data bank of individual comparative firm statistics. Finally to my supervisors, Professors R.C. Olsson and A.S. Carrington and my colleagues, Messrs. A.D. Castagna, S. Filan and D.L. Henderson, with whom I had many conversations concerning the details of this thesis I also extend my gratitude.

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THE EFFECT OF FINANCIAL VARIABLES ON THE COST OF CAPITAL IN AUSTRALIA

CHAPTER 1

THE THEORETICAL FOUNDATIONS

> *'Contrawise'* continued Tweedledee, *'if it was so, it might be; and if it were so it would be; but as it isn't, it ain't. That's logic.'*
>
> Carroll

A] THE CONCEPT OF THE COST OF CAPITAL

The most deep-seated conceptual problem in finance today centres around the term, 'cost of capital' a phrase that has caused as much confusion as the expression, 'rate of interest' in the literature of theoretical economics; and rightly so for no other concept is quite as thoroughly entangled with the foundations of the discipline. While there is fairly general agreement concerning the usefulness of the concept and how it should be applied, there has been a fundamental lack of agreement on exactly what is is and how it should be measured. So long as this remains so, any estimate of the cost of capital requires, at some point, the exercise of informed judgment. The contribution of theory in its present state, is to narrow the range of possible estimates within which judgment must be exercised. A determination of the nature of the cost of capital and its relevance to firm decision making is advanced by examining both the nature of modern financial management and the financial objective of the firm.

Solomon(1) has described the modern approach to

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1. Ezra Solomon, The Theory of Financial Management, (Columbia University Press, New York, 1963), 8.

financial management as the attempt to provide answers to these questions:

1) What specific assets should an enterprise acquire?

2) What total volume of funds should an enterprise commit?

3) How should the funds required be financed?

The first two questions can be referred to jointly as the investment decision, and the third as the financing decision. In each of these two major decision areas, the firm's cost of capital is a critical factor to be considered in arriving at any solution. In the investment decision the cost of capital serves as a 'hurdle rate' or 'cut-off' rate when evaluating proposed capital expenditures using the rate of return approach.(2) Alternatively, it is the discount rate in the net-present value method. Figure (1-1) illustrates the use of the marginal cost of capital as the cut-off rate, all proposed capital expenditures included in amount of investment OX_1 are profitable, i.e., the marginal investment return is in excess of the marginal cost of capital, whereas those proposed expenditures increasing the amount of investment beyond OX_1 are unprofitable. Figure (1-1) also illustrates that (given no capital rationing) the intersection of the marginal cost of capital line with the marginal investment return line determines the amount of funds to be invested and the amount of financing for the period, which is OX_1. In the financing decision, the cost

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2. This assumes that the firm is not in a capital rationing situation, if it is the appropriate cut-off rate is no longer the cost of capital but the marginal investment return.

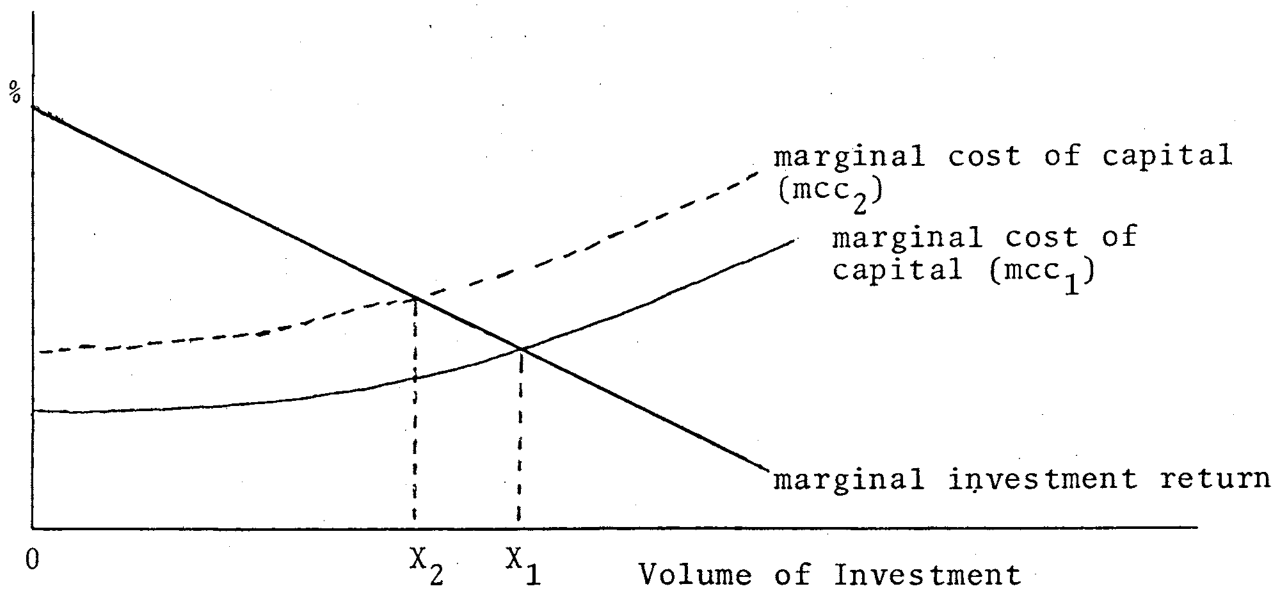

FIGURE (1-1) MARGINAL INVESTMENT RETURN AND THE MARGINAL COST OF CAPITAL

of capital provides a measure of the effectiveness of the firm's capital structure. That is, for a given firm at a point in time, some capital structures could be more efficient than others and, traditionally the efficiency is measured in terms of the cost of capital. In Figure (1-1) the marginal cost of capital line (mcc_1) embodies the optimal capital structure at each scale of investment. The effect of a firm not raising its funds in the optimum manner is that unnecessary financial costs are incurred resulting in an upward shift in the marginal cost of capital line (mcc_2). Such a shift is significant to the economy as a whole, in that, the firm's cut-off rate will be set too high and as a result the economy will not grow as rapidly as it might otherwise do, since the amount of funds to be invested for the period will fall from OX_1 to OX_2. Furthermore, resources may be diverted from more productive to less productive uses causing actual gross national product to fall below potential gross potential product.

The question of the proper objective of the firm is a contentious one. There is at the outset, the question of whether the firm should seek to maximise the welfare of its owners by one criterion or another, or whether it should have broader aims beyond the owners welfare, i.e., incorporating the interests of other groups, e.g. management, employees and creditors. Assuming that the objective of the firm in making its financial decisions should be to maximize the economic welfare of its owners, what does this mean in more precise terms? In order to make a valid formulation of the objective of the firm, it is helpful to revert to the objective of the individual. The objective of the individual in making his financial decisions should be to maximize the utility of his consumption over time, that is, to strive to consume goods and services in the amounts and patterns and at times that will yield the greatest satisfaction. The objective of the firm therefore should be to aid its owners in reaching their objective. Until recently it was almost universally accepted that the principal objective of the firm should be to maximize profit. Most economic analyses of the behaviour of firms assume that they will select that course of action that promises the largest contribution to profit. However, in recent years it has been argued that this assumption is an unsatisfactory basis from which to proceed. Some authors have suggested that profit is not the only objective of the firm,[3] while others, agreeing that profits are important, have questioned the assumption of maximization.[4] Today, most writers on business finance accept the proposition that the fundamental objective of the firm is to maximize its value to the existing ordinary shareholders.[5] For practical convenience, the measure of value is usually taken to be the market value of the firm's ordinary shares over a period of sufficient length to eliminate seasonal and other random fluctuations, that is, a "normalised" market price. The firm by adopting the objective of maximizing its value does what it can to maximize the owners wealth. Then with their wealth maximized, the owners can adjust their fund flows in such a way as to optimize their consumption by buying and selling or borrowing and lending in the market.

When discussing the modern approach to financial management it was stated that the cost of capital is a critical factor in each of the firms' two major decision areas. In the investment decision the cost of capital was seen to represent the cut-off rate for the allocation of

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3. For example see: Herbert A. Simon, "Theories of Decision-Making in Economics and Behavioral Science", American Economic Review, 49 (June 1959), 253-83; William J. Baumol, Business Behaviour, Value and Growth, (Macmillan Company, New York, 1959); Robin Marris, "A Model of the 'Managerial' Enterprise", Quarterly Journal of Economics, 77 (May 1963), 185-209.

4. J. McB. Grant, "The Cost of Capital", The Australian Accountant, (February 1965), 64-65.

5. Van Horne, Financial Management and Policy, *op. cit.*, Chapter 1.

capital to investment projects; as such, the cost of capital can therefore be regarded as the required rate of return needed to justify the use of capital. This definition of the cost of capital can be made more operationally meaningful by relating it to the financial objective of the firm. Gordon has provided us with an excellent definition reflecting this approach which is, "the cost of capital for a firm is a discount rate with the property that an investment with a rate of profit above (below) this rate will raise (lower) the value of the firm."[6] It is important for a proper understanding of the cost of capital to appreciate the intimate relationship between a firm's cost of capital and its value. Such a relationship was recognized as early as 1952 by Durand,who in suggesting that attempts to define and measure the cost of capital must await the formulation of a viable theory of security valuation said, "Security appraisal is the key to measuring the cost of capital."[7] More recently Brigham and Gordon on this same point have commented that:

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6. Myron J. Gordon, The Investment, Financing and Valuation of the Corporation, (Richard D. Irwin, Homewood Illinois, 1962), 218.

7. David Durand, Costs of Debt and Equity for Business: Trends and Problems of Measurement, (Conference on Research in Business Finances: National Bureau of Economic Research, New York, 1952).

> "Implicit in every cost of capital proposition is a stock value model, and testing a particular cost of capital theorem involves establishing and testing the stock value model from which the theorem was derived."(8)

In an endeavour to clarify the relationship between a firm's cost of capital and its value several stock value models purporting to show the influence of a firm's leverage and dividend policies on its value will be examined.

B] LEVERAGE AND VALUATION

1) Introduction

Since the several theories concerning the influence of leverage on a firm's value are based on the path-breaking work of Durand, a proper understanding of these theories can only benefit from a presentation of his ideas. Concerning the question of security appraisal, Durand has proposed two approaches to the determination of a firm's value. The first approach is called the net operating income approach while the second is called the net income approach. These two approaches represent the extremes in valuing the firm with regard to the degree of leverage. Durand's two approaches to security appraisal are based on the following simplifying assumptions:

1. The expected future operating earnings of the firm are assumed to be the same as the present operating earnings; furthermore, the expected values of the probability distributions of expected operating

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8. Brigham and Gordon, "Leverage, Dividend Policy and the Cost of Capital, *op. cit.*, 85-6.

earnings are assumed to be the same in all periods.

2. All investors in the market are assumed to have the same expected values of the subjective probability distributions for a firm's expected future operating earnings.

3. Changes in a firm's capital structure are assumed to be effected immediately, such that the ratio of debt to equity is changed by issuing debt to repurchase equity or by issuing equity to pay-off debt; furthermore, firms are assumed to have a policy of paying 100% of their earnings in dividends.

4. Capital markets are assumed to be perfect; there are no transaction costs and all securities are assumed to be infinitely divisible; furthermore, investors are assumed to be rational and behave accordingly.

5. The business risk complexion of the firm is assumed to remain constant; furthermore, there is an absence of tax on firm earnings.

Using the net operating income approach, the total market value of the firm is obtained by capitalizing the net operating income by an average capitalization rate (K_o). The market value of the equity is then obtained by subtracting the market value of the debt from the total market value of the firm. The essence of this approach, is that the equity capitalization rate (K_e) rises with the degree of leverage to such an extent, as to offset the supposedly cheaper cost of debt (K_i) and thereby maintains the average capitalization rate constant for all degrees of leverage. Graphically the effect on K_i, K_e and K_o when the degree of leverage, as denoted by the ratio, V_D/V_S increases under the assumptions of the net operating income approach is shown in Figure (1-2). Therefore, according to the net

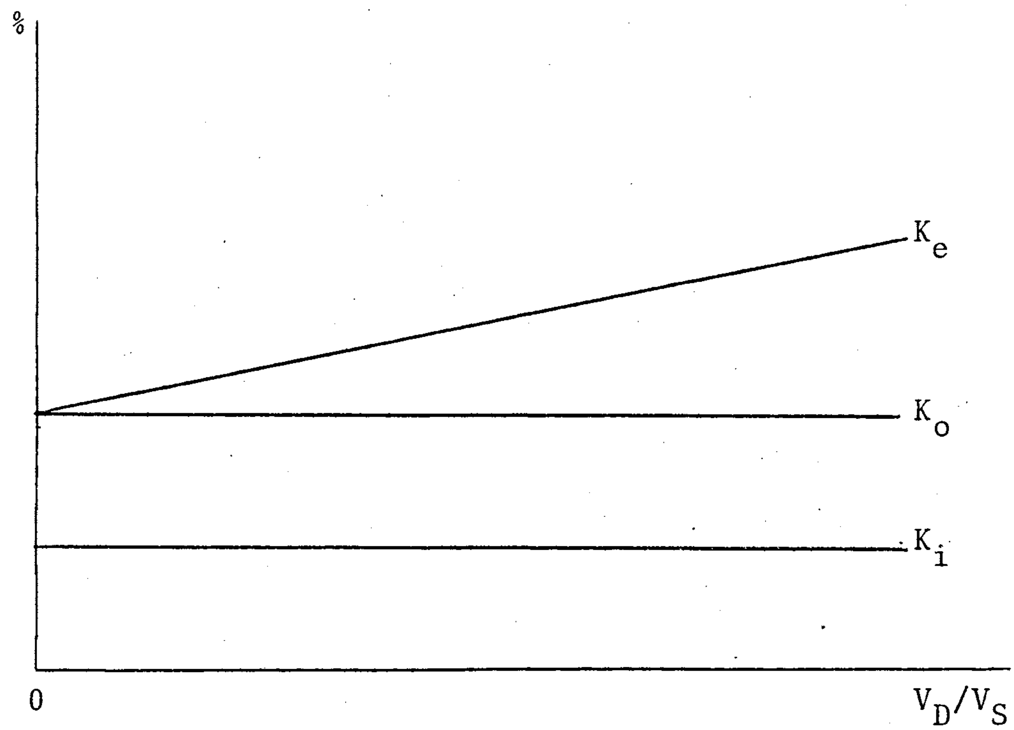

FIGURE (1-2) CAPITAL COSTS - NET OPERATING INCOME APPROACH

operating income approach, the total market value of the firm is constant irrespective of the proportion of debt in its capital structure. As a result of this fact, the approach implies that there is no one optimal capital structure, that is all capital structures are optimal and the investor is indifferent as to which one is chosen by the firm.

Using the net income approach, the market value of the equity is obtained by capitalizing the earnings available to ordinary shareholders (net operating income less the dollar cost of debt) by an equity capitalization rate. The total market value of the firm is then obtained by adding the market value of the debt to the market value of the equity. The essence of this approach is that the debt capitalization rate but more particularly the equity capitalization rate remain constant for all degrees of leverage.(9) Graphically the net income approach is shown in Figure (1-3). Therefore according to the net income approach, the total market value of the firm does not

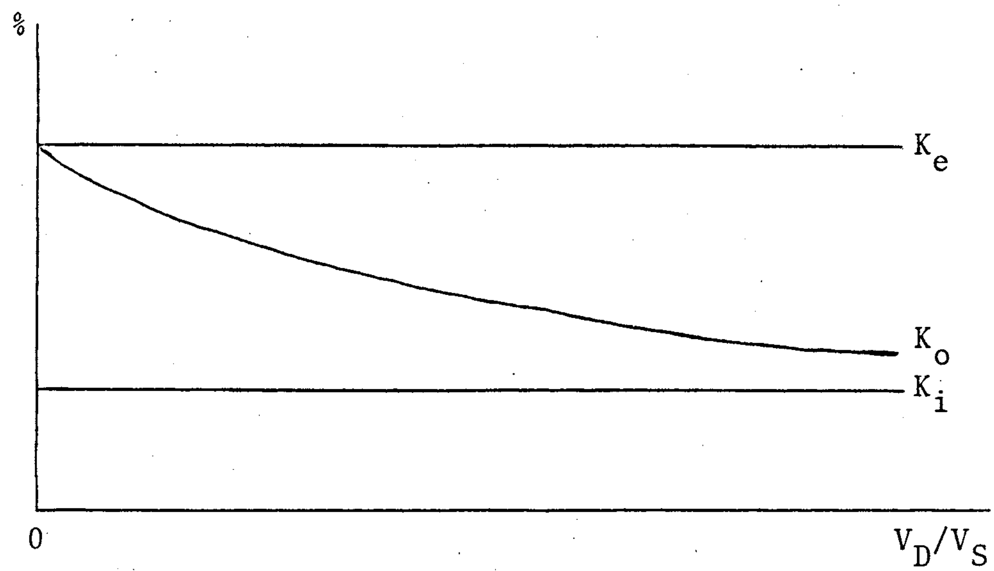

FIGURE (1-3) CAPITAL COSTS - NET INCOME APPROACH

remain constant but increases with the proportion of debt in its capital structure. The outcome of this event is that there is an optimal capital structure and it is the one at which the total market value of the firm is at its greatest, or alternatively, the average capitalization rate is at its lowest.

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9. This approach is often referred to as the naive traditional approach and it implies that the firm does not become increasingly more risky in the minds of investors and creditors as the degree of leverage is increased.

In supporting the net operating income approach to valuation its proponents contend that,

> ". . . the totality of risk incurred by all security holders of a given company cannot be altered by merely changing the capitalization proportions. Such a change could only alter the proportion of the total risk borne by each class of security holder."(10)

Since a firm's total risk cannot be altered by changes in its capital structure then neither, contend the proponents of the net operating income approach, can its total market value. On the other hand, proponents of the net income method of valuation take a position that is somewhat less straightforward. They contend,

> ". . . firstly, that conservative increases in the amount of debt does not increase the risk borne by the ordinary shareholders; secondly, that a package of securities containing a conservative proportion of debt will justifiably command a higher market price than a package of ordinary equity alone."(11)

Although the first contention appears to have little merit in that it runs counter to the rigorous analysis offered by the proponents of the net operating income method of valuation the second, foreshadowing imperfections in the capital market appears to be correct. In fact, an opportunity may well exist to increase the total market value of the firm through the introduction of debt financing, because in the real world investors are hampered in their

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10. Durand, "Cost of Debt and Equity Funds for Business: Trends and Problems of Measurement", *op. cit.*, 228.

11. *Ibid.*, 230.

actions. That is, in a perfectly fluid world the market will endeavour to ensure that yield and risk differentials between securities are in constant equilibrium. However, in the real world investors may find that they are no longer able to maintain a situation of equilibrium in the market, either because of insufficient funds, income taxes or legal barriers. As a result of this fact yield differentials may well be maintained above risk differentials and there will occur what Durand has referred to as, "a sort of super premium for safety; and a corporations management can take advantage of this super premium by issuing as many bonds as it can maintain at a high rating grade."[12] It would appear therefore that a theoretical compromise between the two methods of security appraisal is entirely feasible in fact Durand contends that,

> "One can agree with the advocates of the NOI Method that the totality of risk inherent in the securities of a single company always remain the same, regardless of the capitalization; and one can agree with the advocates of the NI Method that the market will actually and justifiably pay more for the same totality of risk if the company is judicially capitalized with bonds and stock, and no inconsistency whatsoever will be introduced."[13]

To date our discussion of the net operating income and net income approaches to security appraisal have been purely definitional, that is, lacking in behavioral significance. Behavioral support for the independence of the total market value of the firm or alternatively the cost of capital from

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12. Durand, *op. cit.*, 231.

13. *Ibid.*

its capital structure first appeared in the now famous 1958 article of Modigliani and Miller.[14] However before examining their position let us consider the traditional approach to security appraisal.

2) <u>The Traditional Approach</u>

The traditional approach to security appraisal although clearly disagreeing with the net operating income approach is not the net income approach in pure form. Rather the traditional approach covers all the ground between those two approaches. It contends that if a firm employs moderate amounts of leverage, then the added earnings available to the remaining shareholders is sufficient to offset the increase in the equity capitalization rate due to the increased risk of carrying debt in the firm's capital structure, with the result being an increase in the total market value of the firm. However, beyond some critical proportion of leverage, the approach contends that the equity and (at extreme proportions) debt capitalization rates will rise sufficiently to offset the added earnings available to the remaining shareholders, thereby producing a decline in the total market value of the firm, or alternatively a rise in the cost of capital. Graphically, the effect on K_i, K_e and K_o when the degree of leverage as denoted by the ratio, V_D/V_S increases under the assumptions of the traditional approach is shown in Figure (1-4). Therefore, according to the

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14. Modigliani and Miller, "The Cost of Capital, Corporation Finance and the Theory of Investment", *op. cit.*, 261-77; indeed many authorities date the development of modern analytical finance theory from this article.

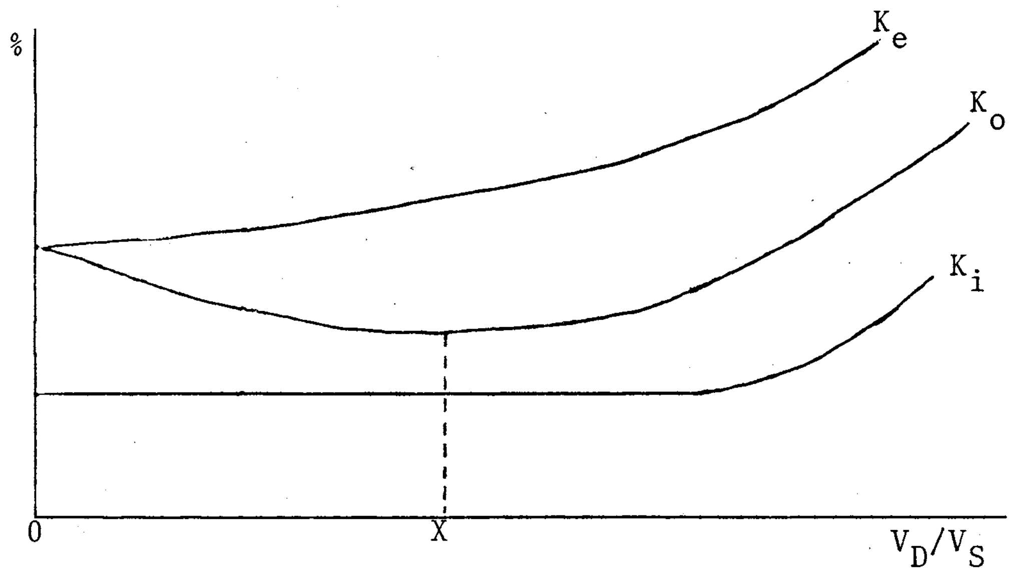

FIGURE (1-4) CAPITAL COSTS: TRADITIONAL APPROACH

traditional approach the total market value of the firm or alternatively the cost of capital is not independent of its capital structure and there is an optimal capital structure (X). At that optimal structure, the marginal real cost of debt (explicit and implicit) is the same as the marginal real cost of equity in equilibrium. For proportions of leverage before that structure, the marginal real cost of debt is less than that of equity; beyond that structure, the marginal real cost of debt exceeds that of equity.

According to the traditional position the actual location of the optimum capital structure for any given firm will depend upon the amount of business uncertainty involved in its operations and with the attitude of the capital markets toward that uncertainty. This in turn is made up of the composite of expectations with regard to a firm's product market and prices, the fixity of its costs, and the opinion of the market with respect to the firm's management. As far as those elements of instability and uncertainty are concerned, a firm is likely to resemble other firms in the same industry, but interindustry, differences are likely to be significant.(15) Because of this, each industry group can be expected to have a different optimum range as far as leverage is concerned. This optimum range occurs at a higher level of leverage for stable industries than for unstable industries. Additionally, the optimum capital structure for a particular firm is said to be a function of the liquidity and marketability of its assets.(16) Thus the traditional approach to security appraisal allows for considerable variation in the optimal capital structure of different firms.

In their original paper, Modigliani and Miller comment that, "although the falling, or at least U-shaped, cost of capital function is in one form or another the dominant view in the literature, the ultimate rationale of that view is by no means clear."(17) To rectify this situation let us briefly consider both the traditional and net operating income approaches to security appraisal from the viewpoint of investor behaviour.(18) As mentioned earlier, the

15. For an examination of the differences in capital structures of various industries, see Eli Schwartz and J. Richard Aronson, "Some Surrogate Evidence in Support of the Concept of Optimal Financial Structure", Journal of Finance, 22 (March 1967), 10-18.

16. See Solomon, The Theory of Financial Management, *op. cit.*, 97.

17. Modigliani and Miller, "The Cost of Capital, Corporation Finance and The Cost of Capital", *ibid.*, 278.

18. This section has benefited greatly from the works and comments of Professor Ronald F. Wippern.

objective of the individual in making his financial decisions should be to maximize the utility of his consumption over time. Furthermore, from the firm's point of view it was said that the attainment of such an objective was enhanced if it sought to maximize its value to the existing ordinary shareholders. The criterion of maximization of firm value may be regarded as a function of two variables, the expected earnings stream from the assets and the rate at which that stream is capitalized by the market. Rates of substitution between the size of the earnings stream and the capitalization rate may be portrayed by a set of constant wealth lines such as those shown in Figure (1-5). There the lines W_1, W_2 and W_3 each represent a locus of points of equal wealth. These equal wealth lines depict the arithmetic relationship between earnings levels and capitalization rates, such that all combinations along a line represent a constant capitalized value. The slopes

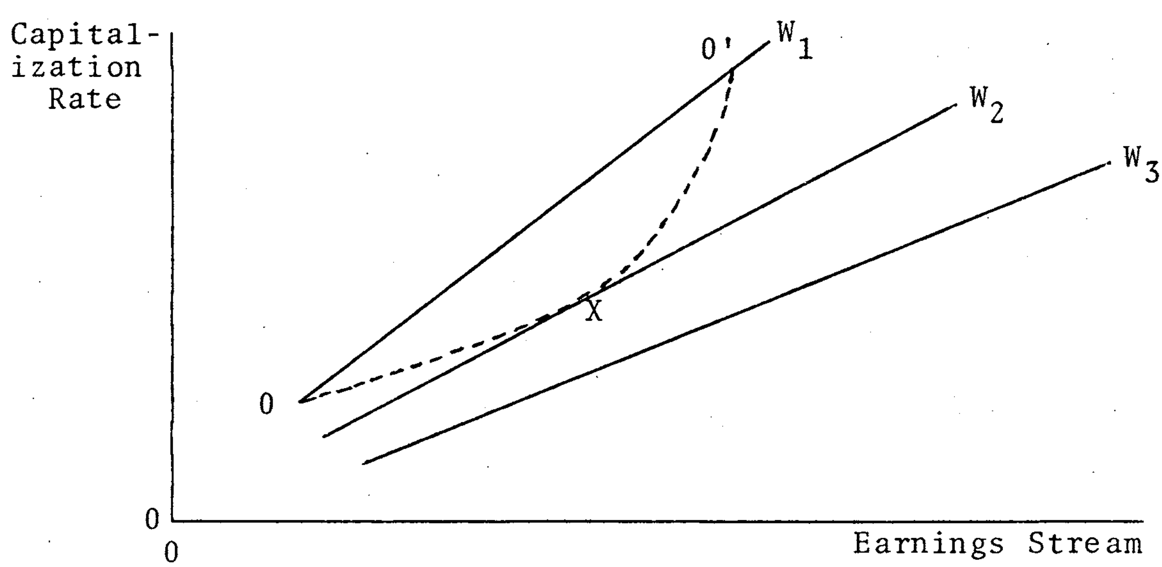

FIGURE (1-5) INVESTOR CONSTANT WEALTH LINES AND THE INVESTMENT OPPORTUNITY BOUNDARY of the constant wealth lines may be interpreted as the marginal rates of substitution between risk and earnings. Therefore, if the capitalized value of an asset is to remain constant as both risk and earnings increase, a constant rate of marginal substitution between these two variables must exist, and an example of this rate of substitution is shown in Figure (1-5).

Furthermore in Figure (1-5), the curve 0-0' represents the set of investment opportunities available to the shareholder. These opportunities are depicted as combinations of the level of the earnings stream and risk (as reflected in the capitalization rates). Based on the assumption that increased earnings are available only at an increasing marginal rate of substitution between risk and earnings the investment opportunity boundary is drawn convex downward. The shareholders objective is achieved at the point of tangency between the investment opportunity curve and the highest attainable constant wealth line.

The problem of the effect of leverage on the total market value of the firm can now be rephrased in terms of the analytical framework provided by the wealth line-investment opportunity curve analysis. In order to make the analysis as simple as possible the earlier assumptions surrounding Durand's two approaches to security appraisal are retained and additionally it is also assumed that the general level and structure of capital market rates remain constant. By formulating the analysis in this way it is possible to view the problem from the perspective of both the firm and the investor. In making its capital structure decisions the firm seeks to achieve a unique position in an investment opportunity set. In doing so the firm's pursuit of the goal of maximizing the economic welfare of its owners may then be visualized as an attempt to provide the combination of risk and earnings that will lead both to a point on the efficient boundary of the investment opportunity set and to a tangency position of the set with the investor's wealth line. The point of tangency between the boundary of the investment opportunity set and the highest attainable investor's wealth line represents a particular combination which constitutes both optimal investment allocation for the shareholder and goal achievement for the firm.

In terms of the relationships defined above the traditional approach to security valuation implies that as the proportion of debt to equity in a firm's capital structure increases, then the market valuation of the firm's shares will trace out an investment opportunity boundary of the firm similar to the curve 0-0' in Figure (1-5). The slope of such a curve commences by being less than that of the investor's wealth line, then proceeds to equal that of the investor's wealth line (at which point tangency occurs) and finally ends by being greater than that of the investor's wealth line. At the point of tangency between the investment opportunity curve with the highest attainable investor's wealth line the firm's optimal capital structure is achieved. The economic interpretation of this relationship is simply that, as the firm offers differing combinations of earnings and risk by adjusting its capital structure, the market responds by demanding varying marginal rates of substitution between risk and earnings than that defined by the investor's wealth line. Given the form of response described above a shareholders wealth will first increase with respect to leverage reach a maximum and then decrease with the addition of debt beyond some acceptable limit.

Alternatively in terms of the relationships defined earlier the net operating income approach to security valuation implies that as the proportion of debt to equity in a firm's capital structure increases, then the market valuation of the firm's shares will trace out an investment opportunity boundary of the firm coincident with and having the same slope as an investor's wealth curve.[19] The implication that the market responds to changes in a firm's capital structure by moving along (instead of across) a constant wealth curve means that a constant marginal rate of substitution between risk and earnings is required as leverage is increased. However, if it can be assumed that the addition of debt to a firm's capital structure always results in some added risk to the shareholder, the form of market response implicit in the net operating income approach is clearly at variance with the usual assumption in economics that increases in risk must be compensated for by ever-increasing equity yield premiums. Thus in terms of the behaviour of equity capitalization rates with respect

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19. This conclusion follows from the basic contention of the net operating income approach that the equity capitalization rate increases with increases in leverage by an amount exactly sufficient to offset the contribution of the incremental earnings attributable to each remaining share.

to leverage the net operating income approach implies that increasingly risky returns are valued at lower and lower marginal risk premiums.

The proponents of the net operating income approach argue, however, that the traditional view of the effect of leverage on the total market value of the firm implies that, the total risk or uncertainty that must be assumed by all security holders as a group, can be altered by the manner in which this total risk is distributed among the various classes of security holders, that is, by manipulation of the firm's capital structure. Whereas they maintain that changes in a firm's capital structure only shifts the manner in which earnings and the uncertainty of earnings are distributed among the various classes of security holders, but there can be no change in the total amount of uncertainty.

The validity of these two approaches to security appraisal depends on the validity of the assumptions made regarding market response to charges in a firm's capital structure. Whether, in some ex-post sense, the total uncertainty of the firm is or is not constant regardless of its capital structure, it is clear that in a world of the subjective appraisal of uncertainty by investors there is no compelling evidence of why the market should be expected to respond as if this were so. Furthermore, it cannot be conclusively argued that investors ought to respond to leverage changes in the manner specified by the proponents of the traditional theory. In conclusion, both the net operating income and traditional approaches to security appraisal are based on a set of assumptions regarding investor behaviour. However neither approach provides a complete and definitive explanation of how investors should respond to changes in a firm's capital structure.

3) The Modigliani and Miller Approach

The approach adopted by Modigliani and Miller to the question of the relationship between leverage and the total market value of the firm or alternatively its cost of capital is identical with Durand's net operating income approach. They make a formidable attack on the traditional position by offering behavioural justification for having the firm's total market value or alternatively its cost of capital remain constant throughout all degrees of leverage. Modigliani and Miller develop their approach free from any assumptions regarding investor behaviour. Instead, they focus their attention exclusively on the investor's market opportunities and not on the manner in which he responds to those opportunities. The assumptions underlying the Modigliani and Miller approach are:

1. Capital markets are assumed to be perfect and that shares traded in these markets are done so under conditions of atomistic competition; there are no transactions costs and all securities are assumed to be infinitely divisible; furthermore, investors are assumed to be rational and behave accordingly.
2. The uncertain stream of earnings accruing to the firm's shareholders is assumed to be represented

by the concept of the 'average expected future operating earnings of the firm', which is designated as $\overline{X}$ (the 'expected return of the share') a subjective random variable. Furthermore, it is assumed that although individual investors may have different views as to the shape of the probability distribution of a firm's expected returns in any period, they are at least in agreement as to its expected mean return. Finally, it is assumed that the division of the uncertain stream accruing to the firm's shareholders between cash dividends and retained earnings in any period is a mere detail.

3. The risk characteristics of all firms are specified by the concept of 'homogeneous' or 'equivalent' risk classes and it is assumed that firms can be grouped into these classes. Firms in a given 'homogeneous' or 'equivalent' risk class need not be of the same size (measured in terms of $\overline{X}$), but they are assumed to all have the same degree of relative business risk.[20] Furthermore, for an investor who appraises investment returns solely on the basis of expected value and variance it is assumed that the earnings stream of any two firms in the same risk class and with the same capital structures are perfect substitutes.

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20. Two firms are said to be in the same risk class if their earnings after adjustment for scale difference have identical risk characteristics.

4. The 'firm' used in the analysis is assumed to fall into none of the standard categories - proprietorship, partnership or corporation - but is a sort of hybrid, with marketable securities like a corporation distribution of income like a partnership and allocation of responsibility like neither.
5. The absence of tax on firm earnings is assumed.

Operating within these five assumptions, Modigliani and Miller set forth three propositions as follows:

Proposition 1: "The market value of any firm is independent of its capital structure and is given by capitalising its expected return at the rate K_o appropriate to its class."[(21)] Symbolically, this proposition can be expressed in the form of Equation (1-1):

$$V_T \equiv (V_S + V_D) = \frac{\bar{X}}{K_o} \qquad (1\text{-}1)$$

where:

$\bar{X}$ is the expected return on the assets owned by the firm,

V_T is the total market value of the firm,

V_S is the market value of ordinary shares,

V_D is the market value of debt,

K_o is the average capitalization rate of the firm.

Proposition 1 can be stated in an equivalent way in terms of the firm's average capitalization rate as shown by Equation (1-2):

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21. Modigliani and Miller, "The Cost of Capital, Corporation Finance and the Theory of Investment", *op. cit.*, 268.

$$(1\text{-}2) \qquad K_o = \frac{\overline{X}}{V_T} \equiv \frac{\overline{X}}{V_S+V_D}$$

that is, "the average cost of capital to any firm is completely independent of its capital structure and is equal to the capitalisation rate of a pure equity stream of its class."(22)

<u>Proposition 2</u>: "The expected yield of a share of stock is equal to the approximate capitalisation rate K_e^* for a pure equity stream in the class, plus a premium related to financial risk equal to the debt-to-equity ratio times the spread between K_e^* and r."(23) Symbolically, this proposition can be expressed in the form of Equation (1-3):

$$(1\text{-}3) \qquad K_e = K_e^* + (K_e^* - r)\,\frac{V_D}{V_S}$$

where:

K_e is the equity capitalization of the firm

K_e^* is the equity capitalization rate for non-levered firms in a given risk class

r is the interest rate on debt obligations.

<u>Proposition 3</u>: "The cut-off point for investment in the firm will in all cases be $K_e^*(K_o)$ and will be completely unaffected by the type of security used to finance the investment."(24)

The essence of the Modigliani and Miller position is

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22. Modigliani and Miller, *op. cit.*, 268-69.

23. *Ibid.*, 271.

24. *Ibid.*, 288.

that changes in a firm's capital structure does not alter the total risk or uncertainty that must be assumed by its security holders as a group. Therefore the total market value of the firm must be the same regardless of its capital structure. Support for their position rests on the argument that a process akin to arbitrage will establish a market equilibrium in which the total value of a firm will depend only on investor's estimates of the firm's business risk and its expected future earnings. The general condition for this equilibrium to exist is that no two claims to expected future cash receipts considered to be identical in risk can sell at the same time in a rational securities market at prices such that the expected rates of return on the claims differ. In essence, Modigliani and Miller ask the question; is it possible for an individual investor, by borrowing on his own and purchasing shares in firms which have no debt in their capital structure (personal leverage), to duplicate the earnings stream generated by firms that do have debt (firm leverage)? If the answer is affirmative, then the ordinary shares of levered firms cannot command a higher price than ones completely equity financed. To see why this is so consider the following analysis.

Two firms A and B both belong to the same 'equivalent' risk class and generate equal amounts of expected net operating earnings ($\bar{X}$) annually. However, firm A is financed entirely with equity whereas firm B is financed with a combination of debt and equity. Assuming that the market value of firm A's equity is given as ${}_AV_S$ and the market value of firm B's debt and equity are given as ${}_BV_D$ and ${}_BV_S$

respectively. Then Modigliani and Miller's Proposition 1 may be expressed symbolically as follows:

$$_AV_T = {_BV_T}$$

that is,

$$_AV_S = {_BV_D} + {_BV_S}$$

Suppose however that the market is not in a condition of equilibrium and that ${_AV_T} \neq {_BV_T}$ but more specifically that ${_BV_T} > {_AV_T}$ then in these circumstances Modigliani and Miller contend that arbitragers will enter the market and establish equilibrium. To understand this arbitrage operation, consider an investor who owns the fraction α of the shares in firm B, his portfolio return on these shares, represented as, Y_B is given by Equation (1-4):

$$(1\text{-}4) \qquad Y_B = \alpha(\overline{X} - r\,{_BV_D})$$

Assuming then that the investor sells his shares in firm B for $\alpha\,{_BV_S}$ dollars and augments this sum with fixed borrowings of $\alpha\,{_BV_D}$ then he is able to purchase, $\alpha({_BV_S} + {_BV_D})$ dollars worth of shares in firm A. The portfolio return on these shares, represented as, Y_A is given by Equation (1-5):

$$(1\text{-}5) \qquad Y_A = \alpha \frac{{_BV_T}}{{_AV_T}} \overline{X} - \alpha r\,{_BV_D}$$

A comparison of Equations (1-4) and (1-5) reveals that when ${_BV_T} > {_AV_T}$ then $Y_A > Y_B$. Then if as Modigliani and Miller contend, firm and personal leverage are perfect substitutes an investor holding shares in firm B, under the conditions described above, will find it profitable to transfer his holding into shares of firm A. This 'arbitrage' operation - the substitution of personal leverage for firm leverage - will continue until the total market value of levered firm B equals that of unlevered firm A.

Suppose again that the market is not in a condition of equilibrium but this time that ${}_AV_T > {}_BV_T$ then Modigliani and Miller again contend that arbitragers will enter the market and establish equilibrium. Consider an investor who owns the fraction α of the shares in firm A, his portfolio return on these shares is given by Equation (1-6):

$$(1\text{-}6) \qquad Y_A = \alpha\bar{X}$$

Assuming then that the investor sells his shares in firm A for $\alpha_B V_S$ and uses the money to purchase shares in firm B. The portfolio return on these shares is given by Equation (1-7):[25]

$$(1\text{-}7) \qquad Y_B = \alpha\frac{{}_AV_S}{{}_BV_T}(\bar{X} - r_B V_D) + r\alpha\frac{{}_AV_S\ {}_BV_D}{{}_BV_T}$$

$$Y_B = \alpha\frac{{}_AV_T}{{}_BV_T}\bar{X}$$

A comparison of Equations (1-6) and (1-7) reveals that when ${}_AV_T > {}_BV_T$ then $Y_B > Y_A$. Then if as Modigliani and Miller

25. The portfolio return is related to the following analysis. Since firm B is levered, the investor is committed to $\frac{{}_BV_D}{{}_BV_S}$ dollars of leverage for each dollar invested in firm B. It is Modigliani and Miller's contention however that the investor can offset this leverage component in his new portfolio by dividing his investible funds between both the shares and debt securities of firm B in the proportions as given below:

$$\text{shares} \quad \frac{\alpha_A V_S\ {}_BV_S}{{}_BV_T} \text{ dollars}$$

contend, firm and personal leverage are perfect substitutes an investor holding shares in firm A, under the conditions described above, will find it profitable to transfer his holding into shares of firm B. This 'arbitrage' operation - offsetting firm by personal leverage - will continue until the total market value of unlevered firm A equals that of levered firm B.

In summary then the arbitrage argument of Modigliani and Miller contends that investors will take advantage of the occurrence of market disequilibrium to exchange securities of one firm for those of another and in doing so exchange, "one income stream for another stream, identical in all respects but selling at a lower price."[26] Furthermore,

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debt $\alpha({}_A V_S - \frac{{}_A V_S \; {}_B V_S}{{}_B V_T})$ dollars

Since $\alpha\frac{{}_A V_S \; {}_B V_S}{{}_B V_T}$ dollars invested in the shares of firm B commits the investor to $\alpha(\frac{{}_A V_S \; {}_B V_S}{{}_B V_T})(\frac{{}_B V_D}{{}_B V_S})$ dollars of the debt of firm B this leverage is exactly offset by investors holdings of $\alpha(\frac{{}_A V_S - {}_A V_S \; {}_B V_S}{{}_B V_T})$ dollars of firm B's debt.

26. Modigliani and Miller, "The Cost of Capital, Corporation Finance and the Theory of Investment", *Ibid.*, 269.

> ". . . as investors exploit these 'arbitrage' opportunities, the value of the overpriced shares will fall and that of the underpriced shares will rise, thereby tending to eliminate the discrepency between the market values of the firm."(27)

Relying on the arbitrage process Modigliani and Miller are able to conclude that,

> ". . . levered companies cannot command a premium over unlevered companies because investors have the opportunity of putting the equivalent leverage into their portfolio directly by borrowing on personal account."(28)

The arbitrage argument of Modigliani and Miller can be extended to situations in which there are more than two firms in a risk class; but again, the total market value for each firm would be the same in equilibrium. In all cases the important thing is the presence in the market of rational investors who are willing to substitute personal for firm leverage. More recently the arbitrage argument has been extended to cross risk classes and include general equilibrium in the capital markets. Here it occurs on the basis of expected risk and return for individual securities as well as the expected correlation between returns for these securities.(29)

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27. Modigliani and Miller, *op. cit.*, 269.

28. *Ibid.*, 270.

29. For such an analysis see, Robert S. Hamada, "Portfolio Analysis, Market Equilibrium and Corporation Finance", Journal of Finance, 24 (March 1969), 13-31; Joseph E. Stiglitz, "A Re-examination of the Modigliani-Miller Theorem", American Economic Review, 59 (December 1969), 784-93; and Mark E. Rubinstein, "A Mean-Variance Synthesis of Corporate Financial Theory", Journal of Finance, 38 (March 1973), 167-82.

In complete and perfect capital markets, the arbitrage arguments assures the validity of Modigliani and Miller's proposition that the total market value of the firm is independent of its capital structure. However, in order to obtain a positive theory concerning the effect of capital structure on the firm's total market value it is necessary to introduce into the Modigliani and Miller framework market imperfections most likely to exist in practice. The following are regarded as the major market imperfections leading to impairment of the Modigliani and Miller arbitrage process.

1. The Modigliani and Miller analysis implies that personal and firm leverage are perfect substitutes however this may not be the case. From the standpoint of the individual shareholder, there may be less risk in firm than in personal borrowing (for an equivalent amount of leverage). In the case of corporate borrowing the individual is protected by limited liability in the event of the firm going into liquidation. However, if a person engages in arbitrage operations, there is the possibility that he will lose his entire personal investment and in addition be liable for his borrowings as well. As a result of these facts it can be seen that the investor's total risk exposure will be greater with personal leverage and investment in an unlevered firm than with a straight investment in a levered firm. These arguments have been well presented by Weston as follows,

> "The corporate institution is a device which shifts a portion of financial risk from owners to creditors. Since the risk to owners is limited to the amount which they have committed to the corporate enterprise, the owners reduce their probable loss. While their losses are limited to the amount actually invested in the enterprise, their gains are not so restricted. Personal leverage does not have the same limited-risk characteristic."(30)

2. In their model Modigliani and Miller assume that as a first approximation the debt yield curve whatever its precise form, is the same for all borrowers. However due to market imperfections such as the sheer size of the firm, the cost of borrowing for the individual investor may be higher than that for the firm. If so, the levered firm could have somewhat greater value than the unlevered firm for this reason alone. Modigliani and Miller do recognize the point that, a slight modification of Proposition 1 would be required if the debt yield curve were different for different borrowers, "the average cost of capital to corporations might fall slightly, as leverage increased over some range, in reflection of this differential."(31)

3. A significant number of investors may not be able to substitute personal for firm leverage because of institutional restrictions. These institutional restrictions

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30. Weston, "A Test of Cost of Capital Propositions", *op. cit.*, 107. For an extended discussion on the effect of limited liability on an investments potential gains and losses see, Barges, The Effect of Capital Structure on the Cost of Capital, *op. cit.*, 90-100.

31. Modigliani and Miller, "The Cost of Capital, Corporation Finance and the Theory of Investment, *op. cit.*, 274.

were mentioned previously in discussing the net income approach to security appraisal and are best summarized by Durand as follows:

> "Mutual funds, fire and casualty companies, closed-end trusts, life insurance companies and most personal trust funds are prevented from buying stocks on margin either by direct prohibitions in their charters or by the rather general acceptance of the prudent man rule. Together these institutional investors command a tremendous volume of investable or invested funds, most of which are simply not available for the purchase of low-leveraged shares on margin, even when they fall to a discount."(32)

4. The arbitrage process tends to be restricted by the presence of transaction costs, with the result that, arbitrage will take place only up to the limits imposed by the transaction costs, after which it is no longer profitable. Concerning this market imperfection Baumol and Malkiel have commented as follows:

> "With any given degree of homemade leverage, his (the shareholders) may be less than if the company itself had chosen that leverage ratio, since the shareholders expected stream of net earnings will be reduced by a stream of payments equal in present value to his transactions - cost outlay . . . We see then that, once transactions costs enter, the financial structure of the company is not irrelevant to the stockholder."(33)

5. In complete and perfect capital markets the costs

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[32]. David Durand, "The Cost of Capital, Corporation Finance and the Theory of Investment: Comment", American Economic Review, 49 (September 1959), 645.

[33]. William J. Baumol and Burton G. Malkiel, "The Firm's Optimal Debt-Equity Combination and the Cost of Capital", Quarterly Journal of Economics, 81 (November 1967), 554.

associated with bankruptcy are assumed to be zero since the bankrupt firms assets can presumably be sold at their economic values. On the other hand in capital markets that are less than perfect if the firm cannot meet its debt obligation, it is forced into bankruptcy and incurs the associated penalties, such as, the sale of firm assets at less than their economic values. In the event of such an occurrence happening, security holders as a whole would receive less than they would in the absence of the associated penalties. To the extent that the levered firm has a greater possibility of bankruptcy than the unlevered one,[(34)] it would on the basis of the earlier discussion tend to be a less attractive investment, all other things the same. Concerning this line of argument Baxter has commented that, "when account is taken of 'risk of ruin', a rising average cost of capital is perfectly consistent with rational arbitrage operations."[(35)] More recently two further works lend additional support to the importance of this market imperfection. First, Stiglitz has shown that the possibility of bankruptcy has very strong implications for firm behaviour, in that

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34. For an investigation of the effect of debt on the probability of a deficit see, Harold Bierman, Jr. "Risk and the Addition of Debt to the Capital Structure", Journal of Financial and Quantitative Analysis, 3 (December 1968), 415-23.

35. Nevins D. Baxter, "Leverage, Risk of Ruin and the Cost of Capital", Journal of Finance, 22 (September 1967), 395-403.

> ". . . the firm's valuation will depend on its debt-equity ratio; that there will be as a consequence, an optimal debt-equity ratio; that the real decisions of the firm (e.g. its investment and choice of technique) cannot be separated from its financial decisions (the two must be made simultaneously); and that the real decisions of the firm may not be productively efficient."(36)

The result that the value of the firm will decrease if it has a high debt-equity ratio was derived assuming that there were no real costs involved in bankruptcy. If bankruptcy costs had been taken into consideration, Stiglitz's results would undoubtedly be reinforced. Second Kraus and Litzenberger using a state preference approach in a world of taxes and bankruptcy penalties show that,

> ". . . the market value of a levered firm is shown to equal the unlevered market value, plus the corporate tax rate times the market value of the firm's debt, less the complement of the corporate tax rate times the present value of brankruptcy costs."(37)

The arbitrage argument is the behavioral foundation for the Modigliani and Miller approach. If the arbitrage process is less than perfectly effective, a firm may be able to increase its total market value and lower its cost of capital with an appropriate amount of leverage. All of the factors listed above impede the effectiveness of the

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36. Joseph E. Stiglitz, "Some Aspects of the Pure Theory of Corporation Finance: Bankruptcies and Takeovers", Bell Journal of Economics and Management Science, 3 (Autumn 1972), 458.

37. Alan Kraus and Robert H. Litzenberger, "A State-Preference Model of Optimal Financial Leverage", Journal of Finance, 28 (September 1973), 918.

Modigliani and Miller arbitrage process. However, Modigliani and Miller deny the importance of these factors by arguing that they are too general. According to them, the notion of personal leverage as a substitute for firm leverage cannot necessarily be rejected, even under real-world conditions. In conclusion they have also commented that,

> "No amount of a priori speculation can ever settle the question of how close the substitutably is between homemade and corporate leverage, to say nothing of how close it would have to be to prevent any significant discrepancy from emerging . . . If homemade leverage were as poor a substitute for corporate leverage as Durand and traditional doctrines (by implication) suggest, then levered companies would command a substantial premium in the market at least over some not insignificant range of capital structures."(38)

Finally a point not considered to date in the discussion of the Modigliani and Miller approach is that, in making their stand they not only contend that a judicious proportion of leverage will lower the firm's average capitalization rate but also that extreme proportions of leverage will raise it. On this point however Modigliani and Miller are on much weaker ground. They contend that even though the debt-yield curve begins to rise once leverage has become excessive the equity capitalization rate will decline to offset such a rise. Graphically the effect on K_i, K_e and K_o when the degree of leverage V_D/V_S

38. Franco Modigliani and Merton H. Miller, "The Cost of Capital, Corporation Finance and the Theory of Investment: Reply", American Economic Review, 49 (September 1959) 657.

increases under the assumptions of the Modigliani and Miller approach (including extreme leverage) is shown in Figure (1-6). Modigliani and Miller's justification for the decline in the equity capitalization rate with extreme

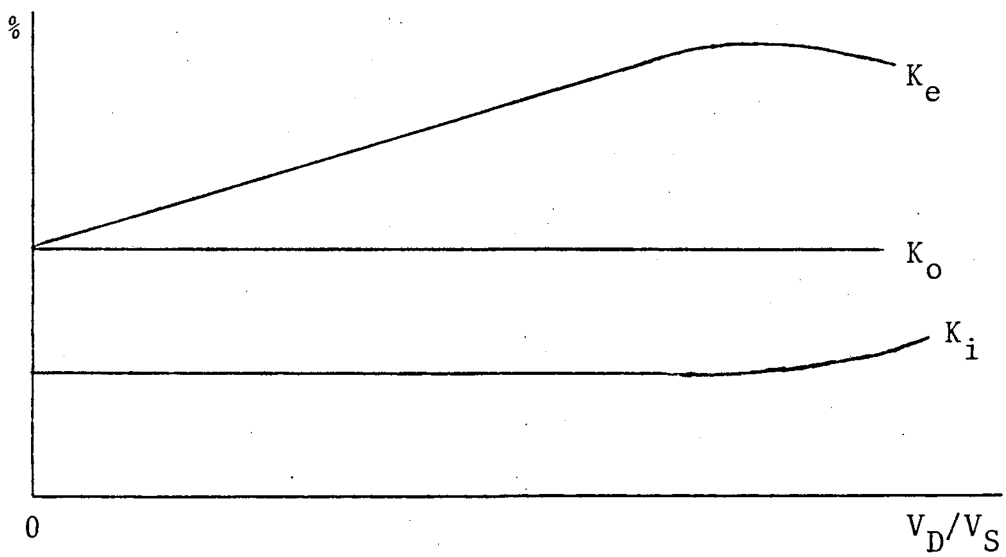

FIGURE (1-6) CAPITAL COSTS - MODIGLIANI AND MILLER APPROACH

leverage is that investors become relatively less risk-averse as the firm increases debt beyond some acceptable limit. However, this contention is regarded as being generally not well founded.

In complete and perfect capital markets Modigliani and Miller have shown that, the firm's total market value and therefore the cost of capital is independent of its capital structure. However, the taxation of firm profits (previously disregarded) is a market imperfection central to a positive theory of the effect of capital structure on the cost of capital. What impact does the introduction of firm taxation have on the Modigliani and Miller propositions?

4) The Effect of Firm Taxation

With the introduction of firm income taxation, Modigliani and Miller also accept the position that the addition of debt to a firm's capital structure will enhance its total market value and lower the cost of capital.[39] This result is obtained because, due to the fact that, interest costs in carrying debt are deductible for taxation purposes to the firm (but not to the individual), then it is no longer possible for individual investors to duplicate the results of firm borrowing through their own actions. However, it should be emphasized that, Modigliani and Miller regard the tax deductibility of interest as the only advantage of debt financing, whereas the traditional approach regards debt as advantageous even when there is no tax.

Following the introduction of taxes, the value of the firm according to Modigliani and Miller is given by Equation (1-8):

$$V_T = \frac{(1-\tau)\bar{X}}{K_e^*} + \frac{\tau R}{r} \qquad (1\text{-}8)$$

$$V_T = {}_uV_T + \tau V_D$$

where: ${}_uV_T$ is the total market value of an unlevered firm

R is the interest bill on the debt outstanding.

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39. Franco Modigliani and Merton H. Miller, "Corporate Income Taxes and the Cost of Capital: A Correction", American Economic Review, 53 (June 1963), 433-43.

In the following analysis Modigliani and Miller's revised determination of a levered firm's total market value, viz., $V_T = {}_uV_T + \tau V_D$, is derived utilizing modern capital market theory[40] (which does not require the personal arbitrage assumption employed in their original analysis).

Modern capital market theory implies that the required return on a security, given equilibrium in the market, can be expressed by Equation (1-9) as:

$$E(R_i) = R_f + \lambda \operatorname{cov}(R_i, R_m) \tag{1-9}$$

where $E(R_i)$ is the equilibrium expected return for the i^{th} security

R_f is the riskless rate of interest

$\operatorname{cov}(R_i, R_m)$ is the covariance of returns for the i^{th} security with the market portfolio

λ is the market price of risk which equals $E(R_m) - R_f / Var(R_m)$ where $E(R_m)$ is the equilibrium expected return for the market portfolio and $Var(R_m)$ is the variance of the probability distributions of possible returns for the market portfolio.

The returns to ordinary shareholders in an unlevered firm are given by Equation (1-10) as:

$$K_e^* = \frac{\overline{X}(1-\tau)}{{}_uV_S} = \frac{\overline{X}(1-\tau)}{{}_uV_T} \tag{1-10}$$

where:

${}_uV_S$ is the unlevered market value of ordinary shares.

40. For a theoretical development of modern capital market theory see Appendix 1.

Substituting from Equation (1-10) into Equation (1-9) gives:

$$E(K_e^*) = E\left[\frac{\overline{X}(1-\tau)}{{}_uV_T}\right] = R_f + \lambda \ \mathrm{cov}(K_e^*, R_m)$$

$$\therefore \qquad E\left[\overline{X}(1-\tau)\right. = R_f \ {}_uV_T + \lambda\, {}_uV_T \ \mathrm{cov}\left[\left[\frac{\overline{X}(1-\tau)}{{}_uV_T}\right], \ R_m\right]$$

or

$$(1\text{-}11) \qquad E[\overline{X}(1-\tau)] = R_f \ {}_uV_T + \lambda(1-\tau)\mathrm{cov}(\overline{X}, R_m)$$

The returns to ordinary shareholders in a levered firm are given by Equation (1-12) as:

$$(1\text{-}12) \qquad K_e = \frac{(\overline{X} - rV_D)(1-\tau)}{V_S}$$

Substituting from Equation (1-12) into Equation (1-9) gives:

$$E(K_e) = E\left[\frac{(\overline{X} - rV_D)(1-\tau)}{V_S}\right] = R_f + \lambda \ \mathrm{cov}(K_e, R_m)$$

$$\therefore \qquad E[\overline{X}(1-\tau) - rV_D(1-\tau)] = R_f \quad V_S + \lambda \ V_S \ \mathrm{cov}\left[\frac{\overline{X} - rV_D}{V_S}, R_m\right]$$

or

$$(1\text{-}13) \qquad E[\overline{X}(1-\tau)] - E[rV_D(1-\tau)] = R_f + \lambda(1-\tau)\mathrm{cov}(\overline{X}, R_m) -$$

$$-\lambda(1-\tau)V_D\mathrm{cov}(r, R_m)$$

Treating the firm's debt as a risky asset, then from Equation (1-9):

$$(1\text{-}14) \qquad E(r) = R_f + \lambda \ \mathrm{cov}(r, R_m)$$

Substituting Equation (1-14) into the left hand side of Equation (1-13) yields:

$$E[\overline{X}(1-\tau)-V_D(1-\tau)[R_f+\lambda \text{cov}(r,R_m)]=R_f\ V_S+\lambda(1-\tau)\text{cov}(\overline{X},R_m)\ -$$

$$-\lambda(1-\tau)V_D\text{cov}(r,R_m)$$

$$\therefore\quad (1\text{-}15)\quad E[\overline{X}(1-\tau)]=R_f\ V_S+\lambda(1-\tau)\text{cov}(\overline{X},R_m)+R_fV_D(1-\tau)$$

Both Equations (1-11) and (1-15) are expressions for $E[\overline{X}(1-\tau)]$ and equating the right hand side of these expressions gives:

$$R_f\ {}_uV_T+\lambda(1-\tau)\text{cov}(\overline{X},R_m)=R_fV_S + \lambda(1-\tau)\text{cov}(\overline{X},R_m)+R_fV_D(1-\tau)$$

$$\therefore\quad R_f\ {}_uV_T = R_f\ \ V_S + R_f\ V_D(1-\tau)$$

$$\therefore\quad {}_uV_T = V_S + V_D-\tau V_D$$

and $\quad V_T = {}_uV_T + \tau V_D$

Modigliani and Miller's propositions can now be reconsidered. Given that the value of a levered firm is given by Equation (1-8) as:

$$(1\text{-}8)\qquad V_T = \frac{(1-\tau)\overline{X}}{K_o^*} + \frac{\tau R}{r}$$

Then to see what this equation implies for the average capitalization rate merely substitute $\overline{X}^\tau-\tau R$ for $(1-\tau)\overline{X}$ to obtain:[41]

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41. Modigliani and Miller refer to, $\overline{X}^\tau$ as 'earnings after taxes' and it is obtained by adding the total interest payments to net income after taxes and interest, that is:

$$\overline{X}^\tau = (1-\tau)(\overline{X}-R) + R$$

$$\overline{X}^\tau = (1-\tau)\overline{X} + \tau R$$

Furthermore, they refer to $\overline{X}(1-\tau)$ as 'tax adjusted earnings' and this takes into account the tax savings property of interest paid and adds back to net income

$$V_T = \frac{\overline{X}^\tau - \tau R}{K_o^*} + \tau V_D$$

$$V_T = \frac{\overline{X}^\tau}{K_o^*} + \tau \frac{K_o^* - r}{K_o^*} V_D$$

from which it follows that the average capitalization rate must be:

$$(1\text{-}16) \qquad \frac{\overline{X}^\tau}{V_T} = K_o^* - \tau(K_o^* - r)\frac{V_D}{V_T}$$

Equation (1-16) replaces their original Equation (1-1) in which they simply had, $\frac{\overline{X}}{V_T} = K_o^*$. Thus in contrast to their earlier result, the tax corrected version implies that the cost of capital can be lowered with leverage. However, the predicted rate of decrease of $\frac{\overline{X}^\tau}{V_T}$ with $\frac{V_D}{V_T}$, is still considerably smaller than under the naive traditional approach, which is given by Equation (1-17) as:

$$(1\text{-}17) \qquad \frac{\overline{X}}{V_T} = K_o^* - (K_o^* - r)\frac{V_D}{V_T}$$

Modigliani and Miller stress that Equation (1-16) implies that,

> ". . . the effect of leverage on $\overline{X}^\tau / V_T$ is solely a matter of the deductibility of interest payments whereas, under the traditional view, going into debt would lower the cost of capital regardless of the method of taxing corporate earnings."[42]

Finally there is the matter of the equity capitalization

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interest less the taxes shelter obtained by the interest payment, that is:

$$\overline{X} = (1-\tau) - \tau R$$

$$\overline{X}(1-\tau) = \overline{\pi}^\tau + (1-\tau)R$$

42. Modigliani and Miller, "Corporate Income Taxes and the Cost of Capital: A Correction", *op. cit.*

rate. By subtracting V_D from both sides of Equation (1-8) and breaking $\bar{X}^\tau$ into its two components - expected net profits after taxes, $\bar{\pi}^\tau$, and interest payments, R, and simplifying Equation (1-18) is obtained:

$$(1\text{-}18) \qquad V_S = V_T - V_D = \frac{\bar{\pi}^\tau}{K_e^*} - (1-\tau)\left(\frac{K_e^*-r}{K_e^*}\right) V_D$$

From Equation (1-18) it follows that the equity capitalization rate must be:

$$(1\text{-}19) \qquad \frac{\bar{\pi}^\tau}{V_S} = K_e^* + (1-\tau)(K_e^*-r)\frac{V_D}{V_S}$$

Equation (1-19) replaces their original Equation (1-3) in which they simply had, $\frac{\bar{\pi}}{V_S} = K_e^* + (K_e^*-r)\frac{V_S}{V_D}$. Thus in contrast to their earlier result, the tax corrected version implies that although the equity capitalization rate increases with leverage it does so at a rate which is smaller by a factor of $(1-\tau)$. However, the linear increasing relation of the corrected version is still fundamentally different from the naive traditional approach, which is given by Equation (1-20) as:

$$(1\text{-}20) \qquad \frac{\pi}{V_S} = K_e^*$$

From the above discussion of the Modigliani and Miller and traditional approaches concerning the effect of capital structure on the total market value of the firm and the cost of capital, four conclusions (which have been well stated by Mao) can be drawn and they are:

"First, in the absence of tax, Modigliani and Miller contend that business value, and therefore the cost of capital, are independent of capital structure. Their conclusion is based on the assumption that corporate leverage and home-made leverage are perfect substitutes; hence if two companies, identical except for their capital structures, should sell at different values, then arbitrage will take place to eliminate this difference.

Second, traditional theorists reject Modigliani and Miller's assumption that corporate and home-made leverages are perfect substitutes. Having rejected Modigliani and Miller's assumption, they use the superpremium argument to show that a levered company may sell at a price higher than that of an unlevered company.

Third, when the tax impact is taken into account, even Modigliani and Miller take the position that debt financing enhances business value and lowers the cost of capital. However, Modigliani and Miller regard the deductibility of interest for computing the income tax as the only advantage of debt financing, whereas the traditional theorists regard debt financing as advantageous even in the absence of the corporate income tax.

Finally, both Modigliani and Miller and the traditional theorists are internally consistent: if we grant their assumptions, their respective conclusions must logically follow. The validity of these competing sets of assumptions, however, is a matter requiring empirical testing. It is not capable of being resolved solely on the basis of a priori reasoning."(43)

Keeping the foregoing discussion in mind the following hypothesis can be stated:

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[43] James C.T. Mao, "Capital Structure, Valuation and the Cost of Capital", <u>Cost and Management</u>, 41 (September 1967), 17.

Hypothesis:

'The ratio of debt to equity has no effect on either the equity or average capitalization rates for firms with equivalent degrees of business risk'.

C] DIVIDENDS AND VALUATION[44]

1) Introduction

While the points of disagreement between the Modigliani and Miller and traditional approaches, as to the effect of capital structure on the market value of the firm have been largely narrowed down to differing empirical assumptions, the same cannot be said regarding the effect of dividend policy. In fact, since Miller and Modigliani published their first paper on the topic,[45] there has continued to co-exist among financial theorists two opposing views on the importance of dividend policy in perfect markets. On one side of the debate, Gordon[46] contends that even in

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44. This section has benefited greatly from the works and comments of Professor Robert C. Higgins.

45. Merton H. Miller and Franco Modigliani, "Dividend Policy, Growth and the Valuation of Shares", Journal of Business, 34 (October 1961), 411-33.

46. Myron J. Gordon, "Dividends, Earnings and Stock Prices", Review of Economics and Statistics, 41 (May 1959), 99-105; Myron J. Gordon, "The Savings, Investment and Valuation of a Corporation, Review of Economics and Statistics, 45 (February 1962), 37-51; Myron J. Gordon, The Investment, Financing and Valuation of the Corporation (Homewood, Illinois: Richard D. Irwin, 1962); Myron J. Gordon, "Optimal Investment and Financing Policy", Journal of Finance, 18 (May 1963), 264-72.

perfect capital markets risk-averse investors are likely to perceive current dividends as less risky than future ones. Consequently, it is argued that a decision by the firm to reduce its current dividend in favour of increased future dividends, will reduce its market value even when the funds are invested to yield the firm's cost of capital. Miller and Modigliani on the other hand, contend that once the investment policy of the firm is given the market value of the firm is independent of its dividend policy.

Before examining dividend policy and market valuation under uncertainty, it will be useful to review the problem under conditions of perfect certainty. The critical assumptions in the present context are:

1. Capital markets are assumed to be perfect and that shares traded in these markets are done so under conditions of atomistic behaviour; there are no transactions costs and all securities are assumed to be infinitely divisible; all investors have equal and costless access to information; there are no taxes.
2. All investors are rational, that is they prefer more wealth to less wealth and are indifferent as to whether a given increment in their wealth takes the form of cash payments or an increase in the market value of their shares.
3. Perfect certainty on the part of every investor as to the future investments and profits of the firm, as a result there is no need to distinguish between debt and equity.

Under the above three assumptions, the market price of a share would be governed by the following fundamental principle:

> "The price of a share must be such that the rate of return (dividends plus capital gains per dollar invested) on every share will be the same throughout the market over any given interval of time."(47)

This principle is given in Equation (1-21) as:

$$(1\text{-}21) \qquad V_o = \frac{D_o + n_o P_1}{1 + K_o}$$

where:

V_o is the market value of the firm at time 0,

D_o is the present value of the total dividend paid during the period,

$n_o P_1$ is the end of period value of the shares held by the ordinary shareholders,

K_o is the market discount rate in the current period,

n_o is the number of shares currently outstanding,

P_1 is the price per share at the end of the period.

If shares are issued or retired by the firm during the period, the end of period value of the firm will consist of (1) the portion currently owned by present shareholders, $n_o P_1$, and (2) the portion issued or retired during the period, $m_1 P_1$; so that

$$(1\text{-}22) \qquad V_1 = n_o P_1 + m_1 P_1$$

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47. Miller and Modigliani, "Dividend Policy, Growth and the Valuation of Shares", *op. cit.*, 412.

where:

V_1 is the market value of the firm at time 1,

m_1 is the number of shares issued or retired by the firm.

Combining Equations (1-21) and (1-22) to eliminate n_oP_1 yields Equation (1-23):

$$V_o = \frac{D_o + V_1 - m_1P_1}{1 + K_o} \tag{1-23}$$

D_o and m_1P_1 are not independent, but are related by a simple accounting identity which equates inflows and outflows of funds to the firm. Specifically, if E_o and I_o are the current earnings and investment of the firm respectively, then:

$$E_o + m_1P_1 = D_o + I_o$$

$$\therefore \quad m_1P_1 = D_o + I_o - E_o \tag{1-24}$$

Substituting Equation (1-24) into Equation (1-23) yields the following:

$$V_o = \frac{V_1 + E_o - I_o}{1 + K_o} \tag{1-25}$$

so that V_o is independent of D_o if K_o, V_1, E_o and I_o are also independent of D_o. This condition is met in a certain world where the firm's investment and dividend decisions are made independently, (i.e., where $I_o \neq f[D_o]$).

Having shown V_o to be independent of D_o, it is easy to show that V_o is independent of D_t for all future values of t by simply applying the proof recursively. Thus Equation (1-25) indicates that D_1 can affect V_o only through its effect on V_1; but by simply repeating the proof for t=1, it is easily shown that V_1 is independent of D_1. In similar fashion, V_0 is shown to be independent of all future dividends. In conclusion if dividends are irrelevant, a firm's cost of capital would be independent of its dividend-payout ratio. If both dividends and earnings are irrelevant, the firm would be indifferent as to whether investment opportunities were financed with debt, retained earnings or an ordinary share issue.

2) The Miller and Modigliani Approach

Even under uncertainty Miller and Modigliani continue to maintain that dividend policy is irrelevant, given the investment policy of the firm. With the introduction of uncertainty Miller and Modigliani replace the assumption of investor rationality with the broader assumption of systematic market rationality. Systematic market rationality occurs when every market participant behaves rationally in prefering more wealth to less, and believes that other market participants behave in the same manner. No specific definition of uncertainty is given by Miller and Modigliani, although Lintner maintains the proof applies only to the case of fully idealized uncertainty.(48) Fully idealized uncertainty is said to describe the situation in which information needed to formulate probability distributions of possible events is distributed uniformly among all market participants, and the probability

48. John Lintner, "Dividends, Earnings, Leverage, Stock Prices and the Supply of Capital to Corporations", Review of Economics and Statistics, 44 (August 1962), 256.

distributions of possible events of all participants are identical.

The starting point in the Miller and Modigliani proof is the specification of what they refer to as the anticipated return to present shareholders during the current period, R_o. This they define by Equation (1-26) as:

$$\text{(1-26)} \qquad \tilde{R}_o = \tilde{D}_o + \tilde{V}_1 - \tilde{m}_1\tilde{P}_1$$

where the tildes over the variables "indicate that these are to be regarded from the standpoint of the current period, not as known numbers but as numbers which will be drawn in the future from appropriate probability distributions."(49) Casual examination of Equation (1-26) indicates that $\tilde{R}_o$ does not equal 'return' in the usual sense of dividends plus or minus changes in capital value. Instead, it equals the undiscounted end of period wealth of current shareholders. Referring to Equation (1-23), it is also the quantity which in the certainty proof is discounted by $\frac{1}{(1+K_o)}$ to define the current value of the firm, V_o.

With this subtle change in the definition of the variables, the proof is analogous to the certainty proof. The accounting identity equating funds flows to and from the firm yields:

$$\tilde{m}_1\tilde{P}_1 = \tilde{D}_o + \tilde{I}_o - \tilde{E}_o$$

so that from Equation (1-26)

49. Miller and Modigliani, "Dividend Policy, Growth and the Valuation of Shares", *op. cit.*, 429.

$$\tilde{R}_o = \tilde{V}_1 + \tilde{E}_o - \tilde{I}_o$$

and $\tilde{R}_o$ is independent of $\tilde{D}_o$ if the investment and dividend decisions of the firm are made separately. But the question of how $\tilde{R}_o$ is related to the current value of the firm V_o must still be answered. In the certainty case,

$$V_o = \frac{R_o}{(1+K_o)}$$

where K_o is independent of R_o. Under conditions of uncertainty, Miller and Modigliani are reluctant to discount $\tilde{R}_o$ and instead simply assert that 'rationality requires' V_o to be independent of $\tilde{D}_o$ where $\tilde{R}_o$ is independent of $\tilde{D}_o$. However, since V_o clearly does not equal $\tilde{R}_o$ except in the instant before the dividend is to be paid, there must be some transformation which defines V_o in terms of $\tilde{R}_o$. Whether the transformation is called a discount factor or not, the Miller and Modigliani proof rests on the assertion that it is independent of $\tilde{D}_o$. This assertion would appear to be reasonable, for as their proof demonstrates, the probability distribution of the end of period wealth accruing to current shareholders is invariant with respect to the level of dividends during the period. Therefore, rational investors interested only in the probability distribution of terminal wealth must place a constant value on the firm regardless of its dividend level in the current period.

A number of arguments have been advanced suggesting that the investor is not indifferent as to how the earnings stream is split between dividends and retained earnings. The more popular of these, are worth examining briefly:

<u>Informational Content of Dividends</u>: According to this view, dividends per share have no intrinsic value to the shareholder, but in an uncertain environment they can be a useful predictor of management's expectations of future performance. Thus if the firm has established a pattern of paying stable dividends which vary only with secular changes in earnings, an increase in dividends can be interpreted as a sign that management expects a secular increase in earnings. Likewise, if dividends are reduced, this can be taken as a signal that management anticipates a secular decline in earnings. Advocates of this reasoning grant that dividends may be a relatively expensive means of communication, but contend that they are more reliable than the verbal statements of management.

Empirically, Petit has lent support to the view that the market does react to announcements of dividend changes. He concluded that,

> ". . . this investigation clearly support the proposition that the market makes use of announcements of changes in dividend payments in assessing the value of a security. Management's fear of reducing or omitting dividends seems well founded and leads to a desire to delay increasing dividends until the level of cash flows can be estimated with little uncertainty."(50)

In another empirical study Watts finds that:

> "All of the tests suggest that on average the relationship between future earnings changes and current unexpected dividend changes is positive and therefore consistent with the information hypothesis. However,

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50. R. Richardson Petit, "Dividend Announcements, Security Performance, and Capital Market Efficiency", <u>Journal of Finance</u>, 27 (December 1972), 1006.

> all of the tests also suggest that the average absolute size of the future earnings changes which may be conveyed by unexpected dividend changes is very small. Further, an examination of the relationship between unexpected dividend changes and stock prices indicates that even if the future earnings changes associated with unexpected dividend changes convey information to market participants, that information is trivial."[51]

Miller and Modigliani do not deny the possibility of the 'informational content of dividends' but continue to maintain that present and expected future earnings are what determine value. They assert that dividends are merely a reflection of these factors and do not in themselves determine value; therefore the irrelevance proposition holds.

A Time Preference for Returns: In its simplest form this argument is that some investors require a regular return from investments in order to maintain desired consumption levels. They will therefore, have a preference for shares which offer a regular dividend return. This argument is easily countered by observing that the investor is free to sell any portion of his assets at any time. Therefore if the investor desires a regular return and the firm pays no dividend, he can simply sell some of his shares. Traditionalists respond with two variants of the same argument. First, the price of a share is subject to considerable unpredictable variation. As a result if an

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51. Ross Watts, "The Informational Content of Dividends", Journal of Business, 46 (April 1973), 211.

investor is required to sell shares at regular intervals, he will subject himself to an additional degree of uncertainty; as a risk averter, the investor will seek to avoid this uncertainty by purchasing shares giving regular dividends. Second, the regular sale of a small number of shares subjects the investor to transactions costs which he could otherwise avoid. In answer to these arguments, it is simply necessary to note that an investor who desires a regular return but wants to avoid selling shares regularly can accomplish both objectives by borrowing money with his shares as collateral. In this way the investor can choose the time he wishes to sell his shares and also consolidate his regular small sales into a single larger sale, thus reducing the fixed portion of his transaction costs. There are, of course, transaction costs associated with borrowing funds, but there is no assurance that these are any larger than those incurred by the firm in issuing regular dividends and selling relatively more equity capital.

In conclusion the critical question of this argument is whether the 'quality' of a current dividend payment is greater than the 'quality' of a future capital gain. Proponents of the independence approach argue that there is no difference and, as a result, there is no systematic preference in the market as a whole for current dividends. That is, at the margin, the market is said to behave in a manner consistent with the independence approach. Modigliani and Miller suggest that,

> "If, for example, the frequency distribution of corporate-payout ratios happened to correspond exactly with the distribution of investor preferences for payout ratios, then the existence of these preferences would clearly lead ultimately to a situation whose implications were different in no fundamental respect from the perfect market case. Each corporation would tend to attract to itself a "clientele" consisting of those prefering its particular payout ratio, but one clientele would be entirely as good as another in terms of the valuation it would imply for the firm."(52)

3) The Gordon Approach

The most rigorous arguments in favour of the traditional approach to dividends are those of Gordon. He contends that in a multi-period model the discount rates applied to future cash flows may vary with respect to the time pattern of dividends. Gordon's most comprehensive exposition of the relevance of dividends under uncertainty is presented in terms of an idealized firm contemplating a specific investment decision.(53) In the absence of this investment, the firm is expected to earn and pay out as dividends a constant amount, D, in perpetuity. Discounting this stream of returns at a constant market value K equates them to the current market value of the firm, as given by Equation (1-27):

$$V_o = \frac{D}{K} \tag{1-27}$$

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52. Miller and Modigliani, "Dividend Policy, Growth and the Valuation of Shares", *op. cit.*, 431.

53. Gordon, "Optimal Investment and Financing Policy", *op. cit.*, 264-72.

Gordon initially makes no assumptions about how K is determined in the market, but merely defines it as the transformation which sets the stream of dividends equal to the current market price. Thus Equation (1-27) is a definition of K.

The investment under consideration by the firm requires an outlay of exactly D dollars at the end of period one, and is expected to yield KD dollars forever beginning in period two. Therefore, assuming the only financing alternative open to the firm is the reduction of dividends in period one, the value of the firm if it accepts the investment is given by Equation (1-28) as:

$$V_o = \frac{0}{1+K} + \frac{D+DK}{(1+K)^2} + \cdots$$

$$V_o = D(1+K) \sum_{t=2}^{\infty} \frac{1}{(1+K)^t}$$

$$V_o = \frac{D}{K} \tag{1-28}$$

Since the value of the firm is independent of the investment decision, Gordon concludes that any subsequently discovered changes in V_o must be due to divident policy.

Having devised an example which to his mind segregates the investment and dividend decisions, Gordon reasons that the constant market discount rate K, should be replaced with a set of increasing discount rates, K_t such that $K_t > K_{t-1}$ for all t. The index t in this case refers not to the calendar time, but to the time span between the instant of decision and the instant in which the expected cash flow will occur. The increasing discount rates envisioned by Gordon are defined so that their average value is equal to

K; that is,

$$\sum_{t=1}^{\infty} \frac{1}{(1+K_t)^t} = \frac{1}{K} \quad .$$

The logic supporting the substitution of K_t for K is based on the supposition that the uncertainty of any event as perceived by an investor increases with its time in the future. Thus, the postponement of a return for one period increases the dispersion of the subjective probability distribution assigned to the return by an investor, forcing him to increase the discount rate applied to the return.

The method by which these increasing subjective discount rates are to be combined to form the market discount rates, K_t, is unspecified, but the clear implication is that the market rates can be inferred directly from individual behaviour. The validity of this reasoning has been criticized on the grounds that,

> ". . . to attempt to derive valuation formulas under uncertainty from these purely subjective discount factors involves, of course, an error essentially analogous to that of attempting to develop the certainty formulas from 'marginal rates of time preference' rather than objective market opportunities."(54)

Having hypothesized a set of increasing market discount rates, Gordon reconsiders his idealized firm. If the firm foregoes the investment in favour of a dividend in period one, its current value is given by Equation (1-29) as:

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54. Miller and Modigliani, "Dividend Policy, Growth and the Valuation of Shares", *op. cit.*, 424-25.

$$V_o = \sum_{t=1}^{\infty} \frac{D}{(1+K_t)^t}$$

(1-29) $$V_o = \frac{D}{K}$$

Its value is unchanged. However, if the firm accepts the investment its value is given by Equation (1-30) as:

$$V'_o = \frac{0}{1+K_1} + \frac{D+DK}{(1+K_2)^2} + \ldots$$

$$V'_o = D(1+K) \sum_{t=2}^{\infty} \frac{1}{(1+K_t)^t}$$

(1-30) $$V'_o = D(1+K) \left[\frac{1}{K} - \frac{1}{1+K_1}\right]$$

If K_1 were still equal to K, this expression would reduce to $V'_o=\frac{D}{K}$ as before, but because K_1 is, by definition, less than K

$$V_o > V'_o$$

Because the investment alternative was designed to have no impact on the value of the firm, Gordon concludes that the reduction in next periods' dividend has produced a decline in the current value of the firm. Therefore, the market value of the firm must be a positive function of the firm's payout ratio in period one.

A number of authors have taken issue with Gordon. Even if current dividends are perceived to be less risky than future ones Higgins contends that,

> ". . . under the assumed market conditions, 'homemade dividends' in the form of periodic shareholder liquidations are a perfect substitute for corporate distributions, even when risk varies with the futurity of returns. It can therefore be concluded that a state of increasing risk with the futurity of returns is not a sufficient condition for the validity of Gordon's theory of dividend policy."(55)

While in more general terms Krainer in examining several criticisms of the Miller and Modigliani approach concluded:

> "From these assumptions it automatically follows that investment policy is independent of dividend policy, and, therefore, capitalization rates will be independent of dividend policy. In some alternative models of share valuation, on the other hand, the assumption is invariably made that external financing is constrained to be zero or some unique positive amount determined by the firm's existing leverage. In any event, the investment policy of the firm under these models is not independent of dividend policy, and this point constitutes the principal difference between the two schools of thought. The implication of these alternative models, then, is that managers of firms do not maximize the value of the firm. The second criticism has suggested that the prospects of issuing shares to finance capital expenditures may have a depressing influence on share prices at the beginning of the period. It was pointed out, however, that changes in equilibrium capitalization rates on shares can only reflect the shareholders' view regarding the future prospects for existing assets and new investments. Consequently the success or failure in the management of the firm's physical assets will determine the quality and quantity of the firm's future earning stream, and it is the quality and quantity of the firm's future earning

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55. Robert C. Higgins, "Divident Policy and Increasing Discount Rates: A Clarification", <u>Journal of Finacial and Quantitative Analysis</u>, 7 (June 1972), 1761.

> stream, in turn, that determines the consumption - savings opportunities of the individual portfolio investor."(56)

Furthermore, Brennan in attempting to show that first, the Gordon approach rests upon a confounding of the effects of both a firm's dividend and investment policy and second, that the Miller and Modigliani approach can be derived from a somewhat weaker assumption than that of systematic market rationality concludes as follows,

> "Thus any denial of the irrelevance of dividend policy must rely upon a rejection of the principle of systematic market rationality, and the assumption of the independence of irrelevant information. To reject the latter assumption requires one of the following three assertions: either that:
> (a) investors are not rational, or
> (b) stock prices depend on past events as well as their expected future prospects, or
> (c) there exist no investors who understand the security valuation process."(57)

In complete and perfect capital markets Miller and Modigliani have shown that, the firm's total market value and therefore the cost of capital is independent of its dividend policy. However, the introduction of market imperfections are central to a positive theory of dividend policy. What impact does the introduction of such factors as taxation and transaction costs have on the Miller and Modigliani approach?

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56. Robert E. Krainer, "A Pedagogic Note on Dividend Policy", Journal of Financial and Quantitative Analysis, 6 (September 1971), 1153.

57. Michael Brennan, "A Note on Dividend Irrelevance and the Gordon Valuation Model", Journal of Finance, 26 (December 1971), 1121.

4) The Effect of Market Imperfections

In departing from an idealized world of zero transaction costs and no differences in taxation between dividend income and capital gain, a departure is made from the position of the irrelevancy of dividends to the concept of an optimal dividend policy, although it is difficult to specify what that optimal dividend policy would be.

First, consider the question of transaction costs; on the one hand positive transaction costs will reduce an investor's wealth if he desires to consume or reallocate his portfolio by selling shares compared to a case where a greater portion of the investor returns comes in the form of dividends. On the other hand, positive transaction costs will also reduce the wealth of investor's holding the shares of firm's with generous dividends when the objective of the investor is to accumulate in the same firm.

Second, consider the question of taxation; since capital gains are taxed at a lower rate relative to dividend income,[58] this suggests that firms with low payout ratios should sell at a premium relative to firms with high payout ratios. Empirically, Elton and Gruber[59] in testing the price behaviour of shares when they go ex-dividend in relation to the magnitude of dividend have lent support to

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58. Edwin J. Elton and Martin J. Gruber, "Marginal Tax Rates and the Clientele Effect", Review of Economics and Statistics, 52 (February 1970), 68-74.

59. In Australia there is effectively no tax on capital gains.

both this view and the corresponding 'clientele effect'.

Third, consider the question of flotation costs; these favour the retention of earnings in the firm. That is, for each dollar paid in dividends, the firm nets less than a dollar after flotation costs per dollar of external financing. This is important since the irrelevance proposition contends that, given the firm's investment policy, funds paid out must be replaced by funds acquired through external financing. Furthermore, the smaller the size of the issue, the greater in general the flotation costs as a percentage of the total amount of funds raised.

From the above discussion of the Modigliani and Miller and traditional approaches concerning the effect of dividend policy on the total market value of the firm and therefore the cost of capital, the following conclusion can be drawn. A firm should endeavour to establish a dividend policy that will maximize shareholder wealth. In theory, the optimal dividend payout should be determined in keeping with the firm's investment opportunities and any preference that investors have for dividends as opposed to capital gains. Concerning any preferences investors might have for dividends as opposed to capital gains Van Horne has commented: "Insight into such a preference can best be gained through an empirical study of the relationship between share price and dividend payout for a sample of similar companies."(60) Keeping the foregoing discussion in mind the following hypothesis can be stated:

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60. Van Horne, Financial Management and Policy, *op. cit.*, 257.

Hypothesis:

'The earnings retention rate has no effect on either the equity or average capitalization rates for firms with equivalent degrees of business risk'.

D] THE EQUIVALENT RISK CLASS ASSUMPTION

It is generally considered that when purchasing a share an investor expects to receive a stream of future dividends, under conditions of certainty the appropriate rate of discount would be the risk-free rate. For many investors, the risk-free rate might be approximated by the current yield on a government fixed-income security whose maturity coincides with the end of the investor's expected holding period. However, under conditions of uncertainty, the rational investor will discount these dividends at a rate higher than the risk-free rate. In other words, the investor will require an expected return in excess of the risk-free rate in order to compensate him for the risk associated with receiving the expected dividend stream. The greater the uncertainty, the greater the expected return the investor will require. Thus the investor's required rate of return can be expressed by Equation (1-31) as:

$$K_e = R_f + \theta \qquad (1\text{-}31)$$

where:

θ is the premium to account for the uncertainty of receiving the expected return.

The overall premium for risk is caused by the dispersion of the subjective probability distribution of dividends per share expected to be received in various future periods. Furthermore, the overall premium for risk might be thought to be comprised of two parts, firstly, a premium for business risk and secondly, a premium for financial risk. The investor's required rate of return can now be expressed by Equation (1-32) as:

$$K_e = R_f + \alpha + \beta \tag{1-32}$$

where:

α is a premium for business risk

β is a premium for financial risk.

In general,

> ". . . the premium for business risk is caused by the relative dispersion of the probability distribution of possible future operating income; whereas the premium for financial risk is caused by the dispersion of expected future income available to ordinary shareholders, holding constant business risk."[61]

More specifically, the degree of business risk associated with a firm's income stream is considered to be a function of all determinants of risk, except those that relate to the means by which a firm's operations are financed (i.e., the nature of a firm's capital structure). Gonedes has described the determinants of business risk as follows,

> "In general, business risk is determined by a firm's asset structure, the purposes for which a firm's assets are used, and the efficiency and effectiveness with which a firm's assets are utilized. The determinants of business risk include the competitive position of a firm, the nature

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61. Van Horne, Financial Management and Policy, *op. cit.*, 98.

> of a firm's operating expenses, the intensity of demand for a firm's products, and a firm's managerial resources, inter alia."(62)

While Solomon regards business risk as including,

> ". . . general expectations with respect to overall economic and political trends, specific expectations about the particular regions and markets within which the company acquires resources and sells its products, and the speed and flexibility with which the company can lower its total operating costs when total revenues decline."(63)

On the other hand, the degree of financial risk associated with a firm's income stream is deemed to be a function of the method used by the firm to finance its assets. Therefore, the higher the percentage of debt in the capital structure, the greater the firm's exposure to financial risk. This assertion is supported by the work of Bierman who considered the consequences of adding more debt to a firm's capital structure or substituting debt for equity. Bierman concluded,

> ". . . that debt will cause the variance of earnings per dollar of common stock investment to increase dramatically if debt, as a percentage of total capital, increases. A larger amount of variance in the earnings may be assumed generally as having increased the amount of risk associated with the earnings of the common stockholders."(64)

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62. Nicholas J. Gonedes, "The Equivalent Risk Class Hypothesis", Journal of Financial and Quantitative Analysis, 4 (June 1969), 159.

63. Solomon, The Theory of Financial Management, *op. cit.*, 71.

64. Harold Jr., Bierman, "Risk and the Addition of Debt to the Capital Structure", Journal of Financial and Quantitative Analysis, 3 December 1968, *op. cit.*, 422-23.

In empirical studies attempting to determine the effect of capital structure on the market value of the firm and therefore the cost of capital, the distinction between business and financial risk is of especial importance. Clearly any study that attempts to evaluate the responses of investors with respect to changes in financial risk but does not hold business risk constant will not generate the desired information. Instead, such studies will secure an evaluation of investors' responses to changes in financial structure and business risk. Let us consider the possible results of such studies under some hypothetical circumstances.[65]

Figure (1-7) shows the case in which business risk does not affect the amount of financial risk the firm decides to incur.[66] In this case, the slope of the overall regression line is the same as that which would be obtained within each group, and the intercept is an average of the intercept for each group. The correlation coefficient for the overall data will be a downward-biased estimate of the coefficient for each group. Furthermore, the intercept term (equity capitalization rate for an all equity firm) will be extremely sample sensitive, increasing as the number of

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65. This examination was adapted from Edwin J. Elton and Martin J. Gruber, "Homogeneous Groups and the Testing of Economic Hypotheses", Journal of Financial and Quantitative Analysis, 6 (January 1970), 581-602; and Edwin J. Elton and Martin J. Gruber, "Improved Forecasting Through the Design of Homogeneous Groups", Journal of Business, 44 (October 1971), 432-50.

66. The elipses represent the scatter of observations for each of two groups - high business risk (H) and low business risk (L). The line segment labelled, 0, represents the relationship between the equity capitalization rate and the debt-equity ratio. For simplicity, the relationship is assumed to be linear and furthermore the slope coefficient is assumed to be the same for each group.

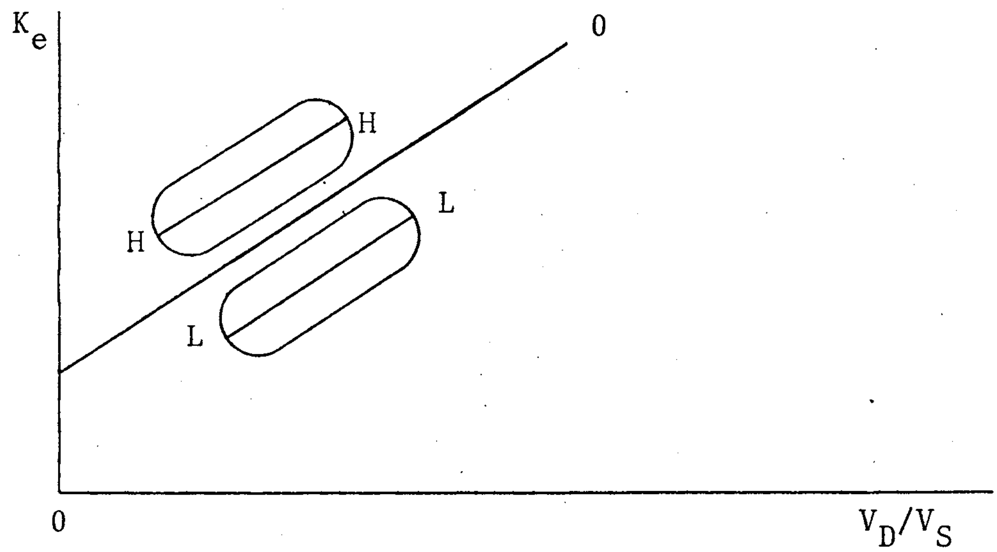

FIGURE (1-7) EQUIVALENT RISK CLASS: CASE 1

observations in the high-risk group is increased relative to the number in the low-risk group.

Figures (1-8) and (1-9) are based on the assumption that financial and business risk are not independent. It seems logical to assume that as firms add debt they will not ignore the amount of overall risk, but rather they will adjust debt to some risk level that either the market finds optimum or with which management is comfortable. Figure (1-8) represents the case of perfect adjustment, where firms in each risk class adjust their financial risk so that each business risk class has the same level of overall risk. In this case, the overall regression would have zero slope and the correlation coefficient would be zero which would lead to the fallacious conclusion that the debt-to-equity ratio had no effect on the equity capitalization rate Furthermore, the intercept would have no relationship to the equity capitalization rate for an all-equity firm.

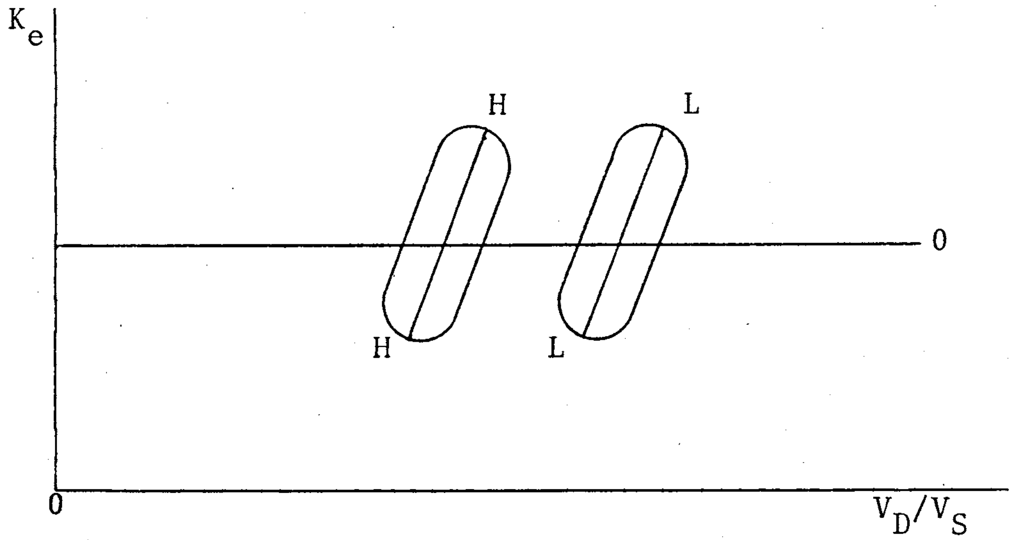

FIGURE (1-8) EQUIVALENT RISK CLASS: CASE 2

Finally, the results obtained would tend to be sample sensitive. For example, as the sample size for the low-risk group was decreased relative to that for the high-risk group, the slope coefficient would move from zero toward its correct value, the correlation coefficient would increase, and the intercept would decrease.

Figure (1-9) represents the case in which low-risk

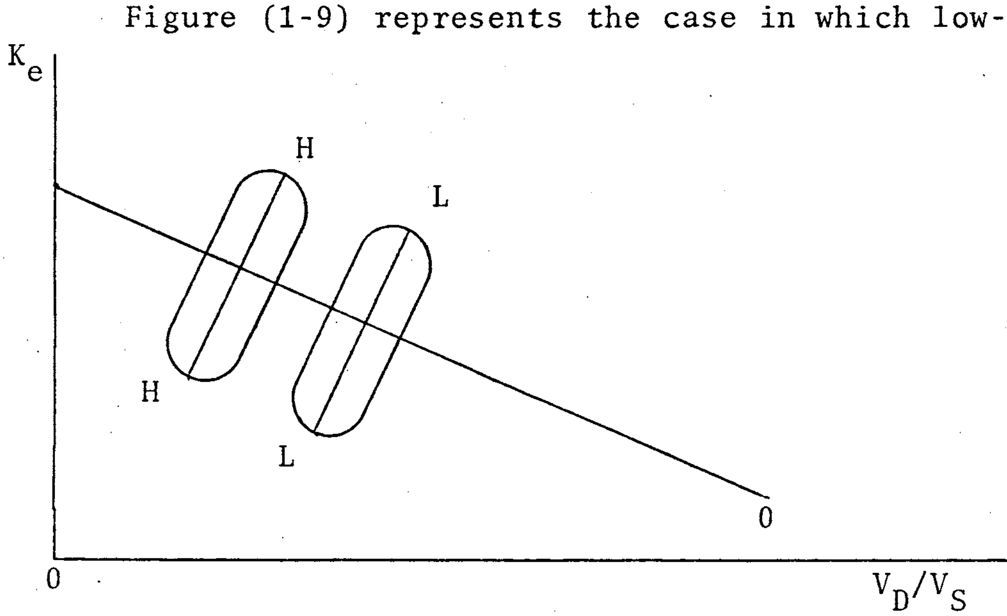

FIGURE (1-9) EQUIVALENT RISK CLASS: CASE 3 firms have added more debt than high-risk firms, but have maintained a lower overall risk level. This situation could arise if managers of low-risk firms were more risk averse than managers of high-risk firms. In this case, the slope of the overall regression line is negative whereas the slope which would be obtained within each group is positive. The correlation coefficient for the overall data would be a downward-biased estimate of the coefficient for each group. Furthermore, the intercept term will be biased upward. Once again the results will be extremely sample sensitive, as the number of observations for the low-risk group are decreased, the slope coefficient will change sign and approach its true value, the correlation coefficient will increase, and the intercept term will approach its correct value for the high-risk firm.

From the above discussion it has been shown that failure to 'hold constant' business risk can result in a complete mis-specification of the relationship between the equity capitalization rate and financial risk. Therefore, in order to test for the effects of leverage it is necessary to group firms with similar business risk. Such a grouping is generally known as an 'equivalent risk class' and has been defined by Modigliani and Miller as a group composed of firms for which, "the probability distribution of the ratio of the actual return to the expected return is identical for all shares in the class."(67) While in their

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67. Modigliani and Miller, "The Cost of Capital, Corporation Finance and the Theory of Investment", *op. cit.*, 266.

1966 study they contend,

> "At the level of pure theory a 'risk-equivalent class' can be defined in precise terms as a collection of firms such that the elements of the (uncertain) future earnings stream of each firm is proportional to (and hence perfectly correlated with) those of every other member of the class."(68)

All of the published studies since the original Modigliani and Miller article have included one or more means of measuring business risk. These measures will be discussed in detail in Chapter 2. In general, the approach has been to include a risk measure as an independent variable in the regression equation. This approach will also be used in this thesis.

Furthermore, this thesis will also test for the effects of leverage and retention within each risk class independently. It is quite possible that the risk class preferences of investors comprising different segments of the market are sufficiently different to cause the effects of leverage and dividend policy to differ as risk changes. For instance, the effect of dividend payout may be much larger for high-risk firms because of the greater uncertainty surrounding the future earnings of these firms. This aspect of the problem has received scant attention in the literature. Durand did suggest that there may be a large demand for high-grade debt on the part of restricted institutional investors and that this restricted demand may

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68. Miller and Modigliani, "Some Estimates of the Cost of Capital to the Electric Utility Industry, 1954-1957", *op. cit.*, 337.

force yields on these bonds lower than they would normally be.[69] Apart from this recent literature is silent. If the arbitrage mechanism between equity and debt is inadequate to neutralize the effects of leverage and dividend policy, as many researchers suggest, the arbitrage mechanism between risk classes may also be inadequate. Keeping in mind the above discussion the following hypothesis can be stated:

Hypothesis:

'The relative effects of leverage and earnings retention on either the equity or average capitalization rates for firms are not dependent upon the level of business risk'.

E] CONCLUSIONS

This chapter has set out briefly the various approaches dealing with the effect of capital structure and dividend policy on the total market value of the firm and therefore the cost of capital. It has also presented three hypotheses to be empirically tested. All of the hypotheses have been stated as indifference hypotheses for convenience in testing. Therefore it is not argued that they are valid as stated, but only that they are stated in testable form.

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69. Durand, "Cost of Debt and Equity Funds for Business: Trends and Problems of Measurement", *op. cit.*, 231.

CHAPTER 2

A REVIEW OF THE PRIOR EMPIRICAL RESEARCH

"Surveys of empirical material are, by their very nature, somewhat unsatisfactory, for they involve the comparison of results obtained using different methodologies, samples and statistics, and the compression of necessary lengthy econometric argument into a few unsatisfactory sentences."

Eatwell

A] GENERAL METHODOLOGY

Over the past dozen years or so a number of empirical studies have been published which have undertaken to test the impact of leverage and/or retention on the cost of capital. Most of these studies have evolved from the 1958 Modigliani and Miller article on leverage or from Gordon's early attempts to test the effects of dividends on share prices. The studies summarized in this chapter cannot be said to have a common approach; they all use either simple or multiple regression analysis on a cross-sectional basis, with the dependent variable being either (1) an estimate of the average capitalization rate, (2) an estimate of the equity capitalization rate, or (3) an estimate of a "normalised" market price per share. Otherwise they have little else in common including their conclusions.

The following sections of this chapter will briefly summarize 14 of the more important empirical studies and attention will be given to several rather general problems encountered in the models which have been used in the studies.

B] TESTS OF THE LEVERAGE HYPOTHESIS

1) Modigliani and Miller (1958)

In their original study,[1] Modigliani and Miller provided empirical support for their Propositions 1 and 2 by presenting the results of two previous empirical studies. The first of these was conducted by Allen[2] and concerned a sample of 43 large electric utility firms in 1947 and 1948, while the second by Smith[3] concerned a sample of 42 oil firms in 1953.

Modigliani and Miller performed two simple linear regressions for the two industries, using the following estimating equations:

$$(2\text{-}1) \qquad \frac{\bar{X}^{\tau}}{V_T} = a_o + a_1 \frac{V_D}{V_T}$$

$$(2\text{-}2) \qquad \frac{\bar{\pi}^{\tau}}{V_S} = a_o + a_1 \frac{V_D}{V_S}$$

where:

$\bar{X}^{\tau}$ is the expected return net of taxes to all security holders

$\bar{\pi}^{\tau}$ is the expected return to ordinary shareholders

V_S is the market value of ordinary shares

V_D is the market value of senior securities (i.e., debt + preferred)

V_T is the market value of all securities.

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1. Modigliani and Miller, "The Cost of Capital, Corporation Finance and the Theory of Investment", *op. cit.*, 261-96

2. Ferry B. Allen, "Does Going into Debt Lower the 'Cost of Capital'?" The Analysts Journal, 10 (August 1954), 57-61.

3. Robert Smith, "Cost of Capital in the Oil Industry" (hectograph) Carnegie Institute of Technology, Pittsburg, 1955.

As measurable approximations of the dependent variables Modigliani and Miller use, (1) the average value of actual net returns[4] in 1947 and 1948 for the utilities in Equation (2-1), (2) the actual net return in 1953 for the oil companies in Equation (2-1), (3) the average value of actual shareholder net income in 1947 and 1948 for the utilities in Equation (2-2) and (4) the average value of actual shareholder net income in 1952 and 1953 for the oil firms in Equation (2-2). Although the use of actual returns as an approximation of expected returns is undoubtedly very crude, Modigliani and Miller contend that, "it will not systematically bias the test in so far as the sign of the regression coefficient is concerned."[5]

In testing Proposition 1, Modigliani and Miller arrive at the following results:- neither correlation coefficients are significantly different from zero; the signs of the leverage coefficients are positive and the regression lines do not even suggest the existence of a U-shaped cost of capital curve.[6] Moreover, a comparison of the estimated with the actual conditions in the two industries substantiated the validity of the results, in that, the cost-of-capital estimates of 5.3 per cent for the utilities

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4. Actual net return was defined as the sum of interest, preferred dividends and shareholder's income net of firm taxes.

5. Modigliani and Miller, "The Cost of Capital, Corporation Finance and the Theory of Investment", *op. cit.*, 282.

6. See the scatter diagrams, Modigliani and Miller, "The Cost of Capital, Corporation Finance and the Theory of Investment", *ibid.*, 283.

and 8.5 per cent for the oil firms do not differ materially from their actual borrowing costs.

In testing Proposition 2, Modigliani and Miller arrive at the following results:- both correlation coefficients are significantly different from zero and the signs of the leverage coefficients are positive. During the testing of Proposition 2, Modigliani and Miller also added a squared term in order to determine the presence and direction of any curvature. The results lent further support to Proposition 2 since both second-degree coefficients were negative, such curvature as was shown in Chapter 1 runs directly counter to the traditional hypothesis.

Both sets of results seem to support the Modigliani-Miller propositions, and as such they concluded,

> ". . . the empirical evidence we have reviewed seems to be broadly consistent with our model and largely inconsistent with the traditional views."[7]

2) <u>Weston (1963)</u>

The study undertaken by Weston[8] to test the Modigliani and Miller cost-of-capital hypothesis was performed on a sample of 59 electric utility firms for the year 1959. Initially, Weston attempted to follow as closely as possible the original paper of Modigliani and Miller. By using estimating equations identical to Equations (2-1) and (2-2), Weston obtained results partially

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7. Modigliani and Miller, "The Cost of Capital, Corporation Finance and the Theory of Investment", *op. cit.*, 287.

8. Weston, "A Test of Cost of Capital Propositions", *op. cit.*, 105-12.

in agreement with those obtained by Modigliani and Miller.[9]

Weston then attempted to improve on the specification of the functional relationship first provided by Modigliani and Miller for the cost-of-capital hypothesis. In order to achieve this, he included asset size and income growth as additional independent variables, which led to the following estimating equations:

$$(2\text{-}3) \qquad \frac{\bar{X}^{\tau}}{V_T} = a_o + a_1 \frac{V_D}{V_T} + a_2 A + a_3 E$$

$$(2\text{-}4) \qquad \frac{\bar{\pi}^{\tau}}{V_S} = a_o + a_1 \frac{V_D}{V_S} + a_2 A + a_3 E$$

where:

A is the total assets at book value

E is the compound growth rate in earnings per share per annum.

As measurable approximations of $\bar{X}^{\tau}$ and $\bar{\pi}^{\tau}$, Weston used, the actual total earnings after taxes in 1959 and the actual shareholder net income in 1959 respectively.

In testing Propositions 1 and 2, Weston finds the results to be consistent with the traditional theory of valuation. This is so because the estimated leverage coefficient from Equation (2-3) is significantly negative, implying an inverse relationship between the average capitalization rate and the leverage ratio. Furthermore, the estimated leverage coefficient from Equation (2-4) is not significantly different from zero. However, Weston's findings, though consistent with the traditional theory,

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9. Weston, "A Test of Cost of Capital Propositions", *op. cit.*, Table 1, 108.

do not disprove Modigliani and Miller's independence hypothesis, since his results offer no clue as to whether the leverage coefficient in Equation (2-3) would remain significantly negative if there were no tax.

The Weston study also shed light on one possible reason why Modigliani and Miller may have failed to detect any relationship between the average capitalisation rate and the leverage ratio in their first study. Suppose the true relationship between the after-tax average cost of capital, the leverage ratio and the rate of growth in per-share earnings is given by the equation:

$$\text{(2-5)} \qquad \frac{\overline{X}^{\tau}}{V_T} = \alpha + \beta \frac{V_D}{V_T} + \gamma E + U$$

where:

α, β and γ are constants

U is a random error term.

Moreover, suppose the leverage ratio and the rate of growth in per-share earnings are related by the equation:

$$\text{(2-6)} \qquad E = a + b \frac{V_D}{V_T} + v$$

where:

a and b are constants

v is a random error term.

Now, if the data are fitted to Equation (2-5) with E suppressed, the coefficient of leverage ratio that one obtains is not an estimate of β, but of $\beta + b\gamma$. Since Weston's data reveal both b and γ to be negative, then the apparent indifference between the average capitalization rate and leverage in Modigliani and Miller's first study may be explained in part by the negative correlation of the rate of growth in per-share earnings with both the average capitalization rate and the leverage ratio.

3) Barges (1963)

By far the most detailed and painstaking study of the cost-of-capital hypothesis was performed by Barges,[10] who utilized cross-section data from the railroad, department store and cement industries. The sample was restricted to firms listed in Moody's during the year 1956. At the outset, two factors should be noted about the Barges study; (1) he found that in the absence of observations with little or no debt and with heterogeneous samples the use of market-value capital structure ratios would result in tests biased in favour of the Modigliani and Miller propositions and biased against the traditional views. In order to avoid the baises associated with market-value ratios, Barges advocated the use of book-value ratios when measuring financial risk. The justification for his decision is based on the following reasons. Firstly,

> ". . . when book-value ratios are used as the risk measure, heterogeneity in the data will not result in the systematic variation in the yields, as it does when market-value ratios are used."[11]

Secondly,

> ". . . book-value ratios are ratios which can be controlled by financial management in the interests of maximizing the shareholders' wealth."[12]

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10. Barges, The Effect of Capital Structure on the Cost of Capital, *op. cit.*

11. *Ibid.*, 37.

12. *Ibid.*

Finally, "book-value debt ratios as measures of financial risk are relevant in the sense that investors look at them and study them."(13) Additionally, to ensure generalized conclusions Barges employed two book-value ratios in the measurement of financial risk. The first considered preferred capital as part of debt, while the second considered preferred capital as part of equity. (2) He used curvlinear regression analysis as opposed to linear regression analysis, this allowed him to test for the U-shaped average capitalization rate curve as postulated in the traditional theory.

Since Barges did not construct a test of Proposition 1 for the department store or cement sample, only the results of his railroad test will be reported. For the railroad test the following estimating equations were used:

$$(2\text{-}7) \qquad \frac{\bar{X}^{\tau}}{V_T} = a_o + a_1 \frac{{}_BV_D}{{}_BV_T} + a_2\left[\frac{{}_BV_D}{{}_BV_T}\right]^2$$

$$(2\text{-}8) \qquad \frac{\bar{\pi}^{\tau}}{V_S} = a_o + a_1 \frac{{}_BV_D + {}_BV_p}{{}_BV_S}$$

$$(2\text{-}9) \qquad \frac{\bar{\pi}^{\tau}}{V_S} = a_o + a_1 \frac{{}_BV_D}{{}_BV_p + {}_BV_S}$$

where:

- ${}_BV_D$ is the book value of debt
- ${}_BV_p$ is the book value of preferred shares
- ${}_BV_S$ is the book value of ordinary shares
- ${}_BV_T$ is the book value of all securities.

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13. Barges, The Effect of Capital Structure on the Cost of Capital, *op. cit.*, 37.

As measurable approximations of $\overline{X}^{\tau}$ and $\overline{\pi}^{\tau}$, Barges used the average value of actual net returns[(14)] in 1954, 1955 and 1956 and the average value of actual shareholder net income in 1954, 1955 and 1956.

In testing Proposition 1 Barges found a significant relation between the average capitalization rate and the leverage ratio. In other words, the test indicated that the average costs at first tended to decline and then tended to rise as the leverage was increased. Barges' use of a second-degree estimating equation permits him to remove a very significant assumption that both Modigliani and Miller and Weston were forced to make, which was that the firms being studied were operating within acceptable debt limits. The acceptance of such an assumption permits inspection of the straight line regression equation for a negative sign with respect to the leverage coefficient. Recall that the traditional hypothesis concludes that the average cost of capital function will turn upwards if the use of leverage becomes excessive. Without the critical assumption made by Modigliani and Miller and Weston, their tests of Proposition 1 would be inconclusive, for a positive leverage coefficient would be compatible with the traditional hypothesis if the use of leverage was considered excessive. Barges removes the need for this assumption by fitting a curve that closely resembles the traditional U-shaped cost of capital curve.

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14. Actual net return was defined as the sum of long-term debt interest, debt discount and net income.

The results of testing Proposition 2 were however not too conclusive. Over the entire range of the observed debt/equity ratios a significant linear relationship was found between the yield and the leverage. While the degree of correlation was not very great, the result was not inconsistent with the Modigliani and Miller hypothesis. On the other hand, within the range of moderate debt/equity ratios (up to 82 per cent), correlation was found to be close to zero. Furthermore, in addition to the linear least-square curves, Barges also fitted second-degree curves to the data. However, no improvement over the straight-line curves were recorded.

In summing up the results of his analysis Barges concluded that, "On the basis of the evidence presented herein, the hypothesis of independence between average cost and capital structure appears untenable."[(15)]

4) Wright, Young and Barton (1966)

In the only Australian empirical study of the Modigliani and Miller hypothesis, Wright, Young and Barton,[(16)] analyzed the security yields of 10 Australian retail firms over the years 1954 to 1963 inclusive. Due to the lack of simultaneous observations for a simple cross-sectional study they adopted a combination of time-series and cross-sectional analysis. Although neither the Modigliani and Miller or

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15. Barges, The Effect of Capital Structure on the Cost of Capital, *op. cit.*, 103.

16. Wright, Young and Barton, "The Effect of Financial Structure on the Market Value of Companies", *op. cit.*, 21-34.

traditional theories specifically predict what effect varying interest rates and market conditions will have on the average capitalization rate over time, Wright, Young and Barton presented the following as one possibility,

> ". . . if each years observations lie on a downward-sloping straight line, then all the observations should lie on several straight lines which may, have different intercepts and different slopes. Whilst the superposition of segments of several such lines could possibly simulate curvature, this is not at all likely."(17)

Given that the possibility just described does hold over time they regard empirical testing in a cross-sectional, time-series framework to be no more difficult than on a pure cross-sectional basis as evidenced by their comment,

> "Hence, if the statistical analysis of several year's observations should show pronounced curvature, with a steep rise at high debt ratios, this would be highly unfavourable to the Modigliani and Miller hypothesis."(18)

Furthermore, they consider the combination of time-series and cross-sectional analysis to be superior to pure cross-sectional analysis because of the fact that, "it permits the measurement and segregation of systematic differences between firms."(19) Systematic differences occur due to the use of reported earnings in a particular year or years as measurable approximations of expected returns. As a

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17. Wright, Young and Barton, "The Effect of Financial Structure on the Market Value of Companies", *op. cit.*, 27.

18. *Ibid.*

19. *Ibid.*

result of this practice, the scatter of points obtained around any regression line may occur because of the random dispersion of actual returns around their expected values or because of systematic differences between firms. Wright, Young and Barton therefore argue that by using pure cross-sectional analysis, it is impossible to determine how much of the scatter is due to each factor, whereas by taking observations of the same firms over several years, systematic differences between firms are revealed.

In their testing of the Modigliani and Miller hypothesis, Wright, Young and Barton used the following linear and curvlinear estimating equations:

$$(2\text{-}10) \qquad \frac{\overline{X}^{\tau}}{V_T} = a_o + a_1 \frac{{}_{B}V_D}{{}_{B}V_T}$$

$$(2\text{-}11) \qquad \frac{\overline{X}^{\tau}}{V_T} = a_o + a_1 \frac{{}_{B}V_D}{{}_{B}V_T} + a_2 \left[\frac{{}_{B}V_D}{{}_{B}V_T}\right]^2$$

As a measurable approximation of $\overline{X}^{\tau}$, Wright, Young and Barton used the actual net receipts after tax.[20]

The results obtained from running Equations (2-10) and (2-11) favoured the traditional theory over the Modigliani and Miller hypothesis. Initially the results of the linear equation were not at all conclusive. Although the coefficient of the leverage ratio was negative, implying that the average cost of capital declined as debt increased, the value of the coefficient was not significantly different

20. Actual net receipts after tax was defined as the sum of net profit, plus interest payments minus taxation.

from zero. These results tended to favour the Modigliani and Miller hypothesis, however a downward sloping relationship between the average cost of capital and the leverage ratio does not really provide conclusive support for either hypothesis. Proceeding on to the second-degree equation here it was found that the results showed the presence of a U-shaped relationship favouring the traditional position. Moreover, the F ratio for this least-squares equation was significant at the 1 per cent level, meaning that the probability is less than .01 that a fit as good as the one observed could have happened by chance. While this result seemed reasonably conclusive the coefficient of multiple correlation was rather low and unsatisfactory. Wright, Young and Barton relate this occurrence to the fact that the market was unlikely to regard all 10 firms in the sample as subject to exactly the same degree of uncertainty. Therefore, they tested for systematic differences between the apparent capitalization rates of the various firms by using the following estimating equation:

$$(2\text{-}12) \qquad \frac{\overline{X}^{\tau}}{\overline{V}_T} = a_i + a_1 \frac{{}^{B}V_D}{{}^{B}V_T} + a_2 \left[\frac{{}^{B}V_D}{{}^{B}V_T}\right]^2 + d_j$$

where:

a_i is the market capitalization rate at zero debt ratio for the year i

d_j is a constant (fitted by least squares) characteristic of firm j.[21]

21. The firm constants estimated by the model represent estimates of what individual firms debt free capitalization rates would have been in 1963; corresponding figures for other years are obtained by adding the appropriate year constant to the firm constant.

The results from running Equation (2-12) not only confirmed the presence of a U-shaped average cost curve supporting the traditional theory of valuation, but indicated an increase in the value of the coefficient of multiple correlation - significant at the 1 per cent level. Figure (3-1 shows the graph of the regression curve together with the scatter diagram associated with running Equation (2-12):

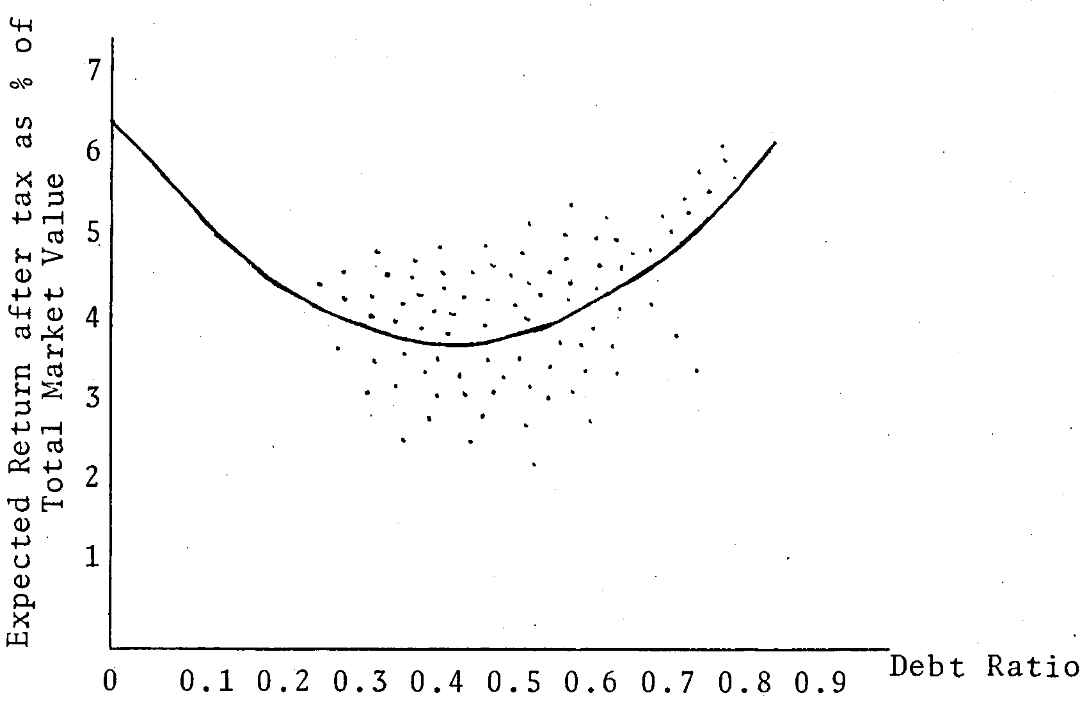

FIGURE (2-1) CAPITALIZATION RATES AND DEBT RATIOS[22]

Based on the above results Wright, Young and Barton conclude that,

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22. Wright, Young and Barton, "The Effect of Financial Structure on the Market Value of Companies", *op. cit.*, 33.

> ". . . for the Australian retailing industry, and for the period covered by this study, the Modigliani-Miller hypothesis is not valid. This implies that the Australian capital market was sufficiently imperfect to inhibit the investor behaviour envisaged by Modigliani and Miller."[23]

5) Wippern (1966)

The study undertaken by Wippern[24] tests for the relationship between the equity capitalization rate and leverage within a sample of 50 firms from seven manufacturing industries in the years 1956, 1958, 1961 and 1963. Wippern's study is significant for two reasons; firstly, he argues that the way leverage has been defined in previous studies, viz., the ratio of debt to equity at book values or this same ratio at market values, contains important conceptual biases, and secondly, he recognizes that the grouping of firms by industry classification does not ensure homogeneity of basic business risk. Consequently, in an effort to obtain a leverage variable which is free from the biases inherent in the debt/equity ratio measures and furthermore avoids the necessity of assuming risk equivalency within industry classes, Wippern introduces the following measure of leverage:

$$\text{Leverage} = \frac{i}{\bar{E}-2s}$$

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23. Wright, Young and Barton, "The Effect of Financial Structure on the Market Value of Companies", *op. cit.*, 33.

24. Wippern, "Financial Structure and the Value of the Firm", *op. cit.*, 615-33.

where:

i is the current level of fixed charges

$\bar{E}$ is the most recent years cash flow of operating income determined from a logarithmic regression of income on time over a ten-year period, and

2s is equal to two standard errors around the regression line.[25]

For his statistical analysis Wippern used the following estimating equation in each of the cross-section years:

$$(2\text{-}13) \quad \frac{E}{P} = a_o + a_1 \frac{i}{\bar{E}-2s} + a_2G + a_3D + a_4L_nS + a_{5\ldots10}ID$$

where:

E is the 'normalised' earnings per share[26]

P is the mean of the high-low share prices during the first quarter of the year following the cross-section year

G is the mean of the slopes of logarithmic regressions of earnings per share on time over a ten year and a four year period

D is the mean of the ratios of ordinary share dividends to earnings on ordinary shares over a four year period

S is the book value of net plant at the end of the cross-section year

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25. The cash flow of net operating income is defined as, earnings before financing charges and taxes plus non-fund charges such as depreciation.

26. Defined as, the last observation from a logarithmic regression of earnings per share on time over the ten year period ending in the cross-section year.

ID is the industry dummy variables.

The results of his empirical analysis indicate a linearly increasing relationship between the equity capitalization rate and leverage. Wippern recognizes however that such an increasing relationship is not a sufficient basis for accepting the net operating income theory, since the traditional theory also implies that the equity capitalization rate will increase with leverage. This being the case, Wippern then proceeds to summarize the relationship between the equity capitalization rate and leverage as specified by the alternative theories of capital structure effects, so as to establish a basis for examining the results. Since Wippern uses a different measure of leverage, the coefficient a_1 in his regression equation must, of course, be adjusted so as to make it comparable to the value one would expect to obtain if the Modigliani and Miller hypothesis were valid. Having made such an adjustment Wippern finds that the actual values of a_1 are generally lower than the values that would support the Modigliani and Miller propositions.

In summing up his study Wippern comments,

> "The evidence of the effects of capital structure on the value of the firms included in this study provides support for the intermediate or traditional view that shareholder wealth is enhanced by the firm's judicious use of fixed commitment financing. The capital markets are not, according to the evidence derived here, sufficiently perfect to validate the Modigliani and Miller arbitrage argument and, in addition to tax effects, firms do gain by employing a mix of financing sources."(27)

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27. Wippern, "Financial Structure and the Value of the Firm", *op. cit.*, 632-33.

C] TESTS OF THE DIVIDEND HYPOTHESIS

1) Gordon (1959)

The basic aim of Gordon's 1^{st} study[28] was to explain the variation in price among ordinary shares. In order to achieve this Gordon proposed three possible hypotheses with respect to what an investor pays for when he acquires a share.[29] In order to test each of the hypotheses, price, dividend and earnings data were obtained for a total of 164 firms from four industries (Chemicals, 32; Foods, 52; Steel, 34; and Machine Tools, 46) and over two years (1951 and 1954), so there were eight samples in all.

Gordon tests the hypothesis that the investor buys both the earnings and dividends when purchasing a share by the use of the following estimating equation:

$$P = a_o + a_1 D + a_2 Y \tag{2-14}$$

where:

P is the year-end price

D is the year's dividend

Y is the year's income.

However, Equation (2-14) is regarded by Gordon as being conceptually weak, since in purchasing a share the investor is looking to the expected future income that share will provide; this income may be the dividend or

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28. Myron J. Gordon, "Dividends, Earnings and Stock Prices", Review of Economics and Statistics, 41 (May 1959), 99-105.

29. The three possible hypotheses are that the investor is buying either, (1) both the earnings and the dividends, (2) the dividends or (3) the earnings.

it may be the earnings per share, but it cannot be both. The conceptual weakness of the model was confirmed by the parameter estimates established when testing the equation. The coefficients were all highly unstable, varying over a wide range from one sample to the next and as such they cannot be used to make reliable statements on the variation in share price with each variable.

The hypothesis that the investor buys only the dividend when he purchases a share was tested by means of the following estimating equation:

$$P = a_o + a_1 D + a_2 (Y-D) \tag{2-15}$$

The reasoning behind Equation (2-15) is that the investor buys the dividend, but the price he is willing to pay for the current dividend varies with its expected rate of growth. As an index of the expected rate of growth Gordon suggests using retained earnings (Y-D), since it will vary with the fraction of income a corporation retains, other things the same. The parameter estimates established when testing Equation (2-15) indicated a material reduction in both the range of variation of the dividend coefficient and its standard error. Based on these results it could be concluded that the use of Equation (2-15) to say how the price will vary with the dividend, given a corporation's retained earnings, yields more reliable and also more plausible statements, than the use of Equation (2-14) to say how price will vary with the dividend given the corporation's earnings. However, some concern exists regarding the values of the retained earnings coefficients.

In theory since retained earnings is serving as an index of growth, their values should be positive, and although this is the case, the coefficients appear low, and in some cases they are not statistically significant. Yet even so, given the crudeness of the model and the measurement of the variables, the findings are not completely out of context. In fact Gordon defends the results obtained as follows,

> "Growth is most uncertain and it becomes quantitatively important by comparison with the current dividend in the distant future. Also, apart from the 1954 chemicals there is a rough correspondence between the rank of the coefficients and notions as to the comparative stability of earnings among the industries."[30]

The hypothesis that the investor buys the earnings when he purchases a share was tested by further reference to the parameter estimates established when running Equation (2-15). Following the rationale of the earnings hypothesis, that if the investor does not receive sufficient cash through the payment of a dividend he can always sell a fraction of his equity, then the dividend and retained earnings coefficients of Equation (2-15) should be the same. However, the parameter estimates showed a statistically significant difference between the coefficients for seven of the eight samples and Gordon finds this result consistent with Durand's bank stock study.[31]

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30. Gordon, "Dividends, Earnings and Stock Prices", *op. cit.*, 102.

31. David Durand, Bank Stock Prices and the Bank Capital Problem, Occasional Paper 54 (New York: National Bureau of Economic Research, 1957).

As a consequence of the poor results obtained by the crude representation of the dividend hypothesis (Equation (2-15)) Gordon suggests some refinements to the model which lead to the following estimating equation:

$$(2\text{-}16) \quad P = \beta_o + \beta_1\bar{d} + \beta_2(d-\bar{d}) + \beta_3\bar{g} + \beta_4(g-\bar{g})$$

where:

P is the year-end price divided by book value

$\bar{d}$ is the average dividend for the prior five years divided by book value

d is the current years dividend divided by book value

$\bar{g}$ is the average retained earnings for the prior five years divided by book value

g is the current years retained earnings divided by book value.

Although theoretically the same the model represented by Equation (2-16) contains two significant changes over the previous model. The first change relates to the independent variables, in Equation (2-15) they are the current values of dividends and retained earnings. However, in selecting the variables for use in Equation (2-16), Gordon relies on the supposition that, it is not current values but departures of current values from averages that are discounted to arrive at what might be considered normal values. Therefore he considers that,

> ". . . some combination of current values and averages over a prior period for dividends and retained earnings would provide a superior explanation of the variation in price among shares."(32)

32. Gordon, "Dividends, Earnings and Stock Prices", *op.cit.*, 104.

The second change relates to the deflation of the variables by book value. Gordon adopts this procedure in an effort to eliminate the scale factor which was producing in part, the correlation between the variables and variation in the coefficients among industries.

The parameter estimates produced from running Equation (2-16) show a slight improvement in the dividend coefficients, both with regard to their statistical significance and their range of fluctuation among the samples. However, the growth coefficient remains disappointing and as such it cannot be said that averages of the sort used by Gordon in his revised dividend model yield reliable estimates of what investors are willing to pay for retained earnings or growth. Even so, the revised dividend model is superior in explaining the variation in price among shares than the earlier models. In concluding his study Gordon considers that room for improvement still exists in such areas as, "a more effective representation of growth and the recognition of variables which influence the valuation of a dividend expectation."(33)

2) Gordon (1962A)

Gordon's 2nd study(34) was designed to test whether share prices could be explained satisfactorily by the familiar dividend capitalization formula:

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33. Gordon, "Dividends, Earnings and Stock Prices, *op. cit.*, 105.

34. Gordon, "The Savings, Investment and Valuation of a Corporation", Review of Economics and Statistics, 44 (February 1962), 37-51.

(2-17) $$P_o = \frac{Y_o(1-b)}{K_e - br}$$

where:

P_o is the price of a firm's share at the end of the period t=0

Y_o is the initial level of income

b is the fraction of income the firm is expected to retain

r is the average return the firm is expected to earn on the ordinary equity investment

K_e is the rate at which the firm's future dividends are discounted at the end of the period t=0 to arrive at their present value.

That is, the value of a share is the current dividend divided by the difference between the rate of profit on the share investors require and the rate of growth in the dividend.

The dividend capitalization model represented by Equation (2-18) assumes that the firm will; first, retain the fraction b of its income in any future period; second, earn a rate of return r on the ordinary equity investment in each future period; third, maintain the existing debt-equity ratio; and finally, undertake no new outside equity financing. For a firm earning Y dollars per share in year 1, these four assumptions imply a per-share dividend of (1-b)Y dollars in year 1 and an ensuring dividend growth rate of br per annum.

Commenting on the validity of his model, Gordon justifies his assumption of no external equity financing by pointing out that firms, particularly in manufacturing do not often issue new shares. Concerning debt policy, Gordon mentions his own findings that, "apart from short-term inventory financing requirements, the maintenance of a stable debt-equity ratio is a widely practiced policy on the part of corporations."[35] On the constancy of the retention ratio, Gordon cites the research of Lintner[36] which indicates that the typical firm, through a process of 'partial adaption', attempts to stabilize its dividend payments at some target ratio of the firm's normal earnings Finally, Gordon admits that the assumption of a constant return on investment is the weakest of his four assumptions.

Summarizing Gordon's findings, the dividend capitalization formula presented in Equation (2-17) can be written alternatively as:

$$d = k - br \tag{2-18}$$

where:

d is equal to $Y_o(1-b)/P_o$, the current dividend yield

If k is constant, as br increases d eventually becomes negative, thus share price becomes infinite. Naturally, this does not accord with reality, therefore Gordon suggests that k should be viewed as increasing with br,

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35. Gordon, "The Savings, Investment and Valuation of a Corporation", *op. cit.*, 38-39.

36. John Lintner, "Distribution of Incomes of Corporations Among Dividends, Retained Earnings and Taxes", American Economic Review, 46 (May 1956), 97-113.

and proposes the following formula:

$$(2\text{-}19) \qquad d = \alpha_o(1+br)^{-\alpha_1}$$

where:

α_o and α_1 are positive constants.

This equation implies that as the dividend growth rate, br, rises, the dividend yield required by investors, d, falls at a decreasing rate. Thus d approaches zero asymptotically, this behaviour is illustrated by Gordon in his Chart 1.(37) Substituting Equation (2-19) into Equation (2-17) yields:

$$(2\text{-}20) \qquad P = Y_o(1-b)\,\frac{1}{\alpha_o}\,(1+br)^{\alpha_1}$$

Equation (2-20) is the equation Gordon uses to explain the differences in price among ordinary shares, however some extensions are made in the derivation of the empirical model.

To allow for differences in risk and size among firms in the sample, Gordon expands Equation (2-20) to read as follows (with $\alpha_5=\frac{1}{\alpha_o}$):

$$(2\text{-}21) \qquad P_o = \alpha_5 Y_o(1-b)(1+br)^{\alpha_1}(1+u)^{\alpha_2} S^{\alpha_3}$$

where u and S are indices of the instability of earnings and firm size respectively. Taking logarithm of both sides, Gordon obtains the following linear estimating equation:

$$(2\text{-}22) \qquad \log P = \log\alpha_5 + \alpha_4 \log Y(1-b) + \alpha_1 \log(1+br) + \alpha_2 \log(1+u) + \\ + \alpha_3 \log S$$

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37. Gordon, "The Savings, Investment and Valuation of a Corporation", *op. cit.*, 41.

The term α_4 is introduced into the equation so that the value of the dividend coefficient will not be forcibly equated to 1, but can be estimated from the particular data. Equation (2-22) is the expression to which the sample data were fitted.

To test this model, Gordon applied it to a sample of 96 firms - 48 from the food industry and 48 from the machinery industry. Data on dividends, retention rates, return on reinvestment, firm size and earnings instability were collected for each of the four years 1954 to 1957 inclusive and normalized to remove the effects of any temporary disturbances.[38] The normalized data were fitted to the estimating equation for each set of firms and for each year separately. Three aspects of the results obtained by Gordon from running Equation (2-22) should be mentioned. First, the dividend coefficient varies within the range .82 to .93 and has a relatively small standard error, therefore it is justifiable to assume that the true value of α_4 is less than 1. This means that a given percentage increase in dividends would result in a less than proportionate increase in the price of a share. Second, the coefficients for the risk size and growth variables also have the correct signs, and with few exceptions are statistically significant,at the 5% level. Third, the coefficient of multiple correlation remains high in

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38. The technique used to obtain the normalized values was that of expotential smoothing, for the weights used see, Gordon, "The Savings, Investment and Valuation of a Corporation", *op. cit.*, 44-45 and Appendix B, 50-51.

successive samples over time, meaning that the model offers a consistently satisfactory explanation of share price during the period under study.

More reliance can be placed on Gordon's results than earlier studies because of the small standard errors and the stable results between different samples. However, although Gordon obtains fairly strong evidence for the existence of the dividend effect, he shows considerable caution in his assessment of the results and emphasizes the need for further research to build a model with more general assumptions and to reduce measurement errors in variables. Moreover, while he is a strong advocate of the dividend hypothesis, Gordon admits that future research may force him to modify or even reject his fundamental propositions.

3) Friend and Puckett (1964)

The last study to deal exclusively with the dividend question was that of Friend and Puckett,[39] which was concerned with the relative importance of dividends and retained earnings in determining the price-earnings ratios of ordinary shares. Friend and Puckett begin their study by briefly reviewing the relevant theory and earlier findings of other empiricists and outlining a considerable number of reasons why previous statistical studies yielded biased results. Their comments are directed in particular to the regression equation most commonly applied to cross-section data, viz:

39. Irwin Friend and Marshall Puckett, "Dividends and Stock Prices", American Economic Review, 54 (September 1964), 656-82.

(2-23) $$P_{it} = a + b\,D_{it} + c\,R_{it} + e_{it}$$

where reading from left to right, the variables represent per-share price, dividends and retained earnings. The subscript i denotes the i^{th} firm in a sample of n firms selected from a particular industry, and all variables are measured in the t^{th} time period. Friend and Puckett argue that statistical tests based on Equation (2-23) and purporting to show strong market preference for dividends (as they nearly all do) failed to take into account several important factors. First, there is the risk factor, which may impart an upward bias to the dividend coefficient. Firms which face greater uncertainty about future earnings may tend to adopt a lower payout ratio in order to reduce the risk of having to cut their dividends in their future. At the same time, greater uncertainty tends to depress the market price of the shares. Thus, there appears to be a direct relationship between the dividends and the price. But if the risk variable were included in the equation, a different dividend coefficient would probably be obtained. Second, there is the growth factor, which may affect the coefficient of retained earnings. If the rate of earnings retention is correlated with external financing the value of the retention coefficient in the regression equation will be biased because it will reflect the effect of both factors rather than retained earnings alone. Third, there are other factors that should be taken into consideration, such as random variations in income, income measurement errors, regression weighting and least-square biases.

Friend and Puckett's statistical analysis was based on sample data from five industries (chemicals, electronics, electric utilities, foods and steels) in each of two years (1956 and 1958). In selecting their sample, Friend and Puckett went to considerably more trouble than most previous empiricists as evidenced by their comment,

> "The industries were selected to permit a distinction to be made between the results for growth and non-growth industries and to provide a basis for comparison with results by other authors for earlier years. Both cyclical and non-cyclical industries are covered. Ready accessibility of data and resource availability were also factors both in industry and year selection. An attempt was made to conform to a fairly narrow definition of the industries chosen so that the sample companies would be reasonably homogeneous in industrial composition. The periods covered include a boom year for the economy when stock prices levelled off after a substantial rise (1956) and a somewhat depressed year for the economy when stock prices, however, rose strongly."(40)

Friend and Puckett begin their statistical analysis by using Equation (2-23) to show that with the data they are using the results obtained are typical of those obtained by other empiricists and to provide a basis of comparison with alternative regression models. The parameter estimates yielded by Equation (2-23) showed the customary strong dividend and relatively weak retained earnings effect in the non-growth industries (steels and foods), while in the growth industries (electronics and electric utilities) more weight relatively is given to retained earnings. However the estimates are not uniform with one growth industry

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40. Irwin Friend and Marshall Puckett, "Dividends and Stock Prices, *op. cit.*, p.670.

(chemicals) indicating a strong dividend effect and for electric utilities depending on the mathematical form of the regression used.[41]

To reduce the problem of regression weights and to hold firm effects constant, Friend and Puckett advocate the introduction of a lagged earnings-price ratio (E/P_{t-1}) resulting in the following estimating equation:

$$(2\text{-}24) \qquad P_t = a + bD_t + cR_t + d(\tfrac{E}{P})_{t-1}$$

The parameter estimates yielded by Equation (2-24) showed that the introduction of the lagged earnings-price ratio results in a reduction of the difference between the dividend and retained earnings coefficients. However, the application of this method runs into several statistical complications the most important of which is probably the potential bias arising from short-run income disturbances.

In order to overcome the problem of short-run income movements, Friend and Puckett derive a 'normalized' earnings figure for each firm included in the tests. They assume that the dividend-price ratio is always normal, but that the earnings-price ratio is subject to short-run fluctuations and additionally that the average earnings-price ratio for the sample, $(\frac{E}{P})_{kt}$, is free of earnings disturbances. The normal value of a firm's earnings-price ratio is then derived by time-series regressions of the

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41. A recomputation of the electric utilities regressions utilizing logarithms for all variables points to a higher dividend than retained earnings effect which is unlike the result obtained in the linear form.

following form:

$$(2\text{-}25) \qquad (\tfrac{E}{P})^n_{it} = [a_i + b_{it}](\tfrac{E}{P})_{kt}$$

Having obtained a normalized value of the earnings-price ratio, normalized earnings, E, are found by simply multiplying this ratio by per-share price while normalized retained earnings, R^n_t, are then obtained by subtracting observed dividends from normalized earnings. The normalization procedure was based on the period 1950-1961, and prices were then related to dividends and normalized retained earnings for chemicals, foods and steels in 1956 and 1958, by the following equation:

$$(2\text{-}26) \qquad P_t = a + bD_t + cR^n_t$$

Subsequently, the prior year's normalized earnings-price variable was also added to hold firm effects constant, the form of the estimating equation becoming:

$$(2\text{-}27) \qquad P_t = a + bD_t + cR^n_t + d(\tfrac{E}{P})^n_{t-1}$$

The parameter estimates for Equations (2-26) and (2-27) showed that in comparison with the corresponding parameter estimates for Equations (2-23) and (2-24) that normalized earnings plays a significant role in eliminating part of the unusual understatement of the relative importance of retained earnings. Additionally, a comparison of the parameter estimates yielded by Equation (2-26) with those yielded by Equation (2-27) indicated that the use of a normalized price-earnings ratio to hold firm effects constant presents a similar picture. Finally, an examination of the parameter estimates yielded by Equation (2-27) showed that for the industry groups covered, when earnings are normalized and firm effects held constant most, but not all, the differences between the dividend and retained earnings coefficients disappear. However, a close examination by Friend and Puckett indicated that the result obtained in the chemical sample (a strong dividend effect) was due to the regression weighting given three firms with prices deviating most from the average price in a sample of 20 firms. Following the omission of these three firms and the re-running of Equations (2-26) and (2-27) the parameter estimates indicated that retained earnings become somewhat more important than dividends as a price determinant.

In their concluding remarks Friend and Puckett comment that,

> "Our analysis suggests that there is little basis for the customary view that in the stock market generally except for unusual growth stocks a dollar of dividends has several times the impact on price of a dollar of retained earnings. There is some indication that in non-growth industries as a whole, a somewhat (but only moderately) higher investor valuation may be placed on dividends than on retained earnings within the range of payout experienced, but that the opposite may be true in growth industries. To the extent that this conclusion is valid, it is possible that management might be able, at least in some measure, to increase stock prices in non-growth industries by raising dividends, and in growth industries by greater retention."(42)

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42. Friend and Puckett,"Dividends and Stock Prices, *op. cit.*, 680.

D] JOINT TESTS OF LEVERAGE AND DIVIDENDS

1) Benishay (1961)

The objective of Benishay's[43] study was to examine empirically the determinants of the differences in rates of return on firm equities. His statistical analysis was based on a sample of 56 firms in each of the four years, 1954, 1955, 1956 and 1957, using the following estimating equation:

$$(2\text{-}28)\quad \log y = a_0+a_1X_1+a_2X_2+a_3\log X_3+a_4\log X_4 + \\ + a_5\log X_5+a_6\log X_6+a_7\log X_7$$

where:

y is the measured rate of return

X_1 is the trend in earnings

X_2 is the trend in the market value of the equity (price)

X_3 is the pay-out ratio: the ratio of dividends to earnings

X_4 is the expected stability of the future income stream

X_5 is the expected stability of the equity value

X_6 is the size of the firm and the liquidity of its shares, both represented by the market value of the equity

X_7 is the debt-equity ratio: the ratio of the book value of debt to the market value of equity.

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43. Haskel Benishay, "Variability in Earnings-Price Ratios of Corporate Equities", American Economic Review, 51 (March 1961), 81-94.

As a measurable approximation of the rate of return on firm equities, Benishay divides the weighted average of annual earnings after taxes for the cross-section year and the eight preceding years by the market value of the corresponding equity in the ninth year. On the empirical definition of the dependent variable Benishay comments that,

> ". . . this empirically derived rate is designed to represent the theoretical ratio of expected income to the market value of the equity, where expected income is the mathematical expectation (mean) of a statistical distribution whose values are expected earnings in the future years."(44)

Regarding the independent variables Benishay separated them into two classes; firstly, the 'corrective' variables: those expected to remove the errors obstructing a valid measurement of the theoretical concept of the rate of return on equity capital; secondly, the 'explanative' variables: those selected to measure the differential 'risk' or 'desirability' of holding firm equities.

The results of the regression analysis indicated that the measured rate of return was inversely correlated with both the pay-out and the debt-equity ratios. The former implying that the higher the pay-out ratio the higher the value of the firm, while the latter that the higher the debt-equity ratio the lower the measured rate of return. However, these results were contrary to what Benishay had expected, since he had already accepted both the leverage

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44. Benishay, "Variability in Earnings-Price Ratios of Corporate Equities", *op. cit.*, 81.

and dividend indifference hypotheses, as a result Benishay rationalizes his results to conform to his ideas. Thus even though Benishay acknowledges the existence of the traditional position with the following statement,

> "A notion seems to prevail in the financial literature, that because investors prefer distribution to retention of earnings, the pay-out ratio and the rate of return are negatively correlated."(45)

Yet he finds no substance in this notion and attributes the correlation between the measured rate of return and the pay-out ratio to,

> ". . . errors in the measurement of expected income, and reinforces the claim that X_3, the pay-out ratio, is a corrector for the deficiently measured expected income in the measured rate of return."(46)

Additionally, when explaining the observed inverse correlation between the debt-equity ratio and the rate of return Benishay submits that the debt equity ratio could be mainly a measure of size instead of risk as follows,

> "If a relevant measure of size is the combined value of both equity and debt, then for a given value of equity the debt-equity ratio becomes a complementary measure of size."(47)

The interpretations by Benishay of the negative correlations he found between the measured rate of return with both the pay-out and debt-equity ratios are, to put it mildly, not convincing.

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45. Benishay, "Variability in Earnings-Price Ratios of Corporate Equities", *op. cit.*, 83.

46. *Ibid.*, 91.

47. *Ibid.*, 92.

2) Gordon (1962B)

In a later empirical analysis, Gordon[48] extends the stock valuation models previously developed (Gordon, 1962A) to include leverage. His statistical analysis was based on a sample of 96 firms - 48 from the food industry and 48 from the machinery industry - in each of the years 1954, 1955, 1956, 1957 and 1958.

The first model tested by Gordon was referred to as the Simlev model, and in logarithmic form it may be represented as follows:

$$(2\text{-}29) \quad \log P = \log\hat{\alpha}_0 + \alpha_1 \log D + \alpha_2 \log(1+br) + \hat{\alpha}_3 \log(1+\breve{\sigma}/_W) + \hat{\alpha}_4 \log(1+h) + \hat{\alpha}_5 \log\pi + \hat{\alpha}_6 \log u + \alpha_7 \log S$$

where:

- P is the market price per share
- D is the amount of dividend paid during the calendar year
- br is the expected rate of growth in the dividend
- $\breve{\sigma}/_W$ is the earnings instability index
- $h=L/_W$ is the debt-equity ratio
- π is the operating asset liquidity index
- u is the debt maturity index
- S is the size of the firm.

The parameter estimates yielded by Equation (2-29) indicated that for the food sample the coefficients of the dividend

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48. Myron J. Gordon, The Investment, Financing and Valuation of the Corporation (Richard D. Irwin, Homewood, Illinois, 1962), *op. cit.*

and growth rate variables were not only highly significant from a statistical point of view but also their parameter estimates varied very little over time. While for the remaining variables the estimates all have the right sign and are statistically significant, often at the 1% level. However these estimates vary enough from one year to the next to make the accuracy of an estimate obtained from one sample year open to question. While the food sample performed quite well, it was not the case with the machinery sample. The coefficients of the dividend and growth rate variables are highly significant, but the growth coefficient is generally lower than in the food samples and it appeared abnormally low in some years. The machinery sample parameter estimates for the remaining variables at best are significant at a lower level than the food samples, and for two of the variables - leverage and asset liquidity - it cannot even be said that the data yield the correlation predicted by theory. Gordon tends to attribute the poor performance in the machinery samples to the greater error in his rules for measuring the variables when applied to the type of firm in that sample.

The second model tested by Gordon and referred to as the Adlev model, differs from the first in that the simple leverage variable is replaced by the definition of the variable suggested by the Modigliani and Miller theory. In logarithmic form the Adlev model may be represented as follows:

$$(2\text{-}30)\quad \log P = \log\hat{\alpha}_o + \alpha_1 \log D + \alpha_2 \log(1+br) + \alpha_3 \log(1+\check{\sigma}/_W) + \hat{\alpha}_4 \log(1+h-ih/_{\check{k}}) + \hat{\alpha}_5 \log\pi + \alpha_7 \log S$$

where:

$\check{k}$ is the rate of return investors require on a share if the firms leverage and retention rates were both equal to zero

i is the rate of interest.

The parameter estimates yielded by Equation (2-30) showed a remarkable increase in the statistical significance and stability of the estimates of the leverage parameter in the food sample. Further, they came surprisingly close to the numerical values suggested by the Modigliani and Miller theory. By contrast, the coefficients of the leverage variable in the machinery sample were not materially improved.

The third model tested by Gordon and referred to as the Eko model, represents an enlargement of his Adlev model to take account of outside equity financing. This involved two things; first, the rate of growth in the dividend was increased so as to reflect the benefit to the existing shareholders from the expected new equity financing; and second, the change in the required rate of profit due to the outside equity financing was recognized by means of a new variable, the outside equity financing rate. In logarithmic form, the Eko model may be represented as follows:

$$(2\text{-}31)\quad \log P = \log\hat{\alpha}_o + \alpha_1 \log D + \alpha_2 \log(1+br+vq) + \hat{\alpha}_3 \log(1+\sigma_{/W}) + \hat{\alpha}_4 \log(1+h-ih/_k) + \hat{\alpha}_5 \log\pi + \alpha_7 \log S + \hat{\alpha}_8 \log(1+q)$$

where:

v is the fraction of the funds invested by new stockholders which accrues to the equity of the existing stockholders

q is the funds a corporation raises during t through outside equity financing expressed as a function of its net worth per-share.

In spite of the theoretical arguments for the recognition of outside equity financing, the parameter estimates yielded by Equation (2-31) did not yield better predictions of the variation in share price with the independent variables than the Adlev model. The poor results of the Eko model seemed to reflect the difficulty in measuring the added variables.

The conclusions that may be drawn from Gordon's tests of the theory are rather mixed. On the one hand his new models do a better job of explaining share prices than do previous efforts. The high statistical significance and the modest variation among sample years for many of the coefficients is impressive. Furthermore, for the variables that do not perform so well, common experience with other models has been failure to even obtain significant correlation. Finally, Gordon's findings convincingly demonstrate that other things the same, the greater the evidence that a corporation's dividend expectation is uncertain, the lower the price that investors are willing to pay for the expectation. On the other hand however, the accuracy of the parameter estimates is open to question. As Gordon's objective was to include all the variables that investors consider in pricing a share, the estimates of a coefficient should not differ materially between samples drawn from two industries. As such, there is no obvious good reason for the large year-to-year fluctuations in the parameters.

3) Beranek (1964)

The objective of Beranek's study[49] was to determine the influence of leverage on the market value of the firm. His statistical analysis consisted of running four regression models using sample data drawn from four industries (commercial banks, electric light and power utilities, railroads and industrials) in each of the years, 1955 and 1956.

The first model is expressed on a per-share basis and takes the following form:

$$(2\text{-}32)\quad P = a_o + a_1 d + a_2 d^2 + a_3 y + a_4 y^2 + a_5 L + a_6 L^2 + a_7 V$$

where:

P is the price per-share

d is the dividends per-share

y is the earnings per-share

L is the ratio debt to equity

V is a variable controlling risk in the gross income stream.

While Beranek recognizes that his first model has an

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49. William Beranek, The Effects of Leverage on the Market Value of Common Stocks (Bureau of Business Research and Science, University of Wisconsin, Madison, Wisconsin, 1964).

important virtue in the fact that all its variables are scaled in a manner consistent with investor decision processes, he also recognizes that this can be a weak factor statistically. The reason for this weaknesses is that because aggregate earnings and dividends have been deflated by the number of shares when 'least-squares' methods are used to estimate the parameter coefficients, there is danger of introducing spurious correlation with a resulting bias in the coefficients. To overcome the danger of spurious correlation Beranek proposes a second model - an aggregative model - which takes the following form:

$$(2\text{-}33)\quad M = a_o+a_1D+a_2D^2+a_3Y+a_4Y^2+a_5L+a_6L^2+a_7S + \\ + a_8S^2+a_9V+a_{10}A$$

where:

M is the aggregate market value of ordinary equity

D is the aggregate annual dividends

Y is the aggregate annual earnings

S is the number of shares on issue

A is the total book assets.

Regarding the validity of his second model, Beranek suggests that the single control variable "total assets" will not adequately remove the influence of firm size. This being the case he proposes that since market value, dividends and earnings reflect firm size, then by deflating each of these variables by total assets the effect of firm size would be severely reduced. This adjustment becomes the foundation of his third model which takes the following form:

$$(2\text{-}34)\quad \frac{M}{A} = a_o + a_1\frac{D}{A} + a_2\left[\frac{D}{A}\right]^2 + a_3\frac{Y}{A} + a_4\left[\frac{Y}{A}\right]^2 + a_5L + a_6L^2 + a_7S + a_8S^2 + a_9V$$

Despite the improvements in the estimating model to this point, Beranek suggests that it is possible to develop a model which suppresses the effect of extreme values due to firm size and also reduces the direct influence of the number of shares on price, dividends and earnings. Beranek considers that this can be achieved by taking the change in each variable from period t to t+1 and then dividing the change by the magnitude of the associated variable in period t. The outcome of adopting such a procedure is his fourth model which takes the following form:

$$(2\text{-}35)\quad \frac{\Delta P}{P} = a_o + a_1\frac{\Delta d}{d} + a_2\left[\frac{\Delta d}{d}\right]^2 + a_3\frac{\Delta Y}{Y} + a_4\left[\frac{\Delta Y}{Y}\right]^2 + a_5\frac{\Delta L}{L} + a_6\left[\frac{\Delta L}{L}\right]^2 + a_7\frac{\Delta S}{S} + a_8\left[\frac{\Delta S}{S}\right]^2 + a_9V$$

While recognizing that his last model has limited decision significance for management, Beranek argues that it is still capable of yielding insights to policy makers on the direction of change management-controlled variables must take to produce the greatest relative change in price.

Considering Beranek's results in general, he found that the overall evidence pointed to the belief that leverage depresses the market value of ordinary shares. This result was found to hold regardless of whether equity in the leverage ratio was measured by book or market value and regardless of the industry studied. Furthermore, the influence of leverage on market value appeared to be most marked in the electric power and light utilities and in the railroad industry. In addition Beranek found support for the belief that dividends have an influence on the market value of ordinary shares. However, Beranek's study is subject to several criticisms which reduce the level of confidence that may be placed on his results. All of the estimating equations included both dividends and earnings, thereby introducing substantial colinearity; additionally, there is no provision for relative growth in earnings and there seems to be no theoretical basis for the equations being used.

4) Miller and Modigliani (1966)

The primary purpose of Miller and Modigliani's 2nd study[50] was to arrive at a multiple regression equation for predicting the average cost of capital to firms in the electric utility industry. Their study was performed on a sample of 63 electric utility firms for the years 1954, 1956 and 1957. The sample consisted of all the consolidated systems that were classified as class A by the Federal Power Commission as of the year 1950. Members of class B were also included, if the portion of their assets assigned to electricity generation exceed $15 million.

The model used by Miller and Modigliani in their 2nd study is derived directly from their formulae describing the value of a levered firm, which is:

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50. Miller and Modigliani, "Some Estimates of the Cost of Capital to the Electric Utility Industry, 1954-1957", *op. cit.*, 333-91.

$$(2\text{-}36) \qquad V_T = \frac{\overline{X}(1-\tau)}{K_e^*} + \tau D$$

where, $\overline{X}(1-\tau)$ is the firm's unlevered earnings after taxes and K_e^* is the equity capitalisation rate of the unlevered firm. The term τD indicates the tax advantage resulting from the introduction of debt into the capital structure. Rearranging Equation (2-36) yields:

$$(2\text{-}37) \qquad V_T - \tau D = \frac{1}{K_e^*} \overline{X}(1-\tau)$$

Extending Equation (2-37) by providing a constant and adding a term for growth Miller and Modigliani's analysis of the theory of valuation leads to the following structural equation:

$$(2\text{-}38) \qquad (V_T - \tau D) = a_o + a_1\overline{X}(1-\tau) + a_2\overline{\Delta A} + u$$

where:

$$\overline{\Delta A} = \frac{1}{5}\left(\frac{A_t - A_{t-5}}{A_{t-5}}\right)$$

A_t is a linear five-year average of total assets times current total assets. This equation states that, on the average, the value of a business, less the tax benefit of debt financing, is equal to a_o plus the value of the business if it were unlevered, plus the present value of its growth potential. The presence of a_o in the equation allows for the possible interaction between the firm's size and earnings on valuation. A positive a_o implies that $V_T - \tau D$ increases less than proportionately with earnings, whereas a negative a_o implies that $V_T - \tau D$ increases more than proportionately with earnings.

If Equation (2-38) is fitted to the sample data, the least-squares estimates of the regression coefficients will be both unbiased and efficient provided that (1) the variance of the random-disturbance term, u, is constant; and (2) none of the independent variables are correlated with u. However, Modigliani and Miller found that a check of the simple scatter of value on measured earnings suggested that the standard deviation of the error term is approximately proportional to the size of the firm. In order to overcome this problem of heteroscedasticity Miller and Modigliani suggested two possible solutions;

> "(1) dividing through by ($V_T - \tau D$) and re-expressing the structural relation in so-called "yield" form; or (2) weighting each observation in inverse proportion to the size of the firm and hence to the size of the standard deviation of the error."[51]

They discard the former approach since it suffers from the fact that the variable ($V_T - \tau D$) enters into the denominator of the ratios on both sides of the equation. An approach such as this would lead to biased estimates of the regression coefficients to the extent that ($V_T - \tau D$) contains stochastic elements independent of those in the numerator of the ratios. However, Miller and Modigliani contend that with the second approach, the fact that the standard deviation of the error term is roughly proportional to the size of the firm means that the required weighting can be effected by the relatively simple expedient of deflating each of the variables by a scale variable, such as the book

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51. Miller and Modigliani, "Some Estimates of the Cost of Capital to the Electric Utility Industry, 1954-1957", *op. cit.*, 349.

value of total assets. Accordingly, they divided Equation (2-38) throughout by A to obtain:

$$(2\text{-}39) \qquad \frac{V_T - \tau D}{A} = a_o \frac{1}{A} + a_1 \frac{\bar{X}(1-\tau)}{A} + a_2 \frac{\overline{\Delta A}}{A} + v$$

When they turn to the actual empirical fitting of their Equation (2-39), Miller and Modigliani believe that measurement errors in their earnings data will result in correlation between the independent earnings variable and the random-disturbance term. These measurement errors arise because the term $\bar{X}$ in Equation (2-39) represents the shareholder's expectation, which can be estimated, but not directly measured by the firm. In an attempt to avoid such biases, Miller and Modigliani resort to an "instrumental variable approach". First a regression of reported earnings on several selected instrumental variables (size, growth, debt, preferred stock and dividends) is obtained. Second, the earnings computed from this regression equation are substituted for the reported earnings.

Miller and Modigliani begin their statistical analysis by fitting Equation (2-39) to the sample data, their reason for doing this is that it enables them to compare the results obtained from running Equation (2-39) with those obtained when testing their debt and dividend indifference hypotheses. In testing their debt indifference hypothesis Miller and Modigliani introduce a debt ratio and a preferred share ratio into Equation (2-39) as additional explanatory variables. Since the Miller and Modigliani theory contends that the subtraction of τD from V_T completely accounts for the effect of leverage on the cost of capital then the addition of the leverage ratios are therefore expected to contribute little in explaining value. The results obtained from re-running Equation (2-39) following the addition of the leverage variables were found to support the Miller and Modigliani position in that for all the three years none of the regression coefficients associated with these variables are significantly different from zero. Moreover, the inclusion of the ratios does not materially improve the accuracy with which the model predicts value.

Miller and Modigliani then proceed to test their dividend independence hypothesis by introducing a variable to represent dividend policy into the structural equation. Their assumption being that the true, as opposed to the purely informational, effect of dividends on the market value is small enough in the utilities industry to be safely ignored. The dividend variable was derived by taking the difference between the actual amount of dividends paid by the firm and the amount it would have paid if it had adhered to the average payout ratio for the sample as a whole. The results obtained from the inclusion of the dividend variable parallel those obtained in regard to the inclusion of the debt and preferred share ratios. The regression coefficients of the dividend variable lack significance and the inclusion of the dividend variable does not materially improve the accuracy with which the model predicts value. Accordingly, Miller and Modigliani's conclusion is that the dividend effect on the value of the firm is sufficiently small and uncertain to be safely neglected.

5) Arditti (1967)

Arditti[52] sought to identify the required return on equity and its relation to various types of investment risks. The sample of firms he selected to study consisted of those listed in the Standard and Poor's Composite Index of industrials, railroads and utilities over the years 1946-1963 inclusive. The Arditti study is notable for its unique and comprehensive approach to risk. Arditti identifies five varieties of investment risks, these he classifies into two categories, distribution risks and investment risks. The distribution risks are first, those associated with the probability distribution of returns from holding a firm's shares. These are given by the second and third moments of the distribution of ordinary share earnings. The second moment represents the variance of the annual rate of return to a firm's shareholder and compares with risk measures used by other researchers. The third moment represents the skewness of the annual rate of return and its use relaxes the assumption of linear utility functions for investors. That is, if the returns from two securities have the same variance but the distribution of one is skewed upwards and the other downwards, investors (who are risk averters) may be

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52. Fred Arditti, "Risk and the Required Return of Equity", Journal of Finance, 22 (March 1967), 19-36.

expected to prefer the security with positive returns. Second, those associated with the correlation between the returns from a single security and all other available securities. That is, securities whose returns are found to be negatively correlated with the other securities available to the investor are desirable because they tend to reduce the overall riskiness of the portfolio, and the investor requires a lower rate of return from these securities.[53] The financial risks are deemed to be associated with the firm's financial policies, that is their debt and dividend policies.

The estimating equation employed by Arditti is illustrated by Equation (2-40) below:

$$\text{(2-40)} \quad p = a_o + a_1X_1 + a_2X_2 + a_3X_3 + a_4X_4 + a_5X_5$$

where: p is the required rate of return on equity

X_1 is the variance of the annual rate of return to a firm's shareholder

X_2 is the skewness of the annual rate of return to a firm's shareholder

X_3 is the correlation coefficient between the securities return and all others which might comprise the shareholders portfolio

X_4 is the debt-equity ratio

X_5 is the dividend-earnings ratio.

As an approximation of the required rate of return Arditti

53. This concept of risk is based on Sharpe's diagonal model of portfolio analysis, see William F. Sharpe, "A Simplified Model of Portfolio Analysis", Management Science, 10 (January 1963), 277-93.

used the actual rate of return which is measured as the geometric mean of the annual rates of return from 1946 to 1963 inclusive, assuming that all dividends are reinvested in additional shares. This measure rests on the assumption that the actual and the required rates of return are one and the same thing. Additionally, Arditti used the average of the annual dividend-payout and debt-equity ratios for his estimates of those variables. The debt-equity ratio was measured by using the book value of debt and the market value of equity.

In testing his model Arditti adopts a stepwise method in that, first the required rate of return is regressed on only those variables termed distribution variables. Second in a separate set of regressions the financial variables are run against the required rate of return. Finally, all the risk variables are brought together in a set of regressions on the required rate of return. In addition to regressing the required rate of return against the various risk variables across all firms in the Standard and Poors Index, Arditti also ran regressions on an intra-industry basis.

The results of Arditti's study tend to refute both the dividend and leverage indifference hypotheses. The slope coefficient of the dividend-earnings ratio is negative and significantly correlated with the required rate of return. The implication of the negative coefficient being that the market prefers dividends to retentions since it is willing to accept a lower rate of return for a higher dividend payout. Although, the introduction of the second and third moments into the regressions tended to reduce the significance of the dividend-earnings coefficient, it was still "marginally" significant at the 5% level. The slope coefficient of the debt-equity ratio appeared in the regressions with a negative sign, implying that shareholders are willing to accept a lower return from firms with debt in their capital structures. In addition, the significance of the negative coefficients increased when the industry regressions were run and yet again when the risk variables were introduced. A significant, negative coefficient is contrary to all theories of leverage and Arditti is at loss to explain it but concludes that, "some other risk variables which are positively correlated with the required return but negatively correlated with the debt-equity ratio have been omitted."[54]

6) Brigham and Gordon (1968)

The purpose of Brigham and Gordon's[55] study was to test the alternative theories of leverage and dividend policy on the cost of capital using sample data drawn from the electric utility industry. They begin their study with the familiar perpetual-growth dividend capitalization model, or[56]

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54. Arditti, "Risk and the Required Return on Equity", *op. cit.*, 36.

55. Brigham and Gordon, "Leverage, Dividend Policy and the Cost of Capital", *op. cit.*, 85-104.

56. The variables P_o, Y_o, K_e, b and r in Equation (2-41) have been previously defined in Gordon (1962A).

$$(2\text{-}41) \qquad P_o = \frac{Y_o(1-b)}{K_e - br}$$

that is, the value of a share is equal to the current dividend divided by the difference between the rate of profit on the share investors require and the rate of growth in the dividend. By rearranging the terms in Equation (2-41) we obtain the following:

$$(2\text{-}42) \qquad \frac{D_o}{P_o} = K_e - br$$

where D_o is the initial level of dividend and is equal to $Y_o(1-b)$.

Equation (2-42) gives rise to the following linear regression model:

$$(2\text{-}43) \qquad \frac{D_o}{P_o} = a_o + a_1 br$$

For a sample of firms the constant term, a_o is said to be an estimate of K_e if the regression coefficient a_1 is equal to -1. However, for a_1 to equal -1, investors would have to be indifferent between current dividends and capital gains arising from growth. If $a_1 > -1$, the evidence is said to be consistent with investors preferring current dividends to capital gains.

On the question of leverage policy, Brigham and Gordon show that with a sample of firms that paid out all their earnings the Modigliani and Miller position regarding the capital structure decision could be expressed as follows:

$$(2\text{-}44) \qquad P_o = \frac{Y_o}{K_e} = \frac{Y_o}{K_e^* + h(K_e^* - i)}$$

where:

K_e^* is the leverage-free rate of K

h is the debt-equity ratio

i is the interest rate on debt obligations.

By rearranging the terms in Equation (2-44) we obtain the following:

$$(2\text{-}45) \qquad \frac{Y_o}{P_o} = K_e^* + (K_e^*-i)h$$

Equation (2-45) gives rise to the following linear regression model:

$$(2\text{-}46) \qquad \frac{Y_o}{P_o} = a_o + a_2h$$

For a sample of firms, the constant term a_o, is an estimate of K_e^* and a_2 should be approximately equal to a_o-i if investors are indifferent between leverage on personal or corporate account. If $o<a_2<a_o-i$, the evidence is said to be consistent with investors preferring corporate leverage to personal leverage.

The two previous regression models assumed either h=0 or b=0, however, h and b typically vary and as a result Brigham and Gordon present the following equation to test the dividend and leverage theories.

$$(2\text{-}47) \qquad \frac{(1-b)Y_o}{P_o} = \frac{D_o}{P_o} = K_e^* - br + (K_e^*-i)h$$

Equation (2-47) gives rise to the following linear regression model:

$$(2\text{-}48) \qquad \frac{D_o}{P_o} = \alpha_o + \alpha_1 br + \alpha_2 h$$

To help reduce the problem of specification bias, Brigham and Gordon introduce additional explanatory variables. Their expanded estimating equation is:

$$(2\text{-}49) \quad \frac{D_o}{P_o} = \alpha_o + \alpha_1 br + \alpha_2 h + \alpha_3 u + \alpha_4 e + \alpha_5 S$$

where:

u is the standard deviation of earnings before interest and taxes

e is the fraction of total sales to electricity sales

S is the ratio of firm assets to mean assets.

If the theories that dividend and debt policy per se have no influence on share value and the cost of capital are true then $\alpha_1=-1$, α_o is an estimate of K_e^*, and $\alpha_2=\alpha_o-i$, with i estimated from other sources. On the other hand if K_e is an increasing function of br then, $0>\alpha_1>-1$, and if investors prefer corporate to personal leverage then, $\alpha_2<\alpha_o-i$.

Brigham and Gordon tested their model with a sample of 69 electric utility firms for each of the years 1958 to 1962 inclusive. In an effort to overcome spurious correlation resulting from the fact that the dependent variable and the leverage variable are related they used book value debt-equity ratios as the measure of leverage for most of their regressions. The results of Brigham and Gordon's study lent support to the traditional position. They found the regression coefficients for the leverage variable to be positive and significant and interpret this finding as being consistent with the equity capitalization rate increasing with leverage. In addition, they suggest that the regression coefficients are not large enough to support the Miller and Modigliani position. Instead they contend that the evidence is consistent with the existence of an optimal capital structure, and furthermore that the cost of capital and the value of the firm depends on its financing policy. Brigham and Gordon also found that the value of the a_1 regression coefficient averaged about -.4 and interpreted this finding as being consistent with investors preferring current dividends to capital gains, all other things being the same. As such they suggest that the equity capitalization rate is directly related to the firm's retention rate. This evidence is viewed as being consistent with the relevance of dividends.

E] THREE DEFICIENCIES OF PRIOR EMPIRICAL RESEARCH

1) Leverage

One of the principal problems in empirical investigations of leverage effects on the cost of capital is that of defining an unbiased measure of leverage. In previous studies leverage has been defined as either the ratio of debt to equity at book values or this same ratio at market values. However, to be consistent with the leverage theories the debt-equity ratio (or the debt to total value ratio) must be measured in terms of market values. The use of book values for measuring debt and preferred shares is generally accepted since the error involved is likely to be small, because periodic refinancing will keep the two measures fairly close together, furthermore market values for privately placed issues are difficult to determine. But the error associated with the use of book value for equity is quite large. Therefore only leverage ratios which include equity at market values can be considered acceptable.

Another deficiency in the handling of leverage involves the assumption that the income stream of a firm is divided into only two segments - one flowing to debt holders, and the other to equity holders. This assumption is regarded as an oversimplification by Wright, Young and Barton in that,

> ". . . not all debt holders of a firm receive income streams of the same quality: debt securities offer varying degrees of asset cover, income and repayment rights."(57)

The treatment of preference shares in the prior empirical research revolves around whether it is part of debt or part of equity. In only one study, that by Miller and Modigliani (1966), was a separate variable provided to test for the effects of preference shares. All other studies combine preference shares with either equity or debt, or omit it altogether in defining the leverage variable. However, what is the position of preference shares as regards their effect on financial leverage? Legally, preference shares are regarded as equity but are commonly regarded by investors as a form of fixed interest borrowing, because their holders have preference over ordinary shareholders with respect to the payment of dividends and

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[57]. Wright, Young and Barton, "The Effect of Financial Structure on the Market Value of Companies", *op. cit.*, 29.

usually with respect to capital repayment in the event of a firm's liquidation. The error introduced by the diverse handling of preference shares may not be significant when the sample of firms being used in the statistical analysis consists of those with small amounts of preference shares on issue in their capital structures. However, when utilities are used, procedures such as those used by Brigham and Gordon (inserting preference shares into the denominator of the debt-equity ratio) may significantly distort the results. The Brigham and Gordon procedure is particularly suspect since Miller and Modigliani (1966) obtained comparable coefficients for both the debt and preference share variables. This suggests that in the electric utility industry, at least, preference shares are comparable to debt in their effect of a firm's cost of capital. Since no assumption should be made as to the effect of preference shares on a firm's cost of capital a separate variable for preference shares should be used as in the 1966 Miller and Modigliani study.

2) <u>The Equivalent Risk Class Assumption</u>

A second problem present in empirical investigations of the effect of leverage on the cost of capital is that of separating business and financial risks. The separation of business and financial risk is of especial importance in empirical analyses of the effect of leverage on the cost of capital. If the determinants of business and financial risk are not separated, then the reactions of investors to alterations in a firm's capital structure may not be ascertained; instead, the reactions of investors to changes in the overall risk attributes of a firm may be observed. Typically, it is assumed that if the sample of firms studied consists of those which are members of the same industry, then the determinants of business risk will be held constant. In other words, it is assumed that firms within the same industry manifest equivalent degrees of business risk. The practice of equating industry classification with risk class was first initiated by Modigliani and Miller (1958) as follows;

> "For empirical purpose, however, the best that can usually be done is to work homogeneous with reasonable industries and hope that the differences among firms are small, random and not strongly correlated with any of the explanatory variables."(58)

However, Modigliani and Miller's identification of a risk class with an industry suffers from all the problems of the non-homogeneity of "an industry". The defects are aggravated in the risk class concept because the dependent variables which they seek to explain are particularly sensitive to differences in characteristics between firms conventionally grouped in a given 'industry' by government or financial agencies. Weston questioned but did not resolve the validity of equating industry classifications and risk classes and comments that,

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58. Modigliani and Miller, "The Cost of Capital, Corporation Finance and the Theory of Investment", *op. cit.*, 282.

> "In a group of 42 oil companies used by Modigliani and Miller would be found the following diversity; fully-integrated oil companies, oil companies strong in refining, oil companies strong in distribution; some regional in their operations, some with heavy investments in troubled international regions; some with stable, assured or rising income from petrochemical or uranium or other minerals. Furthermore, lease obligations, which are common in the oil industry, are not reflected in Modigliani and Miller's data on debt. It is obviously not plausible to regard a group of companies with such wide ranging diversity in significant characteristics as a homogeneous risk class."(59)

However, even though it is possible to argue that some industries do not represent a homogeneous risk class, some authors have implied that other industries will. Thus Miller and Modigliani (1966) in defending the use of electric utilities in their study commented, "they permit us to have both a large sample and one in which the component firms are remarkably homogeneous in terms of product, technology and market conditions."(60)

Several direct tests of the equivalent risk class hypothesis have been made; the results did not support the homogeneity of intraindustry business risk and were divided on the heterogeneity of interindustry business risk. The first test by Wippern(61) examined 61 firms from eight

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59. Weston, "A Test of Cost of Capital Propositions", *op. cit.*, 107.

60. Miller and Modigliani, "Some Estimates of the Cost of Capital to the Electric Utility Industry, 1954-1957", *op. cit.*, 334.

61. Ronald F. Wippern, "A Note on the Equivalent Risk Class Assumption", Engineering Economist, 12 (Spring 1966), 13-22.

different industries by a relative measure of the deviation in operating income[62] and the statistical technique of analysis of variance. The assumption of intraindustry homoegeneity was not supported; that is, firms within the same industry did not necessarily face the same degree of business risk. Another test[63] used the relative deviation of a firm's rate of growth in net operating income from the firm's compound rate of growth in net operating income and the statistical technique of the "Kruskal-Wallis One Way Analysis of Variance by Ranks". The measure of relative deviation used was:

$$BR_{it} = \frac{R_{it}-K_i}{K_i}$$

where:

BR_{it} is the deviation measure for the i^{th} firm at time t

R_{it} is the growth rate of the i^{th} firm's net operating income during period t, t=1958...

K_i is the compound growth rate of i^{th} firm's net operating income over the ten-year period 1958-1967.

Gonedes study concluded that six out of the eight industries tested violated the assumption of intra-industry

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62. The measure used was the variability in net operating earnings expressed as the standard error of the estimate for a logarithmic regression of observed annual net operating income on time.

63. Nicholas J. Gonedes, "A Test of the Equivalent Risk Class Hypothesis", Journal of Financial and Quantitative Analysis, 4 (June 1969), 159-77.

homogeneity. Therefore, it is inappropriate to assume that business risk was the same for all firms within an industry. Gonedes study found, however, in contrast to Wippern's study, that there was sufficient evidence to support interindustry heterogeneity. This conclusion implied that industry operating conditions, exposed each industry group to different degrees of business risk.

In general it may be argued therefore that the selection of firms from an industry group is not equivalent to holding business risk constant. As such cost-of-capital studies that attempt to hold business risk constant by invoking the equivalent-risk class hypothesis and, thence, attempt to evaluate the relationship between financial structure and the cost of capital, will instead secure an evaluation of investors responses to changes in financial structure and business risk. As a way of overcoming this problem Gonedes suggests

> "The degree to which a sample of firms is homogeneous, with respect to business risk, should be subjected to explicit tests before the sample is used in a cost-of-capital study. Alternatively, one might, for example, (1) include explicit business-risk variables in regression models that are used in cost-of-capital studies, and/or (2) use a sampling procedure - such as cluster sampling - in order to create a sample of firms which is homogeneous in regard to business risk."(64)

3) The Required Rate of Return

The third problem present in a cost-of-capital study is that of attempting to define a relevant measure of the

64. Gonedes, "A Test of the Equivalent-Risk Class Hypothesis", *op. cit.*, 168.

investors required rate of return. The ratios of dividends to market price and earnings to market price have both been used in empirical studies as estimates of the investors required rate of return. Neither of these measures however is satisfactory in that they fail to recognize that the stream of payments to the shareholders may grow or decline. In the case of growth firms, for example, with investment opportunities expected to provide returns in excess of those required by investors at the margin, the current earnings-price ratio is a biased and low estimate of the required rate of return. To test the validity of this statement, it is necessary to refer to the capitalization model of Gordon-Shapiro;[65] which is as follows:[66]

$$K_e = \frac{(1-b)Y_o}{P_o} + br \qquad (2\text{-}50)$$

which simply states that the equity capitalization rate is equal to the current dividend yield plus the expected growth rate. If $r=K_e$ then Equation (2-50) may be expressed as follows:

$$K_e = \frac{(1-b)Y_o}{P_o} + bK_e$$

$$K_e(1-b) = \frac{(1-b)Y_o}{P_o}$$

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65. Myron J. Gordon and Eli Shapiro, "Capital Equipment Analysis: The Required Rate of Profit", Management Science, 3 (October 1956), 102-110.

66. The variables P_o, Y_o, K_e, b and r in Equation (2-50) have been previously defined in Gordon (1962A).

$$K_e = \frac{(1-b)Y_o}{(1-b)P_o}$$

$$K_e = \frac{Y_o}{P_o} \qquad (2\text{-}51)$$

Therefore, the current earnings-price ratio is a reasonable estimate of the equity capitalization rate if it is safe to assume that $r=K_e$ over a cross-section of firms.

If $r \neq K_e$, then an error is introduced by the use of the current earnings-price ratio as long as b is not zero. This error can be identified by subtracting the earnings-price ratio, $\frac{Y_o}{P_o}$, from the equity capitalization rate (K_e) as follows:

$$e = K_e - \frac{Y_o}{P_o}$$

$$\therefore \quad e = \frac{(1-b)Y_o}{P_o} + br - \frac{Y_o}{P_o}$$

$$e = b(r - \frac{Y_o}{P_o}) \qquad (2\text{-}52)$$

As illustrated earlier, this error will amount to zero if $b=0$ or if $r=K_e$, but otherwise the error will vary depending on the relationships between K_e and b and between r and K_e. It will be sufficient to explore briefly the effects of the relationship between K_e and b. If K_e is independent of b, then K_e will not change as b changes; a change in b will instead be reflected in a change in P_o, the market value of the shares. This is the situation if the dividend indifference hypothesis is valid. In this case, $\frac{Y_o}{P_o}$ will be a decreasing function of b. Substituting Equation (2-50) for the value of P_o in Equation (2-51) gives:

$$e = b(r - \left[\frac{Y_o}{\frac{(1-b)Y_o}{K_e - br}}\right])$$

$$\text{(2-53)} \qquad e = b(r - \frac{K_e - br}{1-b})$$

The error term in this case would be positive if $r>K_e$, zero if $r=K_e$ and negative if $r<K_e$ and would change at an increasing rate as b increases. If, on the other hand, K_e is directly dependent on b with an increase in br being completely offset by an increase in K_e, then the current dividend yield must remain constant, resulting in $\frac{Y_o}{P_o}$ being an increasing function of b as follows:

$$\text{(2-54)} \qquad \frac{Y_o}{P_o} = \frac{\frac{(1-b)Y_o}{P_o}}{1-b}$$

$$\frac{Y_o}{P_o} = \frac{d}{1-b}$$

where:

d is the current dividend yield, a constant.

Substituting Equation (2-54) into Equation (2-52) gives:

$$\text{(2-55)} \qquad e = b(r - \frac{d}{1-b})$$

This error would be positive at low levels of b, but would become negative at an increasing rate as b increases. Thus, for higher levels of retention, the earnings-price ratio would over-estimate the equity capitalization rate.

The significance of these errors for empirical research is that the results of regressions which use the earnings-price ratio as the dependent variable cannot be interpreted safely. For example, assume that K_e is truly independent of b. A regression run with $\frac{Y_o}{P_o}$ as the dependent variable and b as an independent variable may yield a negative coefficient for b, thereby suggesting that K_e decreases as b increases. But both the magnitude and the sign of the coefficient for b will depend on the relative value for K_e and r in the sample. Therefore, even the direction of the influence of b cannot be interpreted if the earnings-price ratio is the dependent variable. This discussion has assumed that r is independent of b and has assumed the absence of leverage. If these assumptions are eliminated the error term can be shown to take a variety of additional forms. However, there is no point in pursuing the possibilities into further levels of complexity. The point is that the relationship between current earnings, current price and the retention rate cannot be used to establish the relationship between K_e and b. Therefore a direct measurement of K_e should be attempted without relying on current earnings or recent earnings. Yet of all the studies discussed in the preceding sections, only the Arditti and Brigham and Gordon studies attempted to measure K_e in a manner consistent with the cost of capital theories. Their formulations, however appealing on a theoretical basis both have limitations in empirical applications.

As the dependent variable, Arditti used the actual compounded return on each security from 1946 to 1963, assuming that all dividends were reinvested in additional shares. Thus he is not assuming that current earnings are a measure of expected earnings as have all previous researchers, but rather that actual returns over the period equalled expected returns for that same period. Arditti's assumption that actual returns equal expected returns, requires some caution. Over the short-run this assumption is clearly unacceptable since it would imply that there was no deviation at all between expectations and results; but as the time span is increased, the average results may be expected to conform to the average expectations since investors presumably modify their expectations on the basis of actual results. Thus Arditti's use of a 17 year time span should provide a sufficiently long time period to permit the assumption that expectations equal results. However, the use of a long time span introduces another assumption, it assumes fairly stable relationships among the variables. If investors' perceptions or preferences with regard to dividends or leverage change during the period, the effect will be to reduce the significance of these variables in the regressions. Thus regressions based on variables averaged over a 17 year period cannot be relied upon unless it can be shown that the basic relationships among the variables have remained substantially unchanged throughout the period.

The Brigham and Gordon study employs the Gordon-Shapiro formulation of the current dividend yield plus the expected rate of growth in the dividend, i.e., the perpetual-growth dividend model. However, one possible bias arises in that, no firm is likely to grow forever at a rate faster than that for the economy as a whole. Eventually, its growth tends to taper off. If the measured past growth for the firms in the sample exceeds the "true" growth expected by investors at the margin, the regression coefficient a_1 (in Equation (2-49)) would tend to be biased upward, that is, it would be biased toward a lower negative number. However, with the stability that accompanies a regulated industry, past growth is likely to provide a reasonable estimate of future growth.

F] CONCLUSION

The 14 studies discussed above use a broad variety of models and arrived at strikingly different results. The most carefully constructed models are those of Miller and Modigliani (1966) and Brigham and Gordon (1968) and yet these two studies give opposing results. Table (2-1) presents a summary of the results of the 14 studies as interpreted by their authors. If the issue could be settled by vote, both of the independence theories would lose. But eleven of the studies were conducted before Modigliani and Miller presented their modified indifference theory, which leaves Miller and Modigliani (1966), Arditti (1967) and Brigham and Gordon (1968) as the only researchers to be fully aware of all the theories. Unfortunately, however, both the Miller and Modigliani and Brigham and Gordon studies side-stepped the issue by using electric utilities. The use of debt in electric utilities will not increase the expected value of the returns to security holders because the tax savings must be passed on to the customers rather than to the shareholders. This is the essence of the "revenue requirements" approach in regulated utilities.

TABLE (2-1)

CONCLUSIONS OF PRIOR EMPIRICAL RESEARCH

Study	Dependent Variable	Support Indifference Hypothesis	
		Leverage	Dividend
Modigliani and Miller (1958)	$\bar{X}^{\tau}/V_T$ and $\bar{\pi}^{\tau}/V_S$	yes	n.t.
Gordon (1959)	P	n.t.	no
Benishay (1961)	log y	yes	yes
Gordon (1962A)	P	n.t.	no
Gordon (1962B)	log P	no	no
Barges (1963)	$\bar{X}^{\tau}/V_T$ and $\bar{\pi}^{\tau}/V_S$	no	n.t.
Weston (1963)	$\bar{X}^{\tau}/V_T$ and $\bar{\pi}^{\tau}/V_S$	no	n.t.
Beranek (1964)	$P, M, M/_A, \Delta P/_P$	no	no
Friend and Puckett (1964)	P	n.t.	yes
Wright, Young and Barton (1966)	$\bar{X}^{\tau}/V_T$	no	n.t.
Wippern (1966)	$E/_P$	no	n.t.
Miller and Modigliani (1966)	$(V_T - \tau V_D)/A$	yes	yes
Arditti (1967)	p	no	no
Brigham and Gordon (1968)	$D/_P$	no	no
where: n.t. equals not tested			

Therefore, the modified indifference theory is inoperative in electric utilities and neither Miller and Modigliani nor Brigham and Gordon tested the modified theory. In addition to the lack of testing of the modified leverage indifference theory, the previous research contains three general shortcomings. First leverage ratios are commonly measured at book values. Second, it is assumed that firms within the same industry manifest equivalent degrees of business risk. Third, the ratios of dividends to market price and earnings to market price are used as estimates of the investors required rate of return. At least two of these shortcomings apply to every study and all three apply to most studies. This thesis will attempt to correct these deficiencies.

CHAPTER 3

THE SAMPLE DESIGN AND DATA COLLECTION (STANDARDIZATION) PROCEDURES

> *"He that will not reason is a bigot,*
> *he that cannot reason is a fool and*
> *he that dare not reason is a slave."*
>
> Drummond

A] THE AUSTRALIAN SETTING

Australia has been remarkably slow in developing some form of data bank containing individual firm statistics, particularly in a computerized form.(1) The necessity for a data bank relating to the corporate sector of the economy was recognized nearly 18 years ago by Hall who in one of the first Australian empirical studies in corporate finance commented,

> "One of the major gaps in Australian economic statistics is that relating to the corporate sector of the economy . . . Given the weight of the activities of the corporate sector in the economy as a whole, it is indeed surprising that so little has been done to provide data upon which understanding of its behaviour could be based and reliable judgments of its performance made."(2)

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1. Data banks of individual firm statistics are not new. In 1964-65, Standard and Poors developed a magnetic tape known as the Compustat service comprising financial statistics for 1000 United States firms. This tape is made available to broking houses and institutions, enabling them to carry out research much more economically than would be possible had they collected the statistics themselves.

2. Alan R. Hall, Australian Company Finance - Sources and Uses of Funds of Australian Public Companies, 1946-1955; Australian National University, Social Science Monographs, N.7, Canberra, 1956, 1.

The situation described so aptly by Hall has over the years shown no substantial improvement, the result being that research activity in the area of corporate finance has been limited. Since this thesis involves empirically testing the hypotheses established in Chapter 1 certain data requirements must be met, and these are:

First, obtaining a sample of firms that exhibits a high degree of heterogeneity among factors such as growth trends, cost and demand patterns and the relative influences of economic cycles;

Second, obtaining a selection of individual firm statistics comparable on both a firm-to-firm and year-to-year basis so that any conclusions which are drawn from the results of the analysis cannot be said to have been affected by 'noise' in the measurement of the variables.

At the time of commencing this thesis neither of these data requirements could be filled from the then present sources of available information. This chapter describes therefore, not only the several processes used in order to obtain the sample of firms on which the analysis is to be conducted but also, the procedures adopted to collect and standardize the individual firm statistics into a form suitable for comparative analysis.

B] THE SAMPLE DESIGN

Determination of the firms to be included in the analysis was achieved by a three-stage sample selection procedure. This procedure is illustrated by Figure (3-1) below:

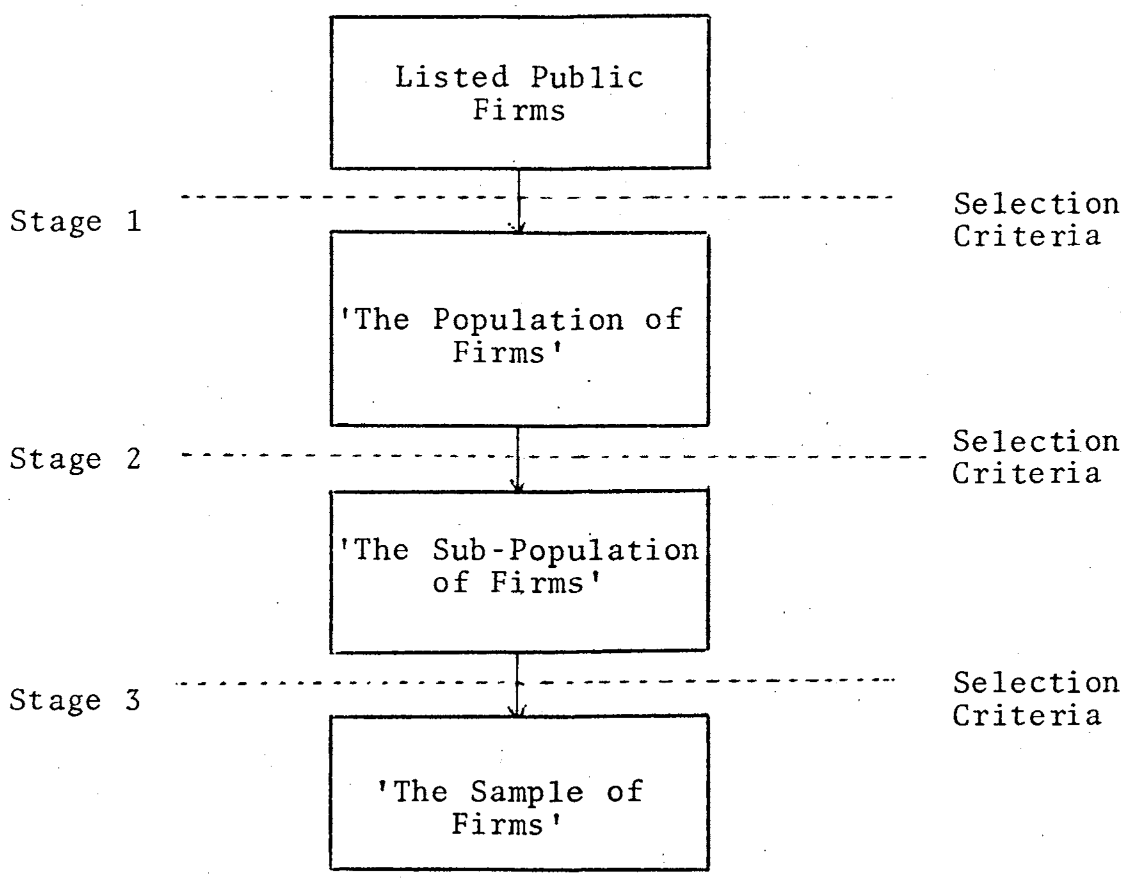

FIGURE (3-1) THE THREE-STAGE SAMPLE SELECTION PROCEDURE

A detailed discussion of the three stages and their associated criteria follows:

1) 'The Population of Firms'

The starting point in deciding which firms to include in the analysis was taken to be all the listed public firms in Australia. Both private and non-listed public firms, although outnumbering the listed public firms were not included in the analysis for two reasons. First, the financial information contained in the returns of private firms are of a very poor quality and in a large number of cases unaudited, thus making the derivation of comparable individual firm statistics a near impossibility. Second, earlier it was stated that the fundamental objective of the firm is to maximize its value to the existing ordinary shareholders, where value is measured by a 'normalised' market price. In the case of private and non-listed public firms where no measure of value can be obtained the performance of the firm with regard to its given objective can at best only be estimated.

Stage 1 of the sample selection procedure involved screening all the listed public firms in order to determine their eligibility for inclusion into 'The Population of Firms'. To be eligible for membership of 'The Population of Firms', every listed public firm was required to meet each one of the following four criteria:

(a) The firm must have been incorporated in Australia, its Territories or Protectorates.

(b) The firm must have had published consolidated accounts spanning the period 1962/63 to 1971/72 inclusive.(3)

(c) The firm must have had its ordinary shares listed on the 'Industrial' board of at least one of the six member exchanges of the Australian Associated Stock Exchange for the period 1962 to 1972 inclusive.(4)

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3. The term 'consolidated accounts' is used to denote that, when a firm has subsidaries, the assets and liabilities of the subsidaries are included in the accounts of the parent firm.

4. The six member exchanges of the Australian Associated Stock Exchange are, Adelaide, Brisbane, Hobart, Melbourne, Perth and Sydney.

(d) The firm must not have been in the hands of an official manager or receiver during the period 1962/1963 to 1971/72 inclusive.

Of all the listed public firms investigated only 710 of these satisfied all four criteria. A list of these firms together with, their main trading activities, stock exchange industrial categories, home exchanges and balance dates will be found in Appendix 2. Several aspects of the four selection criteria detailed above will now be examined more closely.

First, it will have become apparent by now that the study extends over a period of 10 years and as such the commencement date of 1962/1963 has considerable significance. In 1961 each of the six states passed through their respective parliaments a new act to control the activities of commercial organisations entitled, 'The Uniform Companies Act 1961'. Prior to the introduction of the 1961 Act, not only was the barest minimum of financial information required to be published but state government regulations differed in regard to what was considered to be the minimum. In the field of financial reporting, 'The Uniform Companies Act 1961', was designed not only to increase the amount and relevance of financial information presented in the annual accounts but also to bring into line the differing state regulations regarding disclosure. The 1961 Act was the guideline for the published accounts of the majority of firms in the year, 1961/1962. However, it was not until 1962/1963 that the requirements of the 1961 Act were universally adopted and for the first time there emerged a resemblance of uniformity in Australian financial reporting, the outcome of which was that comparative individual firm statistics could now be derived with a much greater degree of confidence than previously.

Furthermore, the time period over which the analysis is to be conducted has significance from the point of view of the effort to eliminate any bias which might appear in the results due to the analysis being conducted in what could be regarded as 'non-normal' years. On this matter Davenport has commented that; "To use years characterized by business recession does seem to be asking for trouble."[5] Davenport regards the trouble as stemming from the problem of defining and measuring the growth and risk variables. Even though his study was restricted to recession years (1961 to 1963 inclusive) by the availability of data, Davenport considers it wise "to choose more 'normal' years where possible."[6] The years 1962/1963 to 1971/1972 may be considered as ones of steady growth and full employment;[7] that is the more 'normal' years referred to by Davenport.

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5. Michael Davenport, "Leverage and the Cost of Capital: Some Tests Using British Data", Economica, 38 (May 1971), 160.

6. Davenport, *ibid*.

7. During the year 1960/1961, the Australian economy passed into a mild but definite recession whose trough was reached (on the evidence of most indicators) in the September quarter of 1961. However, the use by the authorities of both fiscal and monetary policy during 1962, returned the economy to near full-employment by late 1962.

For this reason, together with the availability of more accurate financial information after 1962 it was considered appropriate to commence the analysis from the year 1962/1963.

Second, firms whose ordinary shares are listed on the 'Mining' board of any member exchange of the Australian Associated Stock Exchange were excluded from 'The Population of Firms' for two reasons. First, over the period 1967 to 1971, the Australian Stock Exchanges experienced what has become known as the 'mining boom'. During this 'boom', the prices of shares in most mining firms fluctuated over very wide ranges[8] and in the majority of cases these fluctuations were unrelated to the firm's present or future financial position, but were caused by a combination of high liquidity and imprecise market information resulting in ill-formed speculation. Second, peculiarities in the treatment of certain items in the financial statements of mining firms, especially the treatment of deferred taxation makes the development of comparative individual firm statistics difficult.

Third, over the time period under consideration several listed firms had either an official manager or receiver appointed by the trustees for the debenture and/or noteholders. The consequences of such action being taken is that a scheme of arrangement is entered into between the shareholders and the debenture and/or noteholders along

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8. Tasminex N.L., provides a good illustration of this unusual price behaviour. The monthly high for January 1970 was $90.00 and the monthly low was $2.25.

with other creditors. This arrangement must be approved by the courts and involves the management of the firm so as not to seriously erode the value of the assets being used as security for their loans. Reorganisation of the firm's capital structure is also likely to occur at the same time, with the shareholders having the value of their shares written down due to accumulated losses. Furthermore, the shares although remaining listed on the stock exchange, rarely if ever trade and as a result, it is difficult to determine with any degree of confidence the market value of the firm. It was for these reasons that firms who had either an official manager or receiver appointed over the period under investigation were excluded from 'The Population of Firms'.

In summary, the stage 1 sample selection criteria were designed with the aim of obtaining a group of firms whose main characteristic was continuity of existence. Other characteristics to be met included, the presence of consolidated accounts making possible the development of comparative individual firm statistics suitable for empirical analysis. Also, the availability of market prices for the issued ordinary equity was ensured thus making possible studies of the impact of financial decisions on the market value of the firm. Furthermore, the criteria made certain of the exclusion of those firms whose performance in the market place was not in any way related to the firm's present or future financial position, but was being determined by some speculative irrational element.

2) <u>'The Sub-Population of Firms'</u>

The firms meeting the requirements of stage 1 of the sample selection procedure are not strictly comparable on either a firm-to-firm or year-to-year basis. The achievement of this comparability was left to stage 2 of the procedure with the selection of 'The Sub-Population of Firms'. To ensure comparability on both a firm-to-firm and year-to-year basis, every firm included in 'The Population of Firms' was required to meet each one of the following four criteria:

(a) The firm must not have changed its balance date during the period 1962/1963 to 1971/1972 inclusive.

(b) The firm must not have been involved in any major capital reconstruction during the period 1962/1963 to 1971/1972 inclusive.

(c) The firm must not have had its investment, financing or dividend decisions restricted by any form of direct governmental regulation and/or intervention.

(d) The firm must not have had as its major business activity the financing of consumer durables, the leasing of plant and/or equipment, the investment of its funds in listed or unlisted, government, semi-government or firm securities.

Of the 710 firms included in 'The Population of Firms' only 527 of these satisfied all four criteria. In Appendix 2, the firms excluded from 'The Population of Firms' are appropriately marked (a), (b), (c) and (d) indicating which criteria they failed to meet. Several aspects of the four selection criteria detailed above will now be examined more closely.

First, a firm in altering its balance date from one year to the next ensures that the time period covered by its accounts is greater or less than one financial year. Faced with this situation the development of comparative individual firm statistics, is at best an extremely difficult task. The alternative exists of attempting to adjust the data so as to cover one financial year preceding the new balance date. However, if accepted this alternative is likely to introduce incalculable and uncontrollable errors into the data and, as a result, the decision was taken to exclude from 'The Population of Firms', those firms that had changed their balance date during the time period under analysis.

Second, by far the simplest and most popular form of capital reconstruction undergone by firms during the time period under analysis proved to be the share split.(9) Capital reconstructions of this form, and others such as the repayment of capital in excess of firm needs, present no major problems in the development of comparative individual firm statistics. On the other hand however, problems do arise when firms, after a series of losses, obtain court approval to write down the value of their shares and then consolidate them. This form of capital reconstruction provides a distinct break in the firm's

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9. On February 14th Australia converted to decimal currency and many firms took advantage of converting their one pound shares into two (one) dollar shares, thereby effectively creating a two for one split.

capital structure and, leaving aside the difficulty in developing comparative individual firm statistics, changes quite dramatically a firm's 'stock', 'flow', and 'stock-flow' ratios thereby rendering the results of both firm-to-firm and year-to-year comparative analysis of little value. The consequences arising from a firm undergoing a major capital reconstruction during the time period under analysis influenced the decision to exclude such firms from 'The Population of Firms'.

Third, within the Australian economy there exists four groups of firms whose investment, financing and dividend decisions are restricted by direct government regulation and/or intervention. These groups are:

(1) The banks, who in order to receive lender of last resort facilities from the Reserve Bank have agreed to abide by the provisions of the Banking Act. This Act gives the Reserve Bank direct control over the liquidity of the economy generally and the banking sector particularly, through two complementary systems: the S.R.D. (Statutory Reserve Deposit) system and the L.G.S. (Liquid Assets and Government Securities) convention. In addition, the Reserve Bank has authority under the Banking Act to make regulations in relation to the control of both interest rates paid and received by the banks in the course of any banking business transacted by them. Furthermore, the Reserve Bank is empowered by the same Act to determine the policy to be followed by the banks in relation to advances made by them. The advance policy power enables the Reserve Bank to influence both the volume of bank credit to be

provided and its distribution between various industries or purposes.

(2) The gas firms who are incorporated by Acts of Parliament other than 'The Uniform Companies Act 1961', such as 'The Gas Undertakings Act'. This Act fixes the percentage dividend that may be paid on the issued capital. In recent years following amendments to 'The Gas Undertakings Act', gas firms have been permitted to pay dividends at a rate of 2½ per cent in excess of the current rate for Commonwealth loans. The result of this amendment has been that their dividend policies are to a large extent determined in advance by both the Treasury and the Reserve Bank.

(3) The insurance and trustee firms, who in order to receive the various tax concessions offered to them under 'The Income Tax Assessment Act, 1936-1975', are obliged to hold certain percentages of their assets in government and semi-government securities; the result of this requirement being that their liquidity, and to a large extent their income stream, is exogenously determined.

(4) The building societies who are incorporated under 'The Friendly and Co-operative Societies Act' and other such acts in the various states. This Act gives the power to determine both the rates of interest on deposits and loans and the level of liquid assets, to the governments of the individual states.

Since the investment, financing and dividend decisions of the four groups of firms discussed above are to a large extent pre-determined, inclusion of these firms in a general comparative analysis might well obscure the true impact of such factors as leverage and dividend policy on the cost of capital. Due to this fact, the decision was taken to exclude firms belonging to either of the above four groups from 'The Population of Firms'.

(5) Firms deriving their income from the provision of finance for the acquisition of goods and services (finance firms) and others deriving their income from holding portfolios of government, semi-government and corporate securities (investment firms) both present a series of problems related to the recognition of income. In the case of the finance firms, some recognize income as being earned when the hire purchase or leasing contract is signed, while others recognize income as being earned over the period of the contract and as such apply various apportionment methods, e.g., 'Rule of 78' or 'Collins Factors'[(10)] in determining the amount of income to recognize for each sub-period. If all the finance firms had maintained the same or even their own particular method of income recognition over time, then comparative analysis on both a firm-to-firm and year-to-year basis would present no significant problems. Unfortunately, this desirable state of affairs does not exist; finance firms apply different income recognition procedures depending on the identity of the goods and services being financed, e.g., consumer durables or industrial equipment. This situation

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10. For an excellent summary of the mechanics of these methods see R.K. Yorston, E.B. Smyth and S.R. Brown, Advanced Accounting, Sydney: The Law Book Company, 1966.

would be relatively unimportant except that during the time period under investigation, the majority of finance firms varied the proportionate amounts of goods or services being financed, and as such, their pattern of income varied apart from the market forces of supply and demand. Along with the finance firms, the investment firms also apply several methods in recognizing any income accruing from acquiring and holding portfolios of securities. On average, there are three methods in use, these are: 'The Cost Method', 'The Equity Method' and 'The Market Price Method'. From an income measurement standpoint, the essential feature of 'The Cost Method' is that it recognizes income from an investment in shares only when a dividend has been declared. 'The Equity Method', on the other hand, recognizes income from an investment in a firm when that firm announces a profit, and a loss when that firm announces a loss, whereas 'The Market Price Method' recognizes both dividends declared and any change in the (ex-dividend) market price of the shares.[11] Throughout the time period under consideration no common approach to the recognition of income generated from acquiring and holding portfolios of securities was in existence among firms; different approaches were even adopted for different classes of securities; in general however there appeared to be a

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11. For an examination of the implications of each method for the investor's profit and loss statement and balance sheet see, F.K. Wright and G.B. Mitchell, "Recognition of Income from Share Investments", The Australian Accountant, 41 (October 1971), 383-86.

decided swing towards 'The Equity Method'. The result of this situation being that investment firms exhibited a pattern of income which could well be regarded as different from that attributable to the market forces of supply and demand given that the method of income recognition was held constant. Based on these findings it can be argued that, to include the finance and investment firms in a comparative analysis on both a firm-to-firm and year-to-year basis would be likely to introduce some form of indeterminable bias into the results of the analysis, and as such, the decision was taken to exclude from 'The Population of Firms' both finance and investment firms.

In summary, 'The Sub-Population of Firms' can be characterized as being a homogeneous group to the extent that it exhibits continuity and comparability over the period, 1962/1963 to 1971/1972. Additionally, 'The Sub-Population of Firms', is also sufficiently heterogeneous to permit a determination of the true impact of such factors as leverage, dividend policy, size and business risk on the cost of capital. However, the requirement that firm accounts be available for the entire time period introduces two forms of bias. Firstly, firms in the hands of offical managers and receivers during the time period are excluded from 'The Sub-Population of Firms', the result being that there is an under-representation of firms undergoing considerable financial stress. Secondly, both newly formed firms and those already in existence but only becoming listed during the time period are also excluded from 'The Sub-Population of Firms', the result here being that there is an under-representation of those firms more recently listed. These biases should not however severely affect the findings of any analysis, so long as they are properly recognized and taken into account when drawing any conclusions based on a sample drawn from 'The Sub-Population of Firms'.

3) 'The Sample of Firms'

The firms chosen to test the hypotheses established in Chapter 1 and known as 'The Sample of Firms' were selected by taking a random sample of 220 firms from the 527 firms comprising 'The Sub-Population of Firms'. The firms included in 'The Sample of Firms' are marked in Appendix 2 by an asterisk (*). 'The Sample of Firms' contains the same biases as outlined previously in the discussion of 'The Sub-Population of Firms'. These biases limit to some extent the generalizations that may be made from the results associated with some analysis involving 'The Sample of Firms' to say 'The Population of Firms'. However, these biases do not in any way invalidate the study as a whole, and it is felt that the selection criteria adopted in this thesis has produced for the first time a sample of firms whereby with the appropriate analysis, the effect of such factors as leverage, dividend policy, size and business risk on the cost of capital can be determined with a reasonable degree of accuracy.

C] THE DATA COLLECTION (STANDARDISATION) PROCEDURES

In Australia two major problems have hindered the development of a data bank of comparative individual firm statistics. The first, which has already been briefly mentioned, is that of uneven and variable firm reporting. Whereas in the United States a regulatory body lays down stringent reporting rules - and sees that they are adhered to - in Australia the legislative requirements are few and deficient in a number of respects,[12] e.g., sales figures are still not available for the majority of firms; additionally the profit figure is arrived at in numerous ways. Thus, not only are there considerable differences in the detail of disclosure between firms, but even in the standards adopted by a single firm for different years there can be considerable unevenness.[13] The second is that of frequent capitalization changes. In the United States when issues of equity are made, they are most commonly pitched 'at market', so that 'earnings per share' and 'dividends per share', refers to a share which usually needs to be adjusted only for share splits. However, Australian experience shows that a large number of equity issues consist either of bonus shares or shares pitched

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12. The legislative requirements are limited to 'The Uniform Companies Act 1961' of each state and additionally for those firms listed on a stock exchange there are the additional requirements of the Australian Associated Stock Exchange Listing Requirements.

13. For a detailed examination of the financial information presented in Australian firm reports see, P.E.M. Standish, Australian Financial Reporting, Accounting Research Study, No.2, Accounting Research Foundation, Melbourne, 1972.

below the 'going' market price. The latter issues are also commonly held to contain a 'bonus' element which arises as follows:

> "An issue to shareholders at a discount on the potential placement price, includes a bonus element. If the capital could have been raised by an issue of n shares at a price of 2p, but the company elects to issue 2n at the price p, this is equivalent to a placement of n shares at 2p plus a bonus issue of n shares."(14)

The occurrence of such a large number of 'bonus effects' presents a major problem in the determination of a firms *true* 'earnings per share' and 'dividends per share series'. The problem can be effectively overcome however by the incorporation of a complex adjustment technique whereby the earnings and dividends can be attributed to a 'constant share'.(15) Following such an approach, the earnings and dividends attributable to this 'constant share' then become the *true* 'earnings per share' and 'dividends per share series'.

The development of the data bank of comparative individual firm statistics required the utilization of three basic files:

1) The Balance Sheet (including income account) File - comprising balance sheet and income statement data

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14. Douglas W. Chapman, Cost of Capital, (West Publishing Company, Sydney 1971), 32.

15. The adjustment in question rests on the assumption that a hypothetical investor faced with an offer to subscribe for new shares will sell sufficient of his entitlement to finance the balance. In this way the amount of the initial investment is held constant.

from 1962/1963 to 1971/1972.

2) The Capital History (including dividends) File - comprising capital changes from 1962/1963 to 1971/1972.

3) The Prices File - comprising monthly high, low and end of month prices together with turnovers from January 1962 to December 1972.

A systems flowchart showing how the three basic files are created and then merged together to form the research data bank (known as the UNSW research file) is given in Figure (3-2) below.

Let us now examine the three major files and the research file in more detail.

1) <u>The Balance Sheet File</u>

A computer version of the 'original' balance sheet for Braemar Industries Ltd is shown in Table (3-1). It will be seen that each account title is organised by a sequence number (left-most number); these serve to keep the file in a particular sequential order. Adjacent to the sequence number is the account title as it appears in the firm's published report. Further to the right are the amounts relating to each account description, these are organized by financial year-end dates. Sandwiched between the account titles and amounts relating to those titles are the standard codes. These codes are used to classify each account according to a standard system of codes, e.g., the code '001' means 'ordinary capital', '010' refers to 'unappropriated profits' and so forth. The present coding system contains 200 codes, these codes are listed in

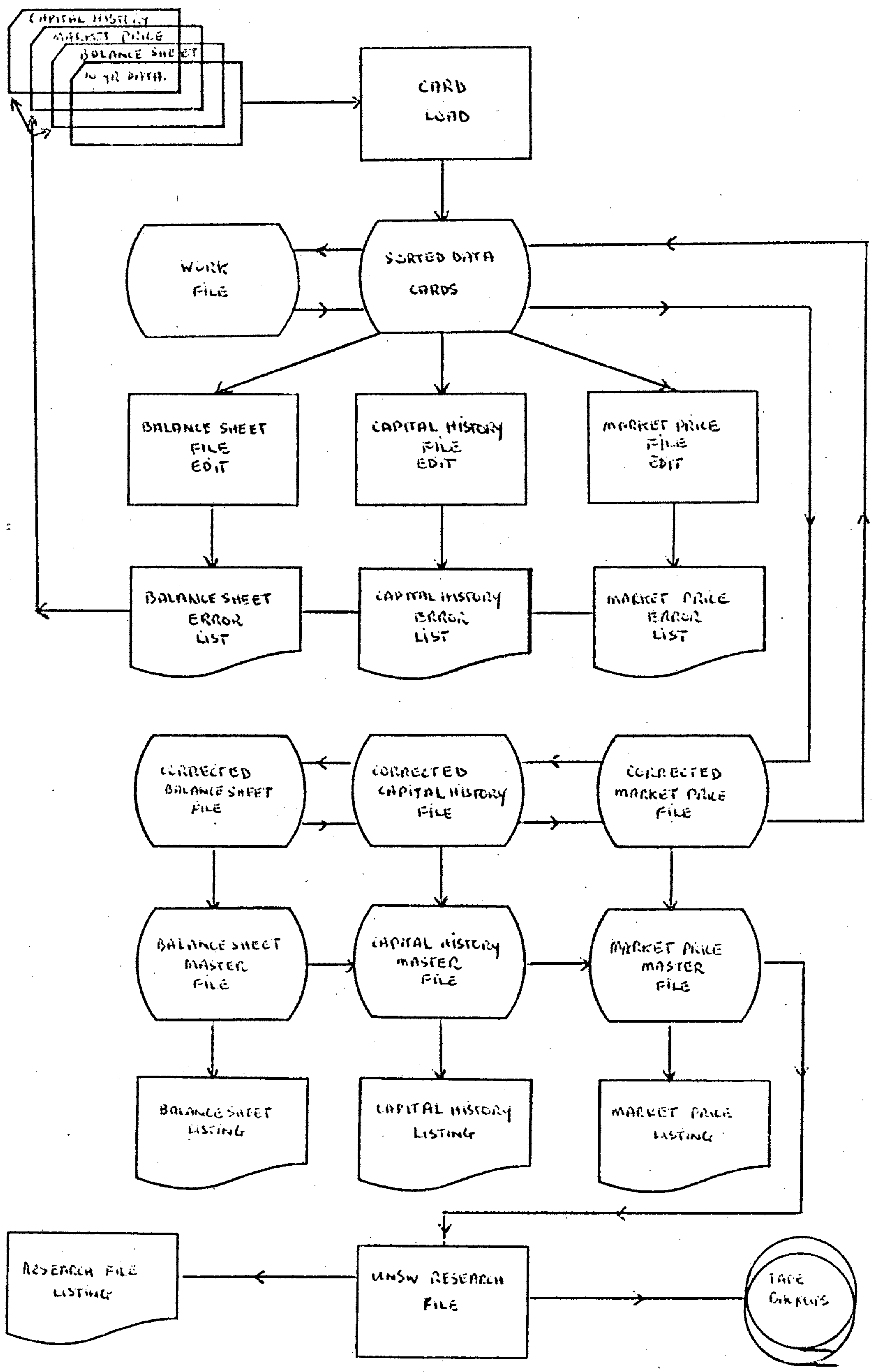

FIGURE (3-2) SYSTEMS FLOW-CHART FOR THE CREATION OF THE RESEARCH DATA BANK

SECURITY ANALYSIS PAGE 1

COMPANY IDENT NO 00131584							
COMPANY NAME BRAEMAR INDUSTRIES LIMITED				SHORT NAME	BRAEMAR IND		
INDUSTRY PROCESS CODE CO	INDUSTRY ACTIVITY CODES 094000000000000000000000000000000000000000000000000000000000						
FOR THE FINANCIAL YEAR ENDED		30.06.72	30.06.71	30.06.70	30.06.69	30.06.68	30.06.67
ORIGINAL VALUES WERE IN	AUST	$	$	$	$	$	$
AND ARE NOW IN		AUST $					

TABLE (3-1) COMPUTER 'HARD COPY' OF AN 'ORIGINAL' BALANCE SHEET

RUN ON 27/08/73

LIABILITIES AND SHAREHOLDERS FUNDS

FOR THE FINANCIAL YEAR ENDED	...4...		30.06.72	30.06.71	30.06.70	30.06.69	30.06.68	30.06.67
0100 TAUTHORISED CAPITAL	000		(4000000)	(4000000)	(4000000)	(4000000)	(4000000)	(4000000)
0150 ISSUED 7% CUMULATIVE PREF SHARES	005+		320000	320000	320000	320000	320000	320000
0200 ISSUED ORDINARY SHARES	001+		2554779	2554779	2554779	1916084	1916084	1916084
0250 NUMBER ISSUED ORDINARY SHARES	003		(5109557)	(5109557)	(5109557)	(3832168)	(3832168)	(3832168)
0300 PAR VALUE ISSUED ORDINARY SHARES	009		(5000)	(5000)	(5000)	(5000)	(5000)	(5000)
0310 CONVERTIBLE NOTES 1966	008+		0	0	0	0	0	0
0350 GENERAL RESERVE	012+		975000	975000	975000	975000	850000	750000
0400 CAPITAL RESERVE	016+		106938	106938	106938	106938	106938	106938
0450 SHARE PREMIUM RESERVE	013+		17100	17100	17100	17100	17100	17100
0500 SURPLUS ON CONSOLIDATION	019+		4779	4779	28600	28650	28599	28599
0550 UNAPPROPRIATED PROFIT	010+		178162	108682	71425	44952	15533	38964
0600 TOTAL SHARE CAPITAL AND RESERVES	000=	+	4156758	4087278	4073842	3408674	3254254	3177685
0650 LOAN SECURED DUE AUGUST 1974	025+		18089	27134	0	0	0	0
0660 TERM LOAN SECURED 1971-75	025+		80000	120000	160000	0	0	0
0670 MORTGAGE LOAN 1974-79	023+		246974	246974	246974	0	0	0
0680 MORTGAGE LOAN 1971-81	023+		455000	473000	491000	500000	500000	500000
0690 MORTGAGE LOAN 1975-85	023+		310000	310000	310000	0	0	0
0700 BILL OF SALE 1971	028+		0	0	42844	0	0	0
0710 OTHER LOANS	026+		0	0	0	0	200000	0
0750 TOTAL DEFERRED LIABILITIES	000=	+	1110063	1177108	1250818	500000	700000	500000
0800 BANK OVERDRAFT	034+		1100026	963296	940852	935746	464139	169122
0850 TRADE CREDITORS AND BILLS PAYABLE	037+		438803	529397	386413	442339	368001	226336
0900 OTHER CREDITORS AND ACCRUALS	038+		144858	136575	121366	60018	41342	42291
0950 MORTGAGE AND SECURED LOAN REPAYMENTS	033+		67045	109888	177533	200000	0	0
1000 FINAL PREFERENCE DIVIDEND	040+		11200	11200	11200	11200	11200	11200
1050 FINAL ORDINARY DIVIDEND	040+		127739	0	127739	95804	95804	95804
1100 LONG SERVICE LEAVE	027+		159000	136200	138800	112500	95535	80656
1110 DOUBTFUL DEBTS	044+		30000	17500	17500	17500	17500	17500
1120 INCOME TAX	039+		272000	148500	241500	256000	214500	233100
1150 TOTAL CURRENT LIABILITIES	000=	+	2350671	2052556	2162903	2131107	1308021	876009
1200 TOTAL LIABILITIES	048	L	7617492	7316942	7487563	6039781	5262275	4553694

...4...

COMPANY NUMBER C0131584 SECURITY ANALYSIS BRAEMAR INDUSTRIES LIMITED PAGE 3

RUN ON 27/08/73 ASSETS

	FOR THE FINANCIAL YEAR ENDED	...4...		30.06.72	30.06.71	30.06.70	30.06.69	30.06.68	30.06.67
1250	FREEHOLD LAND AND BUILDINGS DEEMED VALUATIO	049+		250830	250830	237776	237776	302354	302354
1260	FREEHOLD LAND AND BUILDINGS COST	049+		1362600	1397090	1389229	1021641	1028957	774770
1300	LESS DEPRECIATION	000+		-26059	-13389	0	0	0	0
1350	NETT LAND AND BUILDINGS	050=+		1587371	1634531	1627005	1259417	1331311	1077124
1400	PLANT AND EQUIPMENT DEEMED VALUATION 1962	052+		57920	60780	60780	71848	74278	74660
1410	PLANT AND EQUIPMENT DEEMED VALUATION 1963	052+		11719	11719	11719	11719	11719	11719
1420	PLANT AND EQUIPMENT DEEMED VALUATION 1964	052+		4044	4044	3298	3298	3298	5140
1430	PLANT AND EQUIPMENT DEEMED VALUATION 1966	052+		97555	155577	155577	155577	155577	155577
1440	PLANT AND EQUIPMENT COST	052+		1741622	1616779	1487784	1079185	861685	747087
1500	LESS DEPRECIATION	000+		-791993	-678982	-562008	-452596	-371571	-309725
1550	NETT PLANT AND EQUIPMENT	053=+		1120867	1169917	1157150	869031	734986	684458
1600	MOTOR VEHICLES COST	052+		28524	58385	76788	76132	67534	69861
1610	MOTOR VEHICLES DEEMED VALUE 1962	052+		0	0	0	0	0	0
1650	LESS DEPRECIATION	000+		-17988	-40013	-47012	-41431	-33798	-29049
1700	NETT MOTOR VEHICLES	053=+		10536	18372	29776	34701	33736	40812
1750	OFFICE FURNITURE AND EQUIPMENT DEEMED VALUA	052+		10986	10986	11036	11310	11310	11366
1760	OFFICE FURNITURE AND EQUIPMENT COST	052+		128512	122649	106176	80923	69725	58810
1800	LESS DEPRECIATION	000+		-62704	-54684	-45545	-38797	-33356	-28849
1850	NETT OFFICE FURNITURE AND EQUIPMENT	053=+		76794	78951	71667	53436	47679	41327
1900	TOTAL FIXED ASSETS	000 =	+	2795568	2901771	2885598	2216585	2147712	1843721
1950	TRADE DEBTORS	084 +		1651916	1494705	1693794	1252500	1067855	858004
1960	SUNDRY DEBTORS AND PREPAYMENTS	085 +		54309	18452	37703	11537	59172	11603
1970	DEPOSITS AT CALL	083 +		0	0	0	0	0	325000
2000	RAW MATERIAL	086 +		1357699	1426335	0	0	0	0
2010	WORK IN PROGRESS	086 +		340362	226005	0	0	0	0
2020	FINISHED GOODS	086 +		1417638	1249674	2869468	2559159	1987536	1515366
2050	TOTAL CURRENT ASSETS	000 =	+	4821924	4415171	4600965	3823196	3114563	2709973
2060	SHARES IN NON LISTED COMPANY	066 +		0	0	1000	0	0	0
2070	SHARES IN ASSOCIATED COMPANY	067 +		0	0	0	0	0	0
2080	TOTAL INVESTMENTS	000 =	+	0	0	1000	0	0	0
2100	BORROWING EXPENSES	093 +		0	0	0	0	0	0
2120	TOTAL INTANGIBLES	000 =	+	0	0	0	0	0	0
2130	TOTAL ASSETS	099	A	7617492	7316942	7487563	6039781	5262275	4553694

...4...

COMPANY NUMBER 00131584 SECURITY ANALYSIS BRAEMAR INDUSTRIES LIMITED PAGE 2

RUN ON 27/08/73 LIABILITIES AND SHAREHOLDERS FUNDS

FOR THE FINANCIAL YEAR ENDED		...4...	30.06.68	30.06.67	30.06.66	30.06.65	30.06.64	30.06.63
0100TAUTHORISED CAPITAL	000	(	4000000)(	4000000)(	4000000)(	4000000)(	4000000)(	4000000)
0150 ISSUED 7% CUMULATIVE PREF SHARES	005+		320000	320000	320000	320000	320000	320000
0200 ISSUED ORDINARY SHARES	001+		1916084	1916084	1916084	1213584	1213584	1213584
0250 NUMBER ISSUED ORDINARY SHARES	003	(	3832168)(	3832168)(	3832168)(	2427168)(	2427168)(	2427168)
0300 PAR VALUE ISSUED ORDINARY SHARES	009	(	5000)(	5000)(	5000)(	5000)(	5000)(	5000)
0310 CONVERTIBLE NOTES 1966	008+		0	0	0	702500	702500	702500
0350 GENERAL RESERVE	012+		850000	750000	664000	581200	461200	353000
0400 CAPITAL RESERVE	016+		106938	106938	106938	0	0	0
0450 SHARE PREMIUM RESERVE	013+		17100	17100	17100	17100	17100	17100
0500 SURPLUS ON CONSOLIDATION	019+		28599	28599	28597	10382	10382	10382
0550 UNAPPROPRIATED PROFIT	010+		15533	38964	36408	63544	44362	36634
0600 TOTAL SHARE CAPITAL AND RESERVES	000=	+	3254254	3177685	3089127	2908310	2769128	2653200
0650 LOAN SECURED DUE AUGUST 1974	025+		0	0	0	0	0	0
0660 TERM LOAN SECURED 1971-75	025+		0	0	0	0	0	0
0670 MORTGAGE LOAN 1974-79	023+		0	0	0	0	0	0
0680 MORTGAGE LOAN 1971-81	023+		500000	500000	500000	0	0	0
0690 MORTGAGE LOAN 1975-85	023+		0	0	0	0	0	0
0700 BILL OF SALE 1971	028+		0	0	0	0	0	0
0710 OTHER LOANS	026+		200000	0	0	147000	106406	0
0750 TOTAL DEFERRED LIABILITIES	000=	+	700000	500000	500000	147000	106406	0
0800 BANK OVERDRAFT	034+		464139	169122	81697	618326	259880	246488
0850 TRADE CREDITORS AND BILLS PAYABLE	037+		368001	226336	211128	271408	259888	220878
0900 OTHER CREDITORS AND ACCRUALS	038+		41342	42291	21332	42668	32834	15628
0950 MORTGAGE AND SECURED LOAN REPAYMENTS	023+		0	0	0	0	0	0
1000 FINAL PREFERENCE DIVIDEND	040+		11200	11200	11200	11200	11200	11200
1050 FINAL ORDINARY DIVIDEND	040+		95804	95804	48544	48544	48544	48544
1100 LONG SERVICE LEAVE	027+		95535	80656	68881	66952	58884	51408
1110 DOUBTFUL DEBTS	044+		17500	17500	17000	18000	16000	16000
1120 INCOME TAX	039+		214500	233100	141000	150200	160000	107600
1150 TOTAL CURRENT LIABILITIES	000=	+	1308021	876009	600782	1227298	847230	717746
1200 TOTAL LIABILITIES	048	L	5262275	4553694	4189909	4282608	3722764	3370946

...4...

COMPANY NUMBER 00131584 SECURITY ANALYSIS BRAEMAR INDUSTRIES LIMITED PAGE 3

RUN ON 27/08/73 ASSETS

FOR THE FINANCIAL YEAR ENDED		...4...	30.06.68	30.06.67	30.06.66	30.06.65	30.06.64	30.06.63
1250 FREEHOLD LAND AND BUILDINGS DEEMED VALUATIO	049+		302354	302354	302354	489486	424908	902852
1260 FREEHOLD LAND AND BUILDINGS COST	049+		1028957	774770	665547	522988	550192	14180
1300 LESS DEPRECIATION	000+		0	0	0	0	0	0
1350 NETT LAND AND BUILDINGS	050=+		1331311	1077124	967901	1012474	975100	917032
1400 PLANT AND EQUIPMENT DEEMED VALUATION 1962	052+		74278	74660	77732	239156	240302	616504
1410 PLANT AND EQUIPMENT DEEMED VALUATION 1963	052+		11719	11719	16107	26454	30254	0
1420 PLANT AND EQUIPMENT DEEMED VALUATION 1964	052+		3298	5140	6831	15154	17546	0
1430 PLANT AND EQUIPMENT DEEMED VALUATION 1966	052+		155577	155577	11503	0	0	0
1440 PLANT AND EQUIPMENT COST	052+		861685	747087	796021	821342	688056	47708
1500 LESS DEPRECIATION	000+		-371571	-309725	-267158	-299426	-243078	-45096
1550 NETT PLANT AND EQUIPMENT	053=+		734986	684458	641036	802680	733080	619116
1600 MOTOR VEHICLES COST	052+		67534	69861	63831	58342	80248	2420
1610 MOTOR VEHICLES DEEMED VALUE 1962	052+		0	0	0	0	0	28180
1650 LESS DEPRECIATION	000+		-33798	-29049	-22968	-18532	-45224	-6812
1700 NETT MOTOR VEHICLES	053=+		33736	40812	40863	39810	35024	23788
1750 OFFICE FURNITURE AND EQUIPMENT DEEMED VALUA	052+		11310	11366	11506	14108	14118	36420
1760 OFFICE FURNITURE AND EQUIPMENT COST	052+		69725	58810	54799	59078	48446	5882
1800 LESS DEPRECIATION	000+		-33356	-28849	-27438	-27562	-23066	-4194
1850 NETT OFFICE FURNITURE AND EQUIPMENT	053=+		47679	41327	38867	45624	39498	38108
1900 TOTAL FIXED ASSETS	000 =	+	2147712	1843721	1688667	1900588	1782702	1598044
1950 TRADE DEBTORS	084 +		1067855	858004	841973	958990	923660	756606
1960 SUNDRY DEBTORS AND PREPAYMENTS	085 +		59172	11603	328166	33008	19104	2978
1970 DEPOSITS AT CALL	083 +		0	325000	50000	0	0	0
2000 RAW MATERIAL	086 +		0	0	0	0	0	0
2010 WORK IN PROGRESS	086 +		0	0	0	0	0	0
2020 FINISHED GOODS	086 +		1987536	1515366	1281083	1367604	972800	984658
2050 TOTAL CURRENT ASSETS	000 =	+	3114563	2709973	2501242	2359602	1915564	1744242
2060 SHARES IN NON LISTED COMPANY	066 +		0	0	0	0	0	0
2070 SHARES IN ASSOCIATED COMPANY	067 +		0	0	0	22418	22418	22418
2080 TOTAL INVESTMENTS	000 =	+	0	0	0	22418	22418	22418
2100 BORROWING EXPENSES	093 +		0	0	0	0	2080	6242
2120 TOTAL INTANGIBLES	000 =	+	0	0	0	0	2080	6242
2130 TOTAL ASSETS	099	A	5262275	4553694	4189909	4282608	3722764	3370946

...4...

Appendix 3. To the right of the standard codes are a series of '+'s and '='s. These serve to preserve the sub-totals of the published reports. A sequence of '+','+','+','=' occurring in the same column instructs the computer to add all items and to print out the sub-total when the '=' is encountered. This sub-total is then transferred to a '+' in a column to the right and the totalling process continues. The sub-totals are summed to either 'total liabilities' (L) or 'total assets' (A). The computer stores the total liabilities figure and then, after processing the asset items, compares total assets and total liabilities. If these are not equal, an error message is printed, once the errors have been found and corrected one can be almost certain that the numbers have been transcribed from the published accounts accurately.

The next step involves testing the validity of the standard codes assigned to each account title. The file is sorted by standard code and a 'standard' balance sheet (as against the 'original' just discussed) is produced. A computer version of the 'standard' balance sheet for Braemar Industries Ltd is shown in Table (3-2). This output shows the name of the standard category corresponding to each standard code immediately following the accounts which have been given that standard code. As in the 'original' version, so in the standard form the sum of the assets must equal the sum of the liabilities, ensuring that every item has, in fact, been categorised. 'Standard' listing makes it easy to check the categories which have been assigned to the 'original' account titles. One simply

TABLE (3-2) COMPUTER 'HARD COPY' OF A 'STANDARD' BALANCE SHEET

6630630 131584 BRAEMAR INDUSTRIES LIMITED RUN ON 27/08/73 PAGE 14

LIABILITIES - STANDARD

SEQ	CAT		YEAR 30.06.72	30.06.71	30.06.70	30.06.69	30.06.68	30.06.67	
0200		ISSUED ORDINARY SHARES	2554779	2554779	2554779	1916084	1916084	1916084	1916084
	001	ORDINARY CAPITAL	2554779	2554779	2554779	1916084	1916084	1916084	1916084
0250		NUMBER ISSUED ORDINARY SHARES	5109557	5109557	5109557	3832168	3832168	3832168	3832168
	003	*ORDINARY CAPITAL-NUMBER OF SHARES	(5109557)	(5109557)	(5109557)	(3832168)	(3832168)	(3832168)	(3832168)
0150		ISSUED 7% CUMULATIVE PREF SHARES	320000	320000	320000	320000	320000	320000	320000
	005	PREFERRED SHARES	320000	320000	320000	320000	320000	320000	320000
0310		CONVERTIBLE NOTES 1966							
	008	CONVERTIBLE NOTES							
0300		PAR VALUE ISSUED ORDINARY SHARES	5000	5000	5000	5000	5000	5000	5000
	009	*PAR VALUE ORDINARY ISSUE	(5000)	(5000)	(5000)	(5000)	(5000)	(5000)	(5000)
0550		UNAPPROPRIATED PROFIT	178162	108682	71425	44952	15533	38964	36498
	010	UNAPPROPRIATED PROFITS	178162	108682	71425	44952	15533	38964	36498
0350		GENERAL RESERVE	975000	975000	975000	975000	850000	750000	664000
	012	OTHER REVENUE RESERVES	975000	975000	975000	975000	850000	750000	664000
0450		SHARE PREMIUM RESERVE	17100	17100	17100	17100	17100	17100	17100
	013	SHARE PREMIUM RESERVES	17100	17100	17100	17100	17100	17100	17100
0400		CAPITAL RESERVE	106938	106938	106938	106938	106938	106938	106938
	016	OTHER CAPITAL RESERVES	106938	106938	106938	106938	106938	106938	106938
0500		SURPLUS ON CONSOLIDATION	4779	4779	28600	28600	28599	28599	28597
	019	PREMIUM ON CONSOLIDATION	4779	4779	28600	28600	28599	28599	28597
0670		MORTGAGE LOAN 1974-79	246974	246974	246974				
0680		MORTGAGE LOAN 1971-81	455000	473000	491000	500000	500000	500000	500000
0690		MORTGAGE LOAN 1975-85	310000	310000	310000				
	023	MORTGAGES DUE OVER 1 YR	1011974	1029974	1047974	500000	500000	500000	500000
0650		LOAN SECURED DUE AUGUST 1974	18089	27134					
0660		TERM LOAN SECURED 1971-75	80000	120000	160000				
	025	OTHER SECURED BORROWING OVER 1 YR	98089	147134	160000				
0710		OTHER LOANS					200000		
	026	OTHER UNSECURED BORROWING OVER 1 YR					200000		
1100		LONG SERVICE LEAVE	159000	136200	138800	112500	95535	80656	68881
	027	PROVISIONS DEFFERRED LIABILITIES	159000	136200	138800	112500	95535	80656	68881
0700		BILL OF SALE 1971			42844				
	028	SUNDRY DEFERRED LIABILITIES			42844				

LIABILITIES - STANDARD

SEQ	CAT		YEAR 30.06.72	30.06.71	30.06.70	30.06.69	30.06.68	30.06.67	
0950		MORTGAGE AND SECURED LOAN REPAYMENTS	67045	109888	177533	200000			
	033	MORTGAGES DUE 12 MONTHS	67045	109888	177533	200000			
0800		BANK OVERDRAFT	1100026	963296	940852	935746	464139	169122	81697
	034	BANK OVERDRAFT	1100026	963296	940852	935746	464139	169122	81697
0850		TRADE CREDITORS AND BILLS PAYABLE	438803	529397	386413	442339	368001	226336	211128
	037	TRADE CREDITORS &BILLS PAYABLE	438803	529397	386413	442339	368001	226336	211128
0900		OTHER CREDITORS AND ACCRUALS	144858	136575	121366	60018	41342	42291	21332
	038	OTHER&UNSPEC. CREDITORS	144858	136575	121366	60018	41342	42291	21332
1120		INCOME TAX	272000	148500	241500	256000	214500	233100	141000
	039	TAX PROVISIONS	272000	148500	241500	256000	214500	233100	141000
1000		FINAL PREFERENCE DIVIDEND	11200	11200	11200	11200	11200	11200	11200
1050		FINAL ORDINARY DIVIDEND	127739		127739	95804	95804	95804	48544
	040	DIVIDEND PROVISIONS	138939	11200	138939	107004	107004	107004	59744
1110		DOUBTFUL DEBTS	30000	17500	17500	17500	17500	17500	17000
	044	PROVISION FOR DOUBTFUL DEBTS	30000	17500	17500	17500	17500	17500	17000
1200		TOTAL LIABILITIES	7617492	7316942	7487563	6039781	5262275	4553694	4189909
	048	*TOTAL LIABILITIES	(7617492)(	7316942)(	7487563)(	6039781)(	5262275)(	4553694)(	4189909)
		TOTAL LIABILITIES	7617492	7316942	7487563	6039781	5262275	4553694	4189909

ASSETS - STANDARD

SEC	CAT	YEAR	30.06.72	30.06.71	30.06.70	30.06.69	30.06.68	30.06.67	
1250		FREEHOLD LAND AND BUILDINGS DEEMED VALUATIO	250830	250830	237776	237776	302354	302354	302354
1260		FREEHOLD LAND AND BUILDINGS COST	1362600	1397090	1389229	1021641	1028957	774770	665547
	049	*PROPERTY GROSS	(1613430)	(1647920)	(1627005)	(1259417)	(1331311)	(1077124)	(967901)
1350		NETT LAND AND BUILDINGS	1587371	1634531	1627005	1259417	1331311	1077124	967901
	050	PROPERTY NET	1587371	1634531	1627005	1259417	1331311	1077124	967901
1400		PLANT AND EQUIPMENT DEEMED VALUATION 1962	57920	60780	60780	71848	74278	74660	77732
1410		PLANT AND EQUIPMENT DEEMED VALUATION 1963	11719	11719	11719	11719	11719	11719	16107
1420		PLANT AND EQUIPMENT DEEMED VALUATION 1964	4044	4044	3298	3298	3298	5140	6831
1430		PLANT AND EQUIPMENT DEEMED VALUATION 1966	97555	155577	155577	155577	155577	155577	11503
1440		PLANT AND EQUIPMENT COST	1741622	1616779	1487784	1079185	861685	747087	796021
1600		MOTOR VEHICLES COST	28524	58385	76788	76132	67534	69861	63831
1610		MOTOR VEHICLES DEEMED VALUE 1962							
1750		OFFICE FURNITURE AND EQUIPMENT DEEMED VALUA	10986	10986	11036	11310	11310	11366	11506
1760		OFFICE FURNITURE AND EQUIPMENT COST	128512	122649	106176	80923	69725	58810	54799
	052	*PLANT AND MACHINERY GROSS	(2080882)	(2040919)	(1913158)	(1489992)	(1255126)	(1134220)	(1038330)
1550		NETT PLANT AND EQUIPMENT	1120867	1169917	1157150	869031	734986	684458	641036
1700		NETT MOTOR VEHICLES	10536	18372	29776	34701	33736	40812	40863
1850		NETT OFFICE FURNITURE AND EQUIPMENT	76794	78951	71667	53436	47679	41327	38867
	053	PLANT AND MACHINERY NET	1208197	1267240	1258593	957168	816401	766597	720766
2060		SHARES IN NON LISTED COMPANY			1000				
	066	UNLISTED COMPANY INVESTMENTS			1000				
2070		SHARES IN ASSOCIATED COMPANY							
	067	INVESTS.ADVANCES ASSOC. COYS							
1970		DEPOSITS AT CALL						325000	50000
	083	CASH AND EQUIVALENT						325000	50000
1950		TRADE DEBTORS	1651916	1494705	1693794	1252500	1067855	858004	841973
	084	TRADE DEBTORS	1651916	1494705	1693794	1252500	1067855	858004	841973
1960		SUNDRY DEBTORS AND PREPAYMENTS	54309	18452	37703	11537	59172	11603	328186
	085	OTHER DEBTORS	54309	18452	37703	11537	59172	11603	328186
2000		RAW MATERIAL	1357699	1426335					
2010		WORK IN PROGRESS	340362	226005					
2020		FINISHED GOODS	1417638	1249674	2869468	2559159	1987536	1515366	1281083
	086	INVENTORY	3115699	2902014	2869468	2559159	1987536	1515366	1281083
2100		BORROWING EXPENSES							
	093	CAPITALIZED EXPENSES							
2130		TOTAL ASSETS	7617492	7316942	7487563	6039781	5262275	4553694	4189909
	099	*TOTAL ASSETS	(7617492)	(7316942)	(7487563)	(6039781)	(5262275)	(4553694)	(4189909)

NON-ADD INCOME - STANDARD

SEQ CAT	YEAR	30.06.72	30.06.71	30.06.70	30.06.69	30.06.68	30.06.67	
	TOTAL ASSETS	7617492	7316942	7487563	6039781	5262275	4553694	4189909

compares the names of the standard categories with the 'original' account titles. Thus, if one were to find 'trade creditors' under the standard category for bank overdraft the error would (hopefully) be recognized.

Similar balancing techniques are used in the profit and loss account. In this case the income items are balanced to the last item in the profit and loss appropriation account, namely 'balance carried forward'. The 'balance carried forward' is calculated from the preceding items by the computer, this value is then compared with the 'balance carried forward' as reported by the firm; this value is inputed separately on a punched card. If these values do not agree an error message is given. A computer version of the income statement for Braemar Industries Ltd is shown in Table (3-3). In the case of the income statement, when the 'original' is sorted into 'standard' form, a re-arrangement of profit items takes place. The objective of this re-arrangement is to be able to derive the 'earned for ordinary', that is, the earnings which are standardized and comparable between firms. For this purpose, a differentiation must be made between 'normal operating income', 'normal non-operating income' and 'non-normal surpluses and losses'. The first two are included in the concept of 'earnings for ordinary' while the third is not. The concept of earnings so derived is standardized and does not necessarily agree with the firm's reported profit.

SECURITY ANALYSIS PAGE 1

COMPANY IDENT NO 00131584

COMPANY NAME BRAEMAR INDUSTRIES LIMITED SHORT NAME BRAEMAR IND

INDUSTRY PROCESS CODE 00 INDUSTRY ACTIVITY CODES 094000000000000000000000000000000000000000000000000000000000000000

FOR THE FINANCIAL YEAR ENDED		30.06.72	30.06.71	30.06.70	30.06.69	30.06.68	30.06.67
ORIGINAL VALUES WERE IN	AUST	$	$	$	$	$	$
AND ARE NOW IN		AUST $					

TABLE (3-3) COMPUTER 'HARD COPY' OF AN INCOME STATEMENT

COMPANY NUMBER 00131584 SECURITY ANALYSIS BRAEMAR INDUSTRIES LIMITED PAGE 4

RUN ON 27/08/73 INCOME ACCOUNT

FOR THE FINANCIAL YEAR ENDED	...4...		30.06.72	30.06.71	30.06.70	30.06.69	30.06.68	30.06.67
2150 PROFIT BEFORE TAX AND EXTRAORDINARY ITEM	229	+	561316	310937	493850	585144	436069	500045
2200 DEPRECIATION	116+		-149200	-147760	-126595	-89926	-80984	-68711
2210 DIRECTORS REMUNERATION	113+		-10500	-10000	-8500	-8000	-7500	-7500
2220 AUDITORS REMUNERATION	114+		-15770	-13400	-10530	-8640	-8445	-7960
2230 INTEREST ON FIXED TERM LOANS	118+		-102518	-116291	-81915	-53375	-40032	-38875
2240 OTHER INTEREST PAID	118+		-39698	-21796	0	0	0	0
2250 TRADE DEBTS WRITTEN OFF	125+		-11652	-16716	0	0	0	0
2260 PROVISION FOR LONG SERVICE LEAVE	115+		-37206	-30327	-22337	-21145	-16646	-12494
2270 INTEREST CONVERTIBLE NOTES	119+		0	0	0	0	0	0
2300 TOTAL SPECIFIC CHARGES	000N		-366544	-356290	-249877	-181086	-153607	-135540
2350 INCOME TAX	250	+	-272000	-148500	-241500	-253973	-195221	-219200
2360 DIVIDEND FORMER SUBSIDIARY	232	+	0	0	0	0	0	0
2400 NET PROFIT AFTER TAX	159	= +	289316	162437	252350	331171	240848	280845
2410 SALE OF ASSETS	261	+	0	-1587	0	0	0	0
2450 SALE OF ASSETS	260	+	18772	0	0	0	0	0
2460 SUBSIDIARY ADJUSTMENT	263	+	0	0	0	16836	29733	0
2500 TAXATION OVERPROVIDED	265	+	670	998	905	1259	835	2558
2510 ADJUSTMENT BALANCE BFWD	263	+	0	0	0	0	0	0
2550 BALANCE BFWD	262	+	108682	71425	44952	15533	38964	36408
2600 AVAILABLE FOR APPROPRIATION	000	= +	128124	70836	45857	33628	69532	38966
2650 INTERIM ORDINARY DIVIDEND (AMOUNT)	271	+	-76639	-102191	-76643	-76643	-76643	-76643
2660 INTERIM ORDINARY DIVIDEND RATE	371	(	30000)(	40000)(	40000)(	40000)(	40000)(	40000)
2670 FINAL ORDINARY DIVIDEND (AMOUNT)	274	+	-127739	0	-127739	-95804	-95804	-95804
2680 FINAL ORDINARY DIVIDEND RATE	374	(	50000)(	0)(	50000)(	50000)(	50000)(	50000)
2690 PAID PREFERENCE DIVIDEND	275	+	-11200	-11200	-11200	-11200	-11200	-11200
2700 PROVISION FINAL PREFERENCE DIVIDEND	276	+	-11200	-11200	-11200	-11200	-11200	-11200
2710 BORROWING EXPENSES MORTGAGE LOAN	284	+	0	0	0	0	0	0
2750 PROVISIONS	280	+	-12500	0	0	0	0	0
2760 GENERAL RESERVE	282	+	0	0	0	-125000	-100000	-86000
2770 GOODWILL SUBSIDIARY	284	+	0	0	0	0	0	0
2800 BALANCE CARRIED FORWARD	289	P	178162	108682	71425	44952	15533	38964
MISCELLANEOUS ITEMS								
2850 GROWTH DILUTION FACTOR	393	(	0)(	0)(	0)(	0)(	0)(	0)
2900 CONTRACTS FOR CAPITAL EXPENDITURE	196	(	27648)(	18312)(	28422)(	26820)(	51354)(	33578)
2950 CONTINGENT LIABILITY GUARANTEE BANK O'DRAFT	195	(	202165)(	150201)(	132032)(	41325)(	18148)(	0)

RUN ON 27/08/73 INCOME ACCOUNT

FOR THE FINANCIAL YEAR ENDED	...4...		30.06.68	30.06.67	30.06.66	30.06.65	30.06.64	30.06.63
2150 PROFIT BEFORE TAX AND EXTRAORDINARY ITEM	229 +		436069	500045	321593	396760	389074	319912
2200 DEPRECIATION	116+		-80984	-68711	-45468	-70998	-61094	-56128
2210 DIRECTORS REMUNERATION	113+		-7500	-7500	-3750	-6520	-6312	-5312
2220 AUDITORS REMUNERATION	114+		-8445	-7960	-7896	-6984	-6750	-6530
2230 INTEREST ON FIXED TERM LOANS	118+		-40032	-38875	-13514	-13605	-5188	0
2240 OTHER INTEREST PAID	118+		0	0	0	0	0	0
2250 TRADE DEBTS WRITTEN OFF	125+		0	0	0	0	0	0
2260 PROVISION FOR LONG SERVICE LEAVE	115+		-16646	-12494	-12235	-8068	-7400	0
2270 INTEREST CONVERTIBLE NOTES	119+		0	0	-49175	-49175	-49175	-49175
2300 TOTAL SPECIFIC CHARGES	000N		-153607	-135540	-132038	-155350	-135919	-117145
2350 INCOME TAX	250 +		-195221	-219200	-138227	-160166	-160000	-107600
2360 DIVIDEND FORMER SUBSIDIARY	232 +		0	0	29551	8412	4464	2232
2400 NET PROFIT AFTER TAX	159 =	+	240848	280845	212917	245006	233538	214544
2410 SALE OF ASSETS	261 +		0	0	0	0	0	0
2450 SALE OF ASSETS	260 +		0	0	0	0	0	0
2460 SUBSIDIARY ADJUSTMENT	263 +		29733	0	18002	9966	0	0
2500 TAXATION OVERPROVIDED	265 +		835	2558	4360	5778	8838	4006
2510 ADJUSTMENT BALANCE BFWD	263 +		0	0	-11229	0	0	0
2550 BALANCE BFWD	262 +		38964	36408	63544	44362	36634	55732
2600 AVAILABLE FOR APPROPRIATION	000 =	+	69532	38966	74697	60106	45472	59738
2650 INTERIM ORDINARY DIVIDEND (AMOUNT)	271	+	-76643	-76643	-48544	-48544	-48544	-48544
2660 INTERIM ORDINARY DIVIDEND RATE	371	(	40000)(	40000)(	40000)(	40000)(	40000)(	40000)
2670 FINAL ORDINARY DIVIDEND (AMOUNT)	274	+	-95804	-95804	-48544	-48544	-48544	-48544
2680 FINAL ORDINARY DIVIDEND RATE	374	(	50000)(	50000)(	40000)(	40000)(	40000)(	40000)
2690 PAID PREFERENCE DIVIDEND	275	+	-11200	-11200	-11200	-11200	-11200	-11200
2700 PROVISION FINAL PREFERENCE DIVIDEND	276	+	-11200	-11200	-11200	-11200	-11200	-11200
2710 BORROWING EXPENSES MORTGAGE LOAN	284	+	0	0	-7918	-2080	-4160	-4160
2750 PROVISIONS	280	+	0	0	0	0	-2800	-14000
2760 GENERAL RESERVE	282	+	-100000	-86000	-118800	-120000	-108200	-100000
2770 GOODWILL SUBSIDIARY	284	+	0	0	-5000	0	0	0
2800 BALANCE CARRIED FORWARD	289	P	15533	38964	36408	63544	44362	36634
MISCELLANEOUS ITEMS								
2850 GROWTH DILUTION FACTOR	393	(	0)(	0)(	0)(	0)(	0)(	0)
2900 CONTRACTS FOR CAPITAL EXPENDITURE	196	(	51354)(	33578)(	33572)(	23836)(	5976)(	31966)
2950 CONTINGENT LIABILITY GUARANTEE BANK O'DRAFT	195	(	18148)(	0)(	0)(	0)(	0)(	0)

NON-ADD INCOME - STANDARD

SEQ	CAT		YEAR 30.06.72	30.06.71	30.06.70	30.06.69	30.06.68	30.06.67	
2210		DIRECTORS REMUNERATION	-10500	-10000	-8500	-8000	-7500	-7500	-3750
	113	*DIRECTORS FEES	(-10500)	(-10000)	(-8500)	(-8000)	(-7500)	(-7500)	(-3750)
2220		AUDITORS REMUNERATION	-15770	-13400	-10530	-8640	-8445	-7960	-7896
	114	*AUDITORS FEES	(-15770)	(-13400)	(-10530)	(-8640)	(-8445)	(-7960)	(-7896)
2260		PROVISION FOR LONG SERVICE LEAVE	-37206	-30327	-22337	-21145	-16646	-12494	-12235
	115	*PENSIONS	(-37206)	(-30327)	(-22337)	(-21145)	(-16646)	(-12494)	(-12235)
2200		DEPRECIATION	-149200	-147760	-126595	-89926	-80984	-68711	-45468
	116	*DEPRECIATION	(-149200)	(-147760)	(-126595)	(-89926)	(-80984)	(-68711)	(-45468)
2230		INTEREST ON FIXED TERM LOANS	-102518	-116291	-81915	-53375	-40032	-38875	-13514
2240		OTHER INTEREST PAID	-39698	-21796					
	118	*INTEREST PAID	(-142216)	(-138087)	(-81915)	(-53375)	(-40032)	(-38875)	(-13514)
2270		INTEREST CONVERTIBLE NOTES							-49175
	119	*INTEREST ON CONVERT.NOTES							(-49175)
2250		TRADE DEBTS WRITTEN OFF	-11652	-16716					
	125	OTHER OPERATING EXPENSES	(-11652)	(-16716)					
2400		NET PROFIT AFTER TAX	289316	162437	252350	331171	240848	280845	212917
	159	*NET PROF AFTER TX & MIN. INT.	(289316)	(162437)	(252350)	(331171)	(240848)	(280845)	(212917)
2950		CONTINGENT LIABILITY GUARANTEE BANK O'DRAFT	202165	150201	132032	41325	18148		
	195	O C SALES (ADJ.TC	(202165)	(150201)	(132032)	(41325)	(18148)		
2900		CONTRACTS FOR CAPITAL EXPENDITURE	27648	18312	28422	26820	51354	33578	33572
	196	365 DAYS) TO 1 0 0	(27648)	(18312)	(28422)	(26820)	(51354)	(33578)	(33572)

INCOME - STANDARD

SEQ	CAT	YEAR	30.06.72	30.06.71	30.06.70	30.06.69	30.06.68	30.06.67	
2150		PROFIT BEFORE TAX AND EXTRAORDINARY ITEM	561316	310937	493850	585144	436069	500045	321593
	229	NET OP PROF AFTER CHGS PRIOR TO TAX	561316	310937	493850	585144	436069	500045	321593
2360		DIVIDEND FORMER SUBSIDIARY							29551
	232	OTHER INVESTMENT INCOME							29551
2350		INCOME TAX	-272000	-148500	-241500	-253973	-195221	-219200	-138227
	250	PROVISION FOR INCOME TX THIS YEAR	-272000	-148500	-241500	-253973	-195221	-219200	-138227
2450		SALE OF ASSETS	18772						
	260	NON-OPER. NON-NORMAL SURPLUSES	18772						
2410		SALE OF ASSETS		-1587					
	261	NON-OPER. NON-NORMAL LOSSES		-1587					
2550		BALANCE BFWD	108682	71425	44952	15533	38964	36408	63544
	262	BALANCE P&L B/FWD PREV YR	108682	71425	44952	15533	38964	36408	63544
2460		SUBSIDIARY ADJUSTMENT				16836	29733		18002
2510		ADJUSTMENT BALANCE BFWD							-11229
	263	SUNDRY ADJUSTMENTS-CREDITS				16836	29733		6773
2500		TAXATION OVERPROVIDED	670	998	905	1259	835	2558	4380
	265	TAX OVERPROVIDED PREV. YRS	670	998	905	1259	835	2558	4380
2650		INTERIM ORDINARY DIVIDEND (AMOUNT)	-76639	-102191	-76643	-76643	-76643	-76643	-48544
	271	FIRST INT ORD DIV AMOUNT	-76639	-102191	-76643	-76643	-76643	-76643	-48544
2670		FINAL ORDINARY DIVIDEND (AMOUNT)	-127739		-127739	-95804	-95804	-95804	-48544
	274	FINAL ORD DIV AMOUNT	-127739		-127739	-95804	-95804	-95804	-48544
2690		PAID PREFERENCE DIVIDEND	-11200	-11200	-11200	-11200	-11200	-11200	-11200
	275	PAID PREF DIVS	-11200	-11200	-11200	-11200	-11200	-11200	-11200
2700		PROVISION FINAL PREFERENCE DIVIDEND	-11200	-11200	-11200	-11200	-11200	-11200	-11200
	276	PROV FINAL PREF DIV.	-11200	-11200	-11200	-11200	-11200	-11200	-11200
2750		PROVISIONS	-12500						
	280	TRSFRS TO "APPROPRIATION" PROVS	-12500						
2760		GENERAL RESERVE				-125000	-100000	-86000	-118800
	282	APPROPRIATIONS TO REVENUE RESERVES				-125000	-100000	-86000	-118800
2710		BORROWING EXPENSES MORTGAGE LOAN							-7918
2770		GOODWILL SUBSIDIARY							-5000
	284	WRITE OFF CAPITALIZED EXPENSES							-12918
2800		BALANCE CARRIED FORWARD	178162	108682	71425	44952	15533	38964	36408
	289	BALANCE C/FWD	178162	108682	71425	44952	15533	38964	36408

NOTE ITEMS - STANDARD

SEQ	CAT		YEAR	30.06.72	30.06.71	30.06.70	30.06.69	30.06.68	30.06.67	
2660		INTERIM ORDINARY DIVIDEND RATE		3.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000
	371	*FIRST INT ORD DIV RATE		(3.0000)	(4.0000)	(4.0000)	(4.0000)	(4.0000)	(4.0000)	(4.0000)
2680		FINAL ORDINARY DIVIDEND RATE		5.0000		5.0000	5.0000	5.0000	5.0000	4.0000
	374	*FINAL INT ORD DIV RATE		(5.0000)		(5.0000)	(5.0000)	(5.0000)	(5.0000)	(4.0000)
2850		GROWTH DILUTION FACTOR								
	393	*GROWTH DILUTIONAL FACTOR								

2) The Capital History File

A computer version of the capital history for Braemar Industries Ltd is shown in Table (3-4). The capital history file is comprised of a series of records capturing for each firm the history of changes made in its capitalization, that is of all shares issued since 1962/1963. Each firm's history comprises of a series of entries all of which have a time reference. Each entry has a 'beginning' date and an 'end' date during which the details concerning the firm's capital contained in the entry were applicable. The capital history file is used in several places; first, to adjust prices following new issues, bonus issues and share splits; second, to calculate notional adjustments to earnings to allow for money introduced part way through a financial year and finally, to provide a figure for 'number of equivalent' shares on issue for use in calculating earnings per share and dividends per share series.

Once again balancing techniques are used to ensure the accuracy of the history. The balancing technique works as follows, given that a firm has a certain number of shares on issue in 1963 and that each subsequent addition has been correctly recorded then the 'total on issue' at balance date in 1972 should agree with the 1972 balance sheet report of 'shares on issue', if it does not it could mean that some issues may have been overlooked or alternatively recorded more than once.

Following on from the creation of the capital history file, a dividend history can then be constructed (a

TABLE (5-4) COMPUTER 'HARD COPY' OF A CAPITAL HISTORY FILE

STXCDLDIFUN ON 11/07/73 SHORT CAPITAL HISTORY DETAILS

CO NAME BRAEMAR IND. STARTING FINANCIAL YEAR END DATE 61.06. CO NUMBER 00131584

YEAR END CAPITALIZATIONS YY

FIN YR END	SECURITY CLASS	SEQ NO	TOTAL NO ON ISSUE	TOTAL PAR VALUE	TOTAL PAID UP	PAR VALUE	PAID UP	CONVERSION TO ORDS NO ADDED	AMT SUBSCRIBED
62.06.30	FP01	01	2427168	1213584	1213584	0.5000	0.5000	0	0
62.06.30	CVN1	02	702500	702500	702500	1.0000	1.0000	702500	0
63.06.30	FP01	01	2427168	1213584	1213584	0.5000	0.5000	0	0
63.06.30	CVN1	02	702500	702500	702500	1.0000	1.0000	702500	0
64.06.30	FP01	01	2427168	1213584	1213584	0.5000	0.5000	0	0
64.06.30	CVN1	02	702500	702500	702500	1.0000	1.0000	702500	0
65.06.30	FP01	01	2427168	1213584	1213584	0.5000	0.5000	0	0
65.06.30	CVN1	02	702500	702500	702500	1.0000	1.0000	702500	0
66.06.30	FP01	01	2427168	1213584	1213584	0.5000	0.5000	0	0
66.06.30	NEW1	02	1405000	702500	702500	0.5000	0.5000	0	0
67.06.30	FP01	01	3832168	1916084	1916084	0.5000	0.5000	0	0
68.06.30	FP01	01	3832168	1916084	1916084	0.5000	0.5000	0	0
69.06.30	FP01	01	3832168	1916084	1916084	0.5000	0.5000	0	0
70.06.30	FP01	01	5109557	2554779	2554779	0.5000	0.5000	0	0
71.06.30	FP01	01	5109557	2554779	2554779	0.5000	0.5000	0	0
72.06.30	FP01	01	5109557	2554779	2554779	0.5000	0.5000	0	0

ISSUES TO SHAREHOLDERS (FR,EI EP,EB) TO OUTSIDERS (FC,FE,FA,FS) SPLITS & CONVERSIONS (CS,CC)

FIN YR END	ISSUE TYPE	ISSUE DATE	SEQ NO	APPLICATION DUE DATE	SHARES ISSUED	AMOUNT DUE TOTAL AMT PER SHARE	INSTALMENT TOTAL PER SHARE		RATIO OF ISSUE MULT	DIV	CUM RIGHTS	DIV DIFF	DILUTION FACTOR: CAPITAL WHOLE PER SHARE	PREMIUM WHOLE PER SHARE	TAKEOVERS (TA) AFTER TAX EARNINGS WHOLE PER SHARE	NET TANG ASSETS WHOLE PER SHARE
70.06.30	FR	69.09.03	01	69.10.17	1277389	638695 0.5000	638695 0.5000	NEW1	1	3			0.7500	0.0080	0.9193	

SUMMARY CALCULATIONS

FIN YR END	TOTAL EQUIV SHARES	NOTIONAL INTEREST	YR END NOT INT	NET ASSETS	NET EARNINGS	LAST EX RTS	PROCESSING DATE	DIL FACTOR AFTER LATEST ISSUE	PAR VALUE	PAID UP VALUE
62.06.30	3129668	0	0	0	0	99.99.99		1.0000	0.5000	0.5000

STXCOLDIRUN ON 11/07/73 SHORT CAPITAL HISTORY DETAILS PAGE 4

CO NAME BRAEMAR IND. STARTING FINANCIAL YEAR END DATE 61.06. CO NUMBER 00131584

SUMMARY CALCULATIONS

FIN YR END	TOTAL EQUIV SHARES	NOTIONAL INTEREST	YR END NOT INT	NET ASSETS	NET EARNINGS	LAST EX RTS	PROCESSING DATE	DIL FACTOR AFTER LATEST ISSUE	PAR VALUE	PAID UP VALUE
63.06.30	3129668	0	0	0	0	99.99.99		1.0000	0.5000	0.5000
64.06.30	3129668	0	0	0	0	99.99.99		1.0000	0.5000	0.5000
65.06.30	3129668	0	0	0	0	99.99.99		1.0000	0.5000	0.5000
66.06.30	3832168	0	0	0	0	99.99.99		1.0000	0.5000	0.5000
67.06.30	3832168	0	0	0	0	99.99.99		1.0000	0.5000	0.5000
68.06.30	3832168	0	0	0	0	99.99.99		1.0000	0.5000	0.5000
69.06.30	3832168	0	0	0	0	99.99.99		1.0000	0.5000	0.5000
70.06.30	5109557	7629	0	0	0	69.09.03		0.9193	0.5000	0.5000
71.06.30	5109557	0	0	0	0	99.99.99		1.0000	0.5000	0.5000
72.06.30	5109557	0	0	0	0	99.99.99		1.0000	0.5000	0.5000
73.06.30	5109557	0	0	0	0	99.99.99	73.07.13	1.0000	0.5000	0.5000

PRICES ACCUMULATIVE DILUTIONAL FACT 0.9193 PROCESS LEVEL 3 OR 0.5000UE dividend always being relative to a certain capitalization). By cross-checking the dividend rate against the actual amount paid as recorded in the balance sheet file, a further check on accuracy is created.

3) The Prices File

A computer version of the prices file for Braemar Industries Ltd is shown in Table (3-5). The prices file is comprised of a series of records, these records contain the monthly 'high' and 'low' prices together with the monthly 'end' prices and the monthly trading volume for each firm from January 1962 to December 1972 inclusive. The price and volume records are kept in terms of their 'original' values (as traded in the market) and in terms of their 'adjusted' values. The adjusted values presents a continuing series free from the effects of capitalization changes such as share splits and bonus 'effect' issues.

4) The Research File

The research file is created by merging the three basic files according to the programme presented in Appendix 3. The research file contains 143 arrays, a description of the arrays is also given in Appendix 3, while a computer version of the research file for Braemar Industries Ltd is shown in Table (3-6). The research file presents a set of standardized and comparable data on both a firm-to-firm and year-to-year basis and as a result goes a long way to ensuring that the results of any analysis based on data from this file will be subject to the minimum degree of data error.

N 4K FOR COMPANY 'BRAEMAR IND' NO. 131584

PROCESS DATE 31/12/99
PROCESS LEVEL. 0
ACCUMULATED DILUTIONAL FACTOR 1.0000
PRICES COLLECTED FROM MELBOURNE EXCHANGE

TABLE (3-5) COMPUTER 'HARD COPY' OF A PRICE FILE

PRICE DATE	SEC TYPE	ORIGINAL PRICES HIGH	LOW	END	VOLUME	ADJUSTED PRICES HIGH	LOW	END	VOLUME	CUM DIL FACTOR	PERCENTAGE CHANGE HIGH	LOW	END	VOLUME
30/04/73	E	0.73	0.68	0.68	51600	0.73	0.68	0.68	51600	1.0000				
31/03/73	E	0.80	0.70	0.71	85400	0.80	0.70	0.71	85400	1.0000	-8.75	-2.85	-4.22	-39.57
28/02/73	E	0.80	0.65	0.73	84433	0.80	0.65	0.73	84433	1.0000	-0.00	+7.69	-2.73	+1.14
31/01/73	E	0.72	0.65	0.70	32300	0.72	0.65	0.70	32300	1.0000	+11.11	-0.00	+4.28	+161.40
31/12/72	E	0.74	0.70	0.72	65300	0.74	0.70	0.72	65300	1.0000	-2.70	-7.14	-2.77	-50.53
30/11/72	E	0.75	0.63	0.74	170600	0.75	0.63	0.74	170600	1.0000	-1.33	+11.11	-2.70	-61.72
31/10/72	E	0.66	0.57	0.66	81750	0.66	0.57	0.66	81750	1.0000	+13.63	+10.52	+12.12	+108.68
29/09/72	E	0.65	0.57	0.57	140466	0.65	0.57	0.57	140466	1.0000	+1.53	-0.00	+15.78	-41.80
31/08/72	E	0.58	0.50	0.53	119000	0.58	0.50	0.53	119000	1.0000	+12.06	+14.00	+7.54	+18.03
31/07/72	E	0.58	0.45	0.50	69133	0.58	0.45	0.50	69133	1.0000	-0.00	+11.11	+6.00	+72.13
30/06/72	E	0.48	0.42	0.48	57900	0.48	0.42	0.48	57900	1.0000	+20.83	+7.14	+4.16	+19.40
31/05/72	E	0.45	0.40	0.43	34000	0.45	0.40	0.43	34000	1.0000	+6.66	+5.00	+11.62	+70.29
30/04/72	E	0.47	0.41	0.45	35300	0.47	0.41	0.45	35300	1.0000	-4.25	-2.43	-4.44	-3.68
31/03/72	E	0.43	0.40	0.40	32100	0.43	0.40	0.40	32100	1.0000	+9.30	+2.50	+12.50	+9.96
29/02/72	E	0.45	0.35	0.43	49200	0.45	0.35	0.43	49200	1.0000	-4.44	+14.28	-6.97	-34.75
31/01/72	E	0.40	0.37	0.38	25700	0.40	0.37	0.38	25700	1.0000	+12.50	-5.40	+13.15	+91.43
31/12/71	E	0.40	0.35	0.40	17100	0.40	0.35	0.40	17100	1.0000	-0.00	+5.71	-5.00	+50.29
30/11/71	E	0.39	0.34	0.34	20200	0.39	0.34	0.34	20200	1.0000	+2.56	+2.94	+17.64	-15.34
31/10/71	E	0.40	0.30	0.39	22300	0.40	0.30	0.39	22300	1.0000	-2.50	+13.33	-12.82	-9.41
30/09/71	E	0.45	0.28	0.30	34000	0.45	0.28	0.30	34000	1.0000	-11.11	+7.14	+30.00	-34.41
31/08/71	E	0.45	0.40	0.42	17200	0.45	0.40	0.42	17200	1.0000	-0.00	-30.00	-28.57	+97.67
31/07/71	E	0.44	0.42	0.42	15600	0.44	0.42	0.42	15600	1.0000	+2.27	-4.76	-0.00	+10.25
30/06/71	E	0.45	0.42	0.42	23800	0.45	0.42	0.42	23800	1.0000	-2.22	-0.00	-0.00	-34.45

N 4K FOR COMPANY 'BRAEMAR IND' NO. 131584

PRICE DATE	SEC TYPE	ORIGINAL HIGH	ORIGINAL LOW	PRICES END	PRICES VOLUME	ADJUSTED HIGH	ADJUSTED LOW	PRICES END	PRICES VOLUME	CUM DIL FACTOR	PERCENTAGE CHANGE HIGH	PERCENTAGE CHANGE LOW	PERCENTAGE CHANGE END	PERCENTAGE CHANGE VOLUME
E 31/05/71		0.45	0.41	0.45	36500	0.45	0.41	0.45	36500	1.0000	-0.00	+2.43	-6.66	-34.75
E 30/04/71		0.43	0.41	0.41	22500	0.43	0.41	0.41	22500	1.0000	+4.65	-0.00	+9.75	+62.22
E 31/03/71		0.49	0.43	0.43	13600	0.49	0.43	0.43	13600	1.0000	-12.24	-4.65	-4.65	+65.44
E 28/02/71		0.50	0.43	0.50	25100	0.50	0.43	0.50	25100	1.0000	-2.00	-0.00	-14.00	-45.81
E 31/01/71		0.45	0.41	0.41	27600	0.45	0.41	0.41	27600	1.0000	+11.11	+4.87	+21.95	-9.05
E 31/12/70		0.48	0.45	0.45	18100	0.48	0.45	0.45	18100	1.0000	-6.25	-8.88	-8.88	+52.48
E 30/11/70		0.50	0.45	0.45	19000	0.50	0.45	0.45	19000	1.0000	-4.00	-0.00	-0.00	-4.73
E 31/10/70		0.52	0.45	0.45	21400	0.52	0.45	0.45	21400	1.0000	-3.84	-0.00	-0.00	-11.21
E 30/09/70		0.54	0.50	0.51	23400	0.54	0.50	0.51	23400	1.0000	-3.70	-10.00	-11.76	-8.54
E 31/08/70		0.52	0.46	0.50	31400	0.52	0.46	0.50	31400	1.0000	+3.84	+8.69	+2.00	-25.47
E 31/07/70		0.54	0.45	0.49	34200	0.54	0.45	0.49	34200	1.0000	-3.70	+2.22	+2.04	-8.18
E 30/06/70		0.52	0.42	0.52	26000	0.52	0.42	0.52	26000	1.0000	+3.84	+7.14	-5.76	+31.53
E 31/05/70		0.49	0.44	0.46	28200	0.49	0.44	0.46	28200	1.0000	+6.12	-4.54	+13.04	-7.80
E 30/04/70		0.52	0.48	0.48	64300	0.52	0.48	0.48	64300	1.0000	-5.76	-8.33	-4.16	-56.14
E 31/03/70		0.58	0.50	0.51	32900	0.58	0.50	0.51	32900	1.0000	-10.34	-4.00	-5.88	+95.44
E 28/02/70		0.60	0.53	0.59	32600	0.60	0.53	0.59	32600	1.0000	-3.33	-5.66	-13.55	+0.92
E 31/01/70		0.61	0.51	0.60	37900	0.61	0.51	0.60	37900	1.0000	-1.63	+3.92	-1.66	-13.98
E 31/12/69		0.62	0.55	0.60	30800	0.62	0.55	0.60	30800	1.0000	-1.61	-7.27	-0.00	+23.05
E 31/11/69		0.64	0.60	0.61	18400	0.64	0.60	0.61	18400	1.0000	-3.12	-8.33	-1.63	+67.39
E 31/10/69		0.63	0.60	0.63	19800									
E 17/10/69	RTS	0.15	0.08	0.08	178516	0.63	0.60	0.63	19800	1.0000	+1.56	-0.00	-3.17	-7.07
E 30/09/69		0.66	0.62	0.64	47750									
I 03/09/69		0.75	0.73	0.75	2700	0.75	0.62	0.64	50450	1.0000	-16.00	-3.22	-1.56	-60.75
E 31/08/69		0.75	0.68	0.74	41900	0.75	0.68	0.74	41900	1.0000	-0.00	-8.82	-13.51	+20.40
E 31/07/69		0.70	0.67	0.69	39900	0.70	0.67	0.69	39900	1.0000	+7.14	+1.49	+7.24	+5.01
E 30/06/69		0.72	0.70	0.70	32300	0.72	0.70	0.70	32300	1.0000	-2.77	-4.28	-1.42	+23.52

N 4K FOR COMPANY 'BRAEMAR IND' NO. 131584

PRICE DATE	SEC TYPE	ORIGINAL HIGH	ORIGINAL LOW	PRICES END	PRICES VOLUME	ADJUSTED HIGH	ADJUSTED LOW	PRICES END	PRICES VOLUME	CUM DIL FACTOR	PERCENTAGE CHANGE HIGH	PERCENTAGE CHANGE LOW	PERCENTAGE CHANGE END	PERCENTAGE CHANGE VOLUME
E 31/05/69		0.72	0.68	0.72	56700	0.72	0.68	0.72	56700	1.0000	-0.00	+2.94	-2.77	-43.03
E 30/04/69		0.77	0.68	0.70	31700	0.77	0.68	0.70	31700	1.0000	-6.49	-0.00	+2.85	+78.86
E 31/03/69		0.80	0.70	0.75	30000	0.80	0.70	0.75	30000	1.0000	-3.75	-2.85	-6.66	+5.66
E 28/02/69		0.80	0.75	0.78	55900	0.80	0.75	0.78	55900	1.0000	-0.00	-6.66	-3.84	-46.33
E 31/01/69		0.80	0.75	0.75	87500	0.80	0.75	0.75	87500	1.0000	-0.00	-0.00	+4.00	-36.11
E 31/12/68		0.66	0.63	0.66	31200	0.66	0.63	0.66	31200	1.0000	+21.21	+19.04	+13.63	+180.44
E 30/11/68		0.66	0.63	0.65	33400	0.66	0.63	0.65	33400	1.0000	-0.00	-0.00	+1.53	-6.58
E 31/10/68		0.67	0.62	0.62	16100	0.67	0.62	0.62	16100	1.0000	-1.49	+1.61	+4.83	+107.45
E 30/09/68		0.72	0.66	0.67	34400	0.72	0.66	0.67	34400	1.0000	-6.94	-6.06	-7.46	-53.19
E 31/08/68		0.75	0.66	0.70	6300	0.75	0.66	0.70	6300	1.0000	-4.00	-0.00	-4.28	+446.03
E 31/07/68		0.66	0.63	0.65	56600	0.66	0.63	0.65	56600	1.0000	+13.63	+4.76	+7.69	-88.86
E 30/06/68		0.64	0.59	0.59	89200	0.64	0.59	0.59	89200	1.0000	+3.12	+6.77	+10.16	-36.54
E 31/05/68		0.62	0.55	0.60	23900	0.62	0.55	0.60	23900	1.0000	+3.22	+7.27	-1.66	+273.22
E 30/04/68		0.58	0.55	0.57	7800	0.58	0.55	0.57	7800	1.0000	+6.89	-0.00	+5.26	+206.41
E 31/03/68		0.62	0.50	0.54	13200	0.62	0.50	0.54	13200	1.0000	-6.45	+10.00	+5.55	-40.90
E 29/02/68		0.63	0.60	0.62	24600	0.63	0.60	0.62	24600	1.0000	-1.58	-16.66	-12.90	-46.34
E 31/01/68		0.71	0.60	0.60	70800	0.71	0.60	0.60	70800	1.0000	-11.26	-0.00	+3.33	-65.25
E 31/12/67		0.72	0.70	0.70	39300	0.72	0.70	0.70	39300	1.0000	-1.38	-14.28	-14.28	+80.15
E 30/11/67		0.74	0.68	0.72	30200	0.74	0.68	0.72	30200	1.0000	-2.70	+2.94	-2.77	+30.13
E 31/10/67		0.72	0.67	0.68	34000	0.72	0.67	0.68	34000	1.0000	+2.77	+1.49	+5.88	-11.17
E 30/09/67		0.74	0.60	0.73	48100	0.74	0.60	0.73	48100	1.0000	-2.70	+11.66	-6.84	-29.31
E 31/08/67		0.64	0.57	0.60	30300	0.64	0.57	0.60	30300	1.0000	+15.62	+5.26	+21.66	+58.74
E 31/07/67		0.65	0.51	0.64	23800	0.65	0.51	0.64	23800	1.0000	-1.53	+11.76	-6.25	+27.31
E 30/06/67		0.54	0.50	0.52	27600	0.54	0.50	0.52	27600	1.0000	+20.37	+2.00	+23.07	-13.76
E 31/05/67		0.55	0.53	0.53	17700	0.55	0.53	0.53	17700	1.0000	-1.81	-5.66	-1.88	+55.93
E 30/04/67		0.54	0.50	0.54	15000	0.54	0.50	0.54	15000	1.0000	+1.85	+6.00	-1.85	+18.00

N 4K FOR COMPANY 'BRAEMAR IND' NO. 131584

PRICE DATE	SEC TYPE	ORIGINAL PRICES HIGH	ORIGINAL PRICES LOW	ORIGINAL PRICES END	ORIGINAL PRICES VOLUME	ADJUSTED PRICES HIGH	ADJUSTED PRICES LOW	ADJUSTED PRICES END	ADJUSTED PRICES VOLUME	CUM DIL FACTOR	PERCENTAGE CHANGE HIGH	PERCENTAGE CHANGE LOW	PERCENTAGE CHANGE END	PERCENTAGE CHANGE VOLUME
E 31/03/67		0.56	0.50	0.50	9700	0.56	0.50	0.50	9700	1.0000	-3.57	-0.00	+8.00	+54.63
E 28/02/67		0.57	0.53	0.53	5200	0.57	0.53	0.53	5200	1.0000	-1.75	-5.66	-5.66	+86.53
E 31/01/67		0.52	0.40	0.52	12900	0.52	0.40	0.52	12900	1.0000	+9.61	+32.50	+1.92	-59.68
E 31/12/66		0.41	0.40	0.41	5600	0.41	0.40	0.41	5600	1.0000	+26.82	-0.00	+26.82	+130.35
E 30/11/66		0.42	0.37	0.41	23000	0.42	0.37	0.41	23000	1.0000	-2.38	+6.10	-0.00	-75.65
E 31/10/66		0.41	0.37	0.39	7800	0.41	0.37	0.39	7800	1.0000	+2.43	-0.00	+5.12	+194.87
E 30/09/66		0.44	0.41	0.41	11600	0.44	0.41	0.41	11600	1.0000	-6.81	-9.75	-4.87	-32.75
E 31/08/66		0.41	0.38	0.41	73400	0.41	0.38	0.41	73400	1.0000	+7.31	+7.89	-0.00	-84.19
E 31/07/66		0.46	0.41	0.41	9200	0.46	0.41	0.41	9200	1.0000	-10.86	-7.31	-0.00	+697.82
E 30/06/66		0.46	0.43	0.44	7300	0.46	0.43	0.44	7300	1.0000	-0.00	-4.65	-6.81	+26.02
E 31/05/66		0.50	0.45	0.47	2400	0.50	0.45	0.47	2400	1.0000	-8.00	-4.44	-6.38	+204.16
E 30/04/66		0.50	0.45	0.47	3500	0.50	0.45	0.47	3500	1.0000	-0.00	-0.00	-0.00	-31.42
E 31/03/66		0.50	0.40	0.43	6600	0.50	0.40	0.43	6600	1.0000	-0.00	+12.50	+9.30	-46.96
E 28/02/66		0.55	0.48	0.50	7000	0.55	0.48	0.50	7000	1.0000	-9.09	-16.66	-14.00	-5.71
E 31/01/66		0.55	0.52	0.54	8700	0.55	0.52	0.54	8700	1.0000	-0.00	-7.69	-7.40	-19.54
E 31/12/65	(	5 6)(	410)(	5 6)	5200	0.55	0.48	0.55	5200	1.0000	-0.00	+8.33	-1.81	+67.30
E 30/11/65	(	5 8)(	5 6)(	5 7)	5200	0.56	0.55	0.55	5200	1.0000	-1.78	-12.72	-0.00	-0.00
E 31/10/65	(	5 9)(	5 6)(	5 6)	400	0.57	0.55	0.55	400	1.0000	-1.75	-0.00	-0.00	+1200.00
E 30/09/65	(	6 0)(	5 9)(	5 9)	6800	0.60	0.57	0.57	6800	1.0000	-5.00	-3.50	-3.50	-94.11
E 31/08/65	(	6 0)(	6 0)(	6 0)	1500	0.60	0.60	0.60	1500	1.0000	-0.00	-5.00	-5.00	+353.33
E 31/07/65	(	6 0)(	5 6)(	5 6)	1000	0.60	0.55	0.55	1000	1.0000	-0.00	+9.09	+9.09	+50.00
E 30/06/65	(	6 0)(	5 6)(	5 6)	4000	0.60	0.55	0.55	4000	1.0000	-0.00	-0.00	-0.00	-75.00
E 31/05/65	(	6 1)(	4 9)(	4 9)	3750	0.60	0.47	0.47	3750	1.0000	-0.00	+17.02	+17.02	+6.66
E 30/04/65	(	6 4)(	6 0)(	6 0)	2400	0.63	0.60	0.60	2400	1.0000	-4.76	-21.66	-21.66	+56.25
E 31/03/65	(	611)(	6 3)(	6 3)	7300	0.69	0.62	0.62	7300	1.0000	-8.69	-3.22	-3.22	-67.12
E 28/02/65	(	611)(	6 2)(	611)	15100	0.69	0.61	0.69	15100	1.0000	-0.00	+1.63	-10.14	-51.65

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FOR COMPANY 'BRAEMAR IND' NO. 131584

PRICE DATE	SFC TYPE	ORIGINAL HIGH	ORIGINAL LOW	PRICES END	PRICES VOLUME	ADJUSTED HIGH	ADJUSTED LOW	PRICES END	PRICES VOLUME	CUM DIL FACTOR	PERCENTAGE CHANGE HIGH	PERCENTAGE CHANGE LOW	PERCENTAGE CHANGE END	PERCENTAGE CHANGE VOLUME
F 31/01/65	(	6 6)(	6 3)(	6 3)	8000	0.65	0.62	0.62	8000	1.0000	+6.15	-1.61	+11.29	+88.75
E 31/12/64	(	6 8)(	6 2)(	6 4)	11800	0.66	0.61	0.63	11800	1.0000	-1.51	+1.63	-1.58	-32.20
E 30/11/64	(	7 4)(	7 3)(	7 4)	7100	0.73	0.72	0.73	7100	1.0000	-9.58	-15.27	-13.69	+66.19
F 31/10/64	(	7 6)(	7 0)(	7 0)	9700	0.75	0.70	0.70	9700	1.0000	-2.66	+2.85	+4.28	-26.80
E 30/09/64	(	8 6)(	7 3)(	7 3)	13400	0.85	0.72	0.72	13400	1.0000	-11.76	-2.77	-2.77	-27.61
E 31/08/64	(	8 6)(	7 6)(	8 6)	11000	0.85	0.75	0.85	11000	1.0000	-0.00	-4.00	-15.29	+21.81
E 31/07/64	(	8 0)(	7 6)(	7 8)	9000	0.80	0.75	0.76	9000	1.0000	+6.25	-0.00	+11.84	+22.22
E 30/06/64	(	8 0)(	7 3)(	7 6)	6200	0.80	0.72	0.75	6200	1.0000	-0.00	+4.16	+1.33	+45.16
E 31/05/64	(	710)(	7 3)(	7 6)	15100	0.78	0.72	0.75	15100	1.0000	+2.56	-0.00	-0.00	-58.94
E 30/04/64	(	8 0)(	7 3)(	7 9)	4800	0.80	0.72	0.77	4800	1.0000	-2.50	-0.00	-2.59	+214.58
E 31/03/64	(	8 6)(	8 2)(	8 3)	6100	0.85	0.81	0.82	6100	1.0000	-5.88	-11.11	-6.09	-21.31
E 29/02/64	(	8 3)(	7 9)(	8 0)	11400	0.82	0.77	0.80	11400	1.0000	+3.65	+5.19	+2.50	-46.49
E 31/01/64	(	8 5)(	7 9)(	8 0)	9700	0.84	0.77	0.80	9700	1.0000	-2.38	-0.00	-0.00	+17.52
E 31/12/63	(	8 3)(	7 9)(	8 0)	131500	0.82	0.77	0.80	131500	1.0000	+2.43	-0.00	-0.00	-92.62
E 30/11/63	(	8 0)(	7 1)(	8 0)	21800	0.80	0.70	0.80	21800	1.0000	+2.50	+10.00	-0.00	+503.21
E 31/10/63	(	7 3)(	6 8)(	7 1)	16300	0.72	0.66	0.70	16300	1.0000	+11.11	+6.06	+14.28	+33.74
F 30/09/63	(	711)(	6 9)(	7 0)	10200	0.79	0.67	0.70	10200	1.0000	-8.86	-1.49	-0.00	+59.80
E 31/08/63	(	711)(	5 9)(	711)	22100	0.79	0.57	0.79	22100	1.0000	-0.00	+17.54	-11.39	-53.84
E 31/07/63	(	6 3)(	5 3)(	5 6)	16600	0.62	0.52	0.55	16600	1.0000	+27.41	+9.61	+43.63	+33.13
F 30/06/63	(	5 9)(	5 0)(	5 6)	10000	0.57	0.50	0.55	10000	1.0000	+8.77	+4.00	-0.00	+66.00
E 31/05/63	(	6 0)(	5 6)(	5 6)	10700	0.60	0.55	0.55	10700	1.0000	-5.00	-9.09	-0.00	-6.54
E 30/04/63	(	511)(	5 0)(	5 4)	5300	0.59	0.50	0.53	5300	1.0000	+1.69	+10.00	+3.77	+101.88
E 31/03/63	(	6 6)(	6 0)(	6 0)	3600	0.65	0.60	0.60	3600	1.0000	-9.23	-16.66	-11.66	+47.22
E 28/02/63	(	6 5)(	6 0)(	6 2)	3300	0.64	0.60	0.61	3300	1.0000	+1.56	-0.00	-1.63	+9.09
E 31/01/63	(	6 6)(	6 0)(	6 6)	11600	0.65	0.60	0.65	11600	1.0000	-1.53	-0.00	-6.15	-71.55
E 31/12/62	(	6 0)(	5 9)(	6 0)	8000	0.60	0.57	0.60	8000	1.0000	+8.33	+5.26	+8.33	+45.00

THE SYDNEY STOCK EXCHANGE   M O N T H L Y   P R I C E S - V O L U M E   S E R I E S   PAGE NO 1

N   4K   FOR COMPANY 'BRAEMAR IND' NO. 131584

PRICE DATE	SEC TYPE	ORIGINAL HIGH	ORIGINAL LOW	PRICES END	PRICES VOLUME	ADJUSTED HIGH	ADJUSTED LOW	PRICES END	PRICES VOLUME	CUM DIL FACTOR	PERCENTAGE CHANGE HIGH	PERCENTAGE CHANGE LOW	PERCENTAGE CHANGE END	PERCENTAGE CHANGE VOLUME
E 30/11/62	(	6 0)(	5 9)(	6 0)	15500	0.60	0.50	0.60	15500	1.0000	-0.00	+14.00	-0.00	-48.38
E 31/10/62	(	5 3)(	4 9)(	5 0)	5100	0.52	0.47	0.50	5100	1.0000	+15.38	+6.38	+20.00	+203.92
E 30/09/62	(	5 2)(	4 6)(	411)	12000	0.51	0.45	0.49	12000	1.0000	+1.96	+4.44	+2.04	-57.50
E 31/08/62	(	5 2)(	4 5)(	4 6)	3200	0.51	0.44	0.45	3200	1.0000	-0.00	+2.27	+8.88	+275.00
E 31/07/62	(	5 1)(	4 3)(	5 0)	4100	0.50	0.42	0.50	4100	1.0000	+2.00	+4.76	-10.00	-21.95
E 30/06/62	(	5 2)(	411)(	5 0)	2400	0.51	0.49	0.50	2400	1.0000	-1.96	-14.28	-0.00	+70.83
E 31/05/62	(	5 0)(	411)(	5 0)	3400	0.50	0.49	0.50	3400	1.0000	+2.00	-0.00	-0.00	-29.41
E 30/04/62	(	5 0)(	4 7)(	411)	11300	0.50	0.45	0.49	11300	1.0000	-0.00	+8.88	+2.04	-69.91
E 31/03/62	(	5 6)(	4 6)(	410)	3400	0.55	0.45	0.48	3400	1.0000	-9.09	-0.00	+2.08	+232.35
E 28/02/62	(	6 0)(	5 9)(	5 9)	6000	0.60	0.57	0.57	6000	1.0000	-8.33	-21.05	-15.78	-43.33
E 31/01/62	(	6 0)(	5 9)(	5 9)	1100	0.60	0.57	0.57	1100	1.0000	-0.00	-0.00	-0.00	+445.45

Previously it was mentioned that one of the problems in designing an Australian data bank of individual firm statistics was that of adjusting for frequent capitalization changes, especially those caused by the issuance of bonus shares and cash shares pitched below market value. Let us briefly examine the dual concepts of earnings per share (adjusted) and dividends per share (adjusted) these concepts are important in this thesis' empirical models. First, earnings per share (adjusted) is derived by taking the values of 'earned for ordinary'[(16)] including 'convertible note interest ex tax'[(17)] and 'notional interest adjustments'[(18)] then dividing by the number of 'equivalent fully paid shares'. The resultant series may be called the earnings per share (historical) series. This series assumes the latest par values but is not adjusted for bonus issues or the bonus element in cash issues. This adjustment is made by multiplying the historical series by a dilution factor. Similarly, dividends per share (adjusted)

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16. Consisting of net profit after tax, less preferred dividends and majority interest. It excludes non-normal capital profits and losses and items of a non-recurring 'windfall' nature. However it includes both operating and non-operating income if earned in the normal course of business operations.

17. This item represents interest that would become 'after-tax earnings' after the conversion of the notes (to ordinary shares) as implied under the 'equivalent fully paid shares' notion.

18. This represents the sum of compensatory notional interest adjustments added back to ordinary earnings to allow for money which was not available to the firm for the whole or part of the year in the case of a cash issue; or in the case of part paid issues, on the amount of money which would be raised in bringing all issues to fully paid status; or in the case of options and convertible notes, on the money which would be subscribed as a condition of conversion at some future date.

3	2554.78	2554.78	2554.78	1916.08	1916.08	1916.08	1916.08	1213.58	1213.58	1213.58
4	5109.55	5109.55	5109.55	3832.17	3832.17	3832.17	3832.17	2427.17	2427.17	2427.17
5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	320.00	320.00	320.00	320.00	320.00	320.00	320.00	320.00	320.00	320.00
7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	702.50	702.50	702.50
8	176.16	108.68	71.42	44.95	15.53	38.96	36.41	63.54	44.36	36.63
9	975.00	975.00	975.00	975.00	850.00	750.00	664.00	581.20	461.20	353.00
10	128.82	128.82	152.64	152.64	152.64	152.64	152.63	27.48	27.48	27.48
11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	3836.76	3767.28	3753.84	3088.67	2934.25	2857.68	2769.13	2588.31	2447.05	2326.96
15	1110.06	1177.11	1207.97	500.00	700.00	500.00	500.00	147.00	106.41	0.0
16	1110.06	1177.11	1207.97	500.00	500.00	500.00	500.00	0.0	0.0	0.0
17	0.0	0.0	0.0	0.0	200.00	0.0	0.0	147.00	106.41	0.0
18	159.00	136.20	181.64	112.50	95.53	80.66	68.88	66.95	58.88	51.41
19	1100.03	963.30	940.85	935.75	464.14	169.12	81.70	618.33	259.88	246.49
20	438.90	529.40	386.41	442.34	363.00	226.34	211.13	271.41	259.89	220.88
21	272.00	148.50	241.50	256.00	214.50	233.10	141.00	150.20	160.00	107.60
22	138.94	11.20	138.94	107.00	107.00	107.00	59.74	59.74	59.74	59.74
23	241.90	263.96	316.40	277.52	53.84	59.79	38.33	60.67	48.83	31.63
24	2191.67	1916.36	2024.10	2016.61	1212.49	795.35	531.90	1160.35	788.35	666.34
25	67.04	109.89	177.53	200.00	0.0	0.0	0.0	0.0	0.0	0.0
26	67.04	109.89	177.53	200.00	0.0	0.0	0.0	0.0	0.0	0.0
27	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28	2277.13	2250.29	2326.36	1635.75	1164.14	669.12	581.70	765.33	366.29	246.49
29	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31	1613.43	1647.92	1627.00	1259.42	1331.31	1077.12	967.90	1012.47	975.10	917.03
32	1587.37	1634.53	1627.00	1259.42	1331.31	1077.12	967.90	1012.47	975.10	917.03
33	2080.88	2040.92	1913.16	1489.99	1255.13	1134.22	1038.33	1233.63	1118.97	737.11
34	1209.20	1267.24	1258.59	957.17	816.40	766.60	720.77	888.11	807.60	681.01
35	2795.57	2901.77	2885.60	2216.58	2147.71	1843.72	1689.67	1900.59	1782.70	1598.04
36	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
37	0.0	0.0	1.00	0.0	0.0	0.0	0.0	22.42	22.42	22.42
38	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
39	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40	0.0	0.0	0.0	0.0	0.0	325.00	50.00	0.0	0.0	0.0
41	1651.92	1494.70	1693.79	1252.50	1067.85	853.00	841.97	958.99	923.66	756.61
42	3115.70	2902.01	2869.47	2559.16	1987.54	1515.37	1281.08	1367.60	972.90	984.66
43	54.31	18.45	37.70	11.54	59.17	11.60	328.19	33.01	19.10	2.98
44	4821.92	4415.16	4600.96	3823.20	3114.55	2709.97	2501.24	2359.60	1915.56	1744.24
45	2630.25	2498.81	2576.85	1304.59	1902.08	1914.62	1969.34	1199.26	1127.22	1077.90
46	5425.82	5400.58	5463.45	4021.17	4049.79	3758.34	3658.01	3122.26	2932.34	2698.37
47	7617.48	7316.93	7487.55	6039.78	5262.27	4553.69	4189.91	4282.61	3720.68	3364.70
48	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.08	6.24
49	7617.48	7316.93	7487.55	6039.78	5262.27	4553.69	4189.91	4282.61	3722.76	3370.94
50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
51	2452.58	2146.01	2656.97	2682.51	2260.98	1992.73	1686.15	1721.32	2347.25	1721.32
52	5049.71	4716.30	5303.32	4638.26	3745.11	2981.85	2587.85	2806.64	3033.53	2287.80
53	5109.55	5109.55	5109.55	3832.16	3832.16	3832.16	3832.16	3129.67	3129.67	3129.67
54	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

TABLE (3-6) COMPUTER 'HARD COPY' OF A RESEARCH FILE

55	852.73	596.78	702.36	728.44	557.08	607.63	429.75	530.54	504.53	425.21
56	149.20	147.76	126.59	89.93	80.98	68.71	45.47	71.00	61.09	56.13
57	703.53	449.02	575.76	638.52	476.10	538.92	384.28	459.54	443.44	369.09
58	0.0	0.0	0.0	0.0	0.0	0.0	29.55	8.41	4.46	2.23
59	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
61	703.53	449.02	575.76	638.52	476.10	538.92	413.83	467.95	447.90	371.32
62	142.22	138.09	81.91	53.37	40.03	38.87	62.69	62.78	54.36	49.17
63	561.32	310.94	493.85	585.14	436.07	500.04	351.14	405.17	393.54	322.14
64	272.00	148.50	241.50	253.97	195.22	219.20	138.23	160.17	160.00	107.60
65	289.32	162.44	252.35	331.17	240.85	280.84	212.92	245.01	233.54	214.54
66	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
67	289.32	162.44	252.35	331.17	240.85	280.84	212.92	245.01	233.54	214.54
68	22.40	22.40	22.40	22.40	22.40	22.40	22.40	22.40	22.40	22.40
69	266.92	140.04	229.95	308.77	218.45	258.44	190.52	222.61	211.14	192.14
70	0.0	0.0	7.63	0.0	0.0	0.0	0.0	0.0	0.0	0.0
71	266.92	140.04	237.58	308.77	218.45	258.44	218.79	250.88	239.41	220.42
72	204.38	102.19	204.38	172.45	172.45	172.45	97.09	97.09	97.09	97.09
73	62.54	37.85	25.57	136.32	46.00	86.00	93.43	125.52	114.05	95.06
74	18.77	-1.59	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
75	21.31	36.26	25.57	136.32	46.00	86.00	93.43	125.52	114.05	95.06
76	439.52	310.20	378.94	421.10	321.83	349.56	258.38	316.00	294.63	270.67
77	226.78	124.59	226.78	194.85	194.85	194.85	119.49	119.49	119.49	119.49
78	211.74	185.61	152.16	226.25	126.98	154.71	138.90	196.52	175.14	151.18
79	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
80	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
81	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
82	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
83	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
84	1.00	1.00	1.00	0.92	0.92	0.92	0.92	0.92	0.92	0.92
85	1.00	1.00	1.00	0.92	0.92	0.92	0.92	0.92	0.92	0.92
86	3.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
87	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
88	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
89	5.00	0.0	5.00	5.00	5.00	5.00	4.00	4.00	4.00	4.00
90	8.00	4.00	9.00	9.00	9.00	9.00	8.00	8.00	8.00	8.00
91	4.00	2.00	4.50	4.50	4.50	4.50	4.00	4.00	4.00	4.00
92	3.99	2.00	4.50	4.14	4.13	4.14	3.68	3.68	3.67	3.68
93	5.22	2.74	4.65	8.06	5.70	6.74	5.71	8.02	7.65	7.04
94	5.22	2.74	4.65	7.41	5.22	6.20	5.25	7.37	7.01	6.47
95	0.54	0.39	0.50	0.65	0.62	0.59	0.38	0.53	0.72	0.62

[illegible]	[illegible]	0.50	0.60	0.74	0.58	0.52	0.51	0.64	0.76	0.59
98	0.43	0.49	0.58	0.74	0.57	0.51	0.46	0.64	0.78	0.60
99	0.47	0.43	0.52	0.71	0.53	0.50	0.46	0.58	0.74	0.54
100	0.45	0.45	0.49	0.66	0.57	0.51	0.46	0.56	0.72	0.55
101	0.48	0.45	0.52	0.66	0.59	0.50	0.42	0.55	0.74	0.53
102	0.58	0.44	0.54	0.64	0.61	0.60	0.42	0.55	0.74	0.57
103	0.58	0.45	0.52	0.69	0.59	0.59	0.38	0.55	0.78	0.73
104	0.65	0.45	0.54	0.69	0.66	0.68	0.40	0.55	0.78	0.73
105	0.66	0.40	0.52	0.63	0.62	0.66	0.38	0.53	0.69	0.67
106	0.75	0.39	0.50	0.64	0.61	0.68	0.39	0.52	0.67	0.74
107	0.74	0.40	0.48	0.62	0.61	0.66	0.39	0.51	0.61	0.76
108	0.37	0.41	0.51	0.69	0.55	0.37	0.48	0.57	0.71	0.55
109	0.35	0.43	0.53	0.69	0.55	0.49	0.44	0.57	0.71	0.55
110	0.40	0.43	0.50	0.64	0.46	0.46	0.37	0.57	0.75	0.55
111	0.41	0.41	0.48	0.63	0.51	0.46	0.41	0.55	0.67	0.46
112	0.40	0.41	0.44	0.63	0.51	0.49	0.41	0.44	0.67	0.51
113	0.42	0.42	0.42	0.64	0.54	0.46	0.40	0.51	0.67	0.46
114	0.45	0.42	0.45	0.62	0.58	0.47	0.38	0.51	0.69	0.48
115	0.50	0.40	0.46	0.63	0.61	0.52	0.35	0.55	0.69	0.53
116	0.57	0.28	0.50	0.62	0.61	0.55	0.38	0.53	0.67	0.62
117	0.57	0.30	0.45	0.60	0.57	0.62	0.34	0.51	0.64	0.61
118	0.63	0.34	0.45	0.60	0.58	0.63	0.34	0.51	0.67	0.65
119	0.70	0.35	0.45	0.55	0.58	0.64	0.37	0.44	0.57	0.71
120	0.38	0.41	0.60	0.69	0.55	0.48	0.50	0.57	0.74	0.60
121	0.43	0.50	0.59	0.72	0.57	0.49	0.46	0.64	0.74	0.57
122	0.40	0.43	0.51	0.69	0.50	0.46	0.40	0.57	0.76	0.55
123	0.45	0.41	0.48	0.64	0.52	0.50	0.43	0.55	0.71	0.49
124	0.43	0.45	0.46	0.66	0.55	0.49	0.43	0.44	0.69	0.51
125	0.48	0.42	0.52	0.64	0.54	0.48	0.40	0.51	0.69	0.51
126	0.50	0.42	0.49	0.63	0.60	0.59	0.38	0.51	0.70	0.51
127	0.53	0.42	0.50	0.68	0.64	0.55	0.38	0.55	0.78	0.73
128	0.57	0.30	0.51	0.64	0.62	0.67	0.38	0.53	0.67	0.64
129	0.66	0.39	0.45	0.63	0.57	0.63	0.36	0.51	0.64	0.65
130	0.74	0.34	0.45	0.61	0.60	0.66	0.38	0.51	0.67	0.74
131	0.72	0.40	0.45	0.60	0.61	0.64	0.38	0.51	0.58	0.74
132	25.70	27.60	37.90	95.18	77.01	14.03	9.46	8.70	10.55	12.62
133	49.20	25.10	32.60	60.81	26.76	5.66	7.61	16.42	12.40	3.59
134	32.10	13.60	32.90	32.53	14.36	10.55	7.18	7.94	6.63	3.92
135	35.30	22.50	64.30	34.48	8.48	16.32	3.81	2.61	5.22	5.76
136	34.00	36.50	28.20	51.68	26.00	19.25	2.61	4.08	15.42	11.64
137	57.90	23.80	26.00	35.13	97.03	30.02	7.94	4.35	6.74	10.88
138	69.13	15.60	34.20	43.40	61.57	25.89	10.01	1.09	9.79	18.05
139	119.00	17.20	31.40	45.58	6.35	32.96	79.84	1.63	11.96	24.04
140	140.47	34.00	23.40	50.69	37.42	52.32	12.62	7.40	14.58	11.09
141	81.75	22.30	21.40	19.80	17.51	36.98	8.48	0.43	10.55	17.73
142	170.60	20.20	19.00	18.40	36.33	32.85	25.02	5.66	7.72	23.71
143	65.30	17.10	18.10	30.80	33.94	42.75	6.09	5.66	12.83	143.04

is obtained initially by deriving the dividends per share on the 'old' fully paid shares (i.e., dividing the total ordinary dividend rate by the number of equivalent fully paid shares). This series entitled, dividends per share (historical) is unadjusted for bonus issues and the bonus element in cash issues but assumes the latest par values. As with the earnings per share series, this problem is overcome by multiplying the historical series by a dilution factor.[19]

From the above discussion it can be seen that both the earnings per share (adjusted) and the dividend per share (adjusted) series rely on the dual notions of 'equivalent fully paid shares' and 'dilution factors'. What do these notions entail? First, 'equivalent fully paid shares' is meant to represent, the number of shares on issue at year end plus the number of potentially fully paid shares. Thus contributing new and deferred shares are treated as fully paid while options and convertible notes are treated as increasing the number of fully paid shares by the number of these shares which will be created upon exercise of the options or convertible privileges. Second, the 'dilution factor' is that factor used to adjust earnings and dividends per share from the current year base backwards so as to bring all historical earnings and dividends per share to a comparable capitalization basis. The factor

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19. For a further discussion of the techniques described above, Peter H. Davies, "Earnings Per Share, Adjusted For New Issues: Some Comments", Australian Security Analysts' Journal, 15 (February 1965), 3-7.

adjusts for bonus issues and the bonus element in cash issues on the assumption that a hypothetical investor takes up all bonus issues and, whenever there is a rights issue, sells all rights and takes up old shares, so maintaining a constant investment outlay over the period. The adjustment achieves the same effect as if the firm issued all new shares 'at market'. This removes the 'bonus' element in cash issues, the firm being assumed to issue the minimum number of shares to achieve its fund raising objective.(20)

Finally, selection of data from the research file is made possible by a 'retrieval' programme. The output from this programme consists of either, (a) punched cards in a form suitable for incorporation into most statistical programs and/or (b) hard-copy which can be used as a visual check of the punched card output if need be. Retrievals can also be made conditional by inserting tests for certain firm or financial characteristics.

D] CONCLUSIONS

The preceding sections of this chapter have outlined the procedures adopted in order to develop a data bank of comparative individual firm statistics. Previous studies on the effect of financial variables on the cost of capital have encountered appreciable difficulties which are

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20. In helping me to a greater understanding of these two notions and the problems involved in developing a data bank of comparative individual firm statistics my thanks goes to Peter H. Davies, Consultant to the Sydney Stock Exchange Statistical Service.

adequately expressed by Durand as follows,

> ". . . if an analyst restricts his samples in order to keep them homogeneous, he must perforce keep them small, and as he attempts to expand them to the point where they are numerically satisfactory he must pay a price in lost homogeneity."(21)

However, a satisfactory test requires a large number of observations, covering a wide range of debt ratios, retention rates and firm size, on firms which are subject to similar degrees of business risk. Most of the tests hitherto attempted have been confined to firms from a single industry, but in Chapter 2, it was shown that cost-of-capital studies which endeavour to hold business risk constant by invoking the equivalent-risk class hypothesis and thence proceed to evaluate the relationship between financial variables and the cost of capital, will not secure an evaluation of the relationship that is of interest. In an attempt to overcome this weakness a sample of firms was selected with the intent of achieving a high degree of heterogeneity among factors such as growth trends, cost and demand patterns, and the relative influences of economic cycles. Then in an attempt to endeavour that the conclusions drawn from the results of any analysis will not have been affected by 'noise' in the measurement of the variables used in the empirical models (to be discussed in the next chapter) this chapter then proceeded to develop a data bank of comparative individual firm statistics.

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21. David Durand, "The Cost of Capital, Corporation Finance and the Theory of Investment: Comment", American Economic Review, 49 (September 1959), 652.

CHAPTER 4

THE REGRESSION MODELS USED IN THIS THESIS

"Read not to contradict and confute, nor to believe and take for granted, nor to find talk and discourse, but to weigh and consider."

Bacon

A] THREE DEFICIENCIES OF THE PRIOR EMPIRICAL RESEARCH

As mentioned in Chapter 2 the three deficiencies of the prior empirical research are; first, leverage ratios are commonly measured at book values; second, it is assumed that firms within the same industry manifest equivalent degrees of business risk; third, the ratio of dividends to market price and earnings to market price are used as estimates of the investor's required rate of return. This chapter will endeavour to develop a new series of empirical models designed to help currect these deficiencies.

B] THE DEPENDENT VARIABLE-EQUITY CAPITALIZATION RATE

In theory, the equity capitalization rate may be defined as,

> ". . . the minimum rate of return that the company must earn on the equity financed portion of an investment project in order to leave unchanged the market price of the stock."(1)

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1. James C. Van Horne, Financial Management and Policy, *op. cit.*, 107.

In this thesis the equity capitalization rate was measured using three different methods, these were:

1) <u>The Dividend Valuation Model - DVM</u>

According to generally accepted theory, share prices are dependent only upon expected future dividends and the perceived risk of these dividends.(2) Algebraically, this may be expressed as follows:

$$P_o = \frac{D_1}{(1+K_e)} + \frac{D_2}{(1+K_e)^2} + \frac{D_3}{(1+K_e)^3} + \ldots$$

that is:

$$(4\text{-}1) \qquad P_o = \sum_{t=1}^{\infty} \frac{D_t}{(1+K_e)^t}$$

where:

P_o is value of a share of equity at time 0

D_t is the dividend per share expected to be paid in period t, and

K_e is the rate of discount appropriate for the business-risk complexion of the firm.

In general investors formulate subjective probability distributions of dividends per share expected to be paid in various future periods. For the individual investor, the D_t in Equation (4-1) are the expected values, or means, of these probability distributions. For the market as a whole, the D_t represent the expected values for investors at the margin, and K_e is the market discount factor for

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2. For example, Williams has defined the "investment value" of a share as, "the present worth of all dividends to be paid on it", see John B. Williams, <u>The Theory of Investment Value</u> (North Holland Publishing Company, Amsterdam, 1938), 55.

the risk firm involved. The equity capitalization rate may now be redefined as,

> ". . . the rate of discount that equates the present value of the stream of expected future dividends per share, as perceived by investors at the margin, with the market price of the stock."(3)

This rate is found by solving Equation (4-1) for K_e.(4)

Equation (4-1) is a quite general share valuation model in the sense that the time pattern of D_t can be anything: D_t can be rising, falling, constant or it can even fluctuate randomly and Equation (4-1) will still hold. However, for empirical testing purposes, it is necessary to estimate a particular time pattern and then develop a simplified version of the general share valuation model.

The simplest and most widely known share valuation model is called the perpetual-growth valuation model.(5) Suppose dividends are expected to grow at the constant rate, g, per-period, i.e.: that dividends per-share in any one period is a constant multiple (1+g) of the dividend in the preceding period. Thus, if a firm's most recent dividend is D_o, its dividend in any future year may be

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3. Van Horne, Financial Management and Policy, *op. cit.*, 111.

4. As mentioned in Chapter 2, only under certain circumstances is it appropriate to use the ratio of earnings per share to market price per share as the equity capitalization rate.

5. This model was first developed by John B. Williams, the Theory of Investment Value, *op. cit.*, and later refined by Myron J. Gordon in additional work. See Myron J. Gordon and Eli Shapiro,"Capital Equipment Analysis: The Required Rate of Profit", *op. cit.*, 102-110 and Myron J. Gordon, The Investment, Financing and Valuation of the Corporation, *op. cit.*

forecast as $D_t = D_o(1+g)^t$. Equation (4-1) then becomes:

$$(4\text{-}2) \qquad P_o = \frac{D_o(1+g)}{(1+K_e)} + \frac{D_o(1+g)^2}{(1+K_e)^2} + \frac{D_o(1+g)^3}{(1+K_e)^3} + \ldots$$

if $K_e > g$, then Equation (4-2) can be expressed as follows:(6)

$$(4\text{-}3) \qquad P_o = \frac{D_o(1+g)}{(K_e - g)}$$

Solving Equation (4-3) for K_e yields the following:

$$(4\text{-}4) \qquad K_e = \frac{D_o(1+g)}{P_o} + g$$

Equation (4-3) however presents a near paradox. The assumption that $K_e > g$ is inconsistent with the observation that many shares are expected to have (or at least have had) a rate of growth of dividends in excess of the discount rate. Yet if $K_e \leqslant g$ the market price of the share becomes infinitely large. It has been this observation that has prompted writers to turn to "more realistic" specifications of the dividend time path or other explanations such as risk aversion to resolve the apparent contradictions of fact with theory.(7)

The crucial assumption in the valuation model represented by Equation (4-3) is that dividends per share

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6. See Harold Bierman Jnr. and Jerome Hass, "Normative Stock Price Models", Journal of Financial and Quantitative Analysis, 6 (September 1971), 1135-36 for an often used solution in deriving Equation (4-3).

7. For a systematic exploration of the inconsistency and its resolution see David Durand, "Growth Stocks and the St. Petersburg Paradox", Journal of Finance, 12 (September 1957), 348-63.

are expected to grow perpetually at a compound rate of g. In certain situations, this assumption may be a fair approximation of investor expectations. However, it is more likely that firms will not grow at a constant compound rate forever rather, they will grow at a very high rate initially, after which their growth opportunities slow down to a rate that is normal for firms in general. If maturity is reached, the growth rate may stop altogether. This view is supported by Graham, Dodd and Cottle who when discussing the duration of firm growth comment that,

> "Both mathematics and prudence require that the period of high growth be limited to a finite-actually a fairly short-period of time. After that, the growth must be assumed either to stop entirely or to proceed at so modest a rate . . ."(8)

Furthermore, Jen has commented as follows,

> "Indeed, it appears more reasonable to assume that under uncertainty, available special investment opportunities and economic environment are such that investors can expect the dividends of a stock to increase annually with certainty at a rate g for only a finite interval of n years. Beyond the n^{th} year, investors may doubt that special investment opportunities and economic environment will continue to be favourable."(9)

When the pattern of expected growth is such that the perpetual-growth valuation model is inappropriate,

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[8]. B. Graham, D.L. Dodd and S. Cottle, Security Analysis: Principles and Techniques, (McGraw-Hill, New York, 4th Edition, 1962), 528.

[9]. Frank C Jen, "Common Stock Valuation: An Empirical Investigation of the Finite Horizon Hypothesis", American Statistical Association, Proceedings of the Business and Economic Section, 1965, 293.

modifications of Equation (4-1) can be used to accommodate the expected growth pattern, whatever that pattern may be. A number of valuation models are based on the premise that growth will taper off eventually.[10] Suppose dividends are expected to grow at the rate g_s for N periods, then at the rate g_n (the norm for the economy) to infinity. The value of a share with such a growth pattern may be represented algebraically as follows:

$$(4\text{-}5) \qquad P_o = \sum_{t=1}^{N} \frac{D_o(1+g_s)^t}{(1+K_e)^t} + \sum_{t=N+1}^{\infty} \frac{D_N(1+g_n)^{t-N}}{(1+K_e)^t}$$

Where the 1^{st} summation is the present value of all the dividends during the early growth period, while the 2^{nd} summation is the present value of the remainder of the expected dividends. For empirical purposes Equation (4-5) may be reformulated as follows:

$$(4\text{-}6) \qquad P_o = \sum_{t=1}^{N} \frac{D_o(1+g_s)^t}{(1+K_e)^t} + \left[\frac{D_N(1+g_n)}{K_e-g_n}\right] \frac{1}{(1+K_e)^N}$$

if $\dfrac{(1+g_s)}{(1+K_e)} = r$; then

10. See W. Scott Bauman, "Investment Returns and Present Values", Financial Analysts Journal, 25 (November-December 1969), 107-18; Eugene F. Brigham and James L. Pappas, "Duration of Growth, Changes in Growth Rates, and Corporate Share Prices", Financial Analysts Journal, 22 (May-June 1966), 157-62; Charles C. Holt, "The Influence of Growth Duration on Share Prices", Journal of Finance, 17 (September 1962), 465-75; Burton G. Malkiel, "Equity Yields, Growth and the Structure of Share Prices", American Economic Review, 53 (December 1963), 1004-31; Paul F. Wendt, "Current Growth Stock Valuation Models", Financial Analysts Journal, 21 (March-April 1965), 3-15.

$$P_o = D_o \sum_{t=1}^{N} r^t + \left[\frac{D_N(1+g_n)}{K_e-g_n}\right] \frac{1}{(1+K_e)^N}$$

$$P_o = \frac{D_o(1-r^N)}{{}^1/r-1} + \left[\frac{D_N(1+g_n)}{K_e-g_n}\right] \frac{1}{(1+K_e)^N}$$

$$P_o = \frac{D_o\left(1-\left(\frac{1+g_s}{1+K_e}\right)^N\right)}{\frac{1+K_e}{1+g_s}-1} + \left[\frac{D_N(1+g_n)}{K_e-g_n}\right] \frac{1}{(1+K_e)^N}$$

$$P_o = \frac{D_o(1+g_s)\left[1-\left(\frac{1+g_s}{1+K_e}\right)^N\right]}{K_e-g_s} + \left[\frac{D_N(1+g_n)}{K_e-g_n}\right] \frac{1}{(1+K_e)^N}$$

$$P_o = \frac{D_o(1+g_s)}{K_e-g_s} - \frac{D_o(1+g_s)(1+g_s)^N}{(K_e-g_s)(1+K_e)^N} + \left[\frac{D_N(1+g_n)}{K_e-g_n}\right] \frac{1}{(1+K_e)^N}$$

(4-7)

$$P_o = \frac{D_o(1+g_s)}{K_e-g_s} - \frac{D_o(1+g_s)(1+g_s)^N}{(K_e-g_s)(1+K_e)^N} + \frac{D_o(1+g_s)^N(1+g_n)}{(K_e-g_n)(1+K_e)^N}$$

Equation (4-7) may be solved for K_e by using Newton's Method - an interative routine,[11] Table (4-1) presents a solution of Equation (4-7) employing the following data, P_o=52.00¢,D_o=4.60¢,g_s=4.00%,g_n=4.50% and N=5. Initially approximate roots for Equation (4-7) are found by inserting the relevant data values and then substituting increasing values of K_e (from say 1% to 50%) until both sides of the equation are equal - this may result in more than one approximate root being found. A solution of Equation (4-7)

[11] For an explanation of Newton's Method see, S.D. Conte, Elementary Numerical Analysis, (McGraw-Hill, New York, 1965).

EQUATION IS Y = 4.787(K- 0.0400) - 5.827((K- 0.0400)(1+K)** 5) + 5.357((K- 0.0450)(1+K)** 5) - [illegible]

FOR THIS EQUATION 1 ROOTS HAVE BEEN FOUND THESE APPROX ROOTS ARE :- 13.5500
EXACT (NEWTONS METHOD) ROOTS ARE :- 13.5573

GRAHP OF P(ACROSS PAGE) AGAINST KT(DOWN PAGE) MIDDLE OF GRAPH = 52.0000

1.0	-133.86 9
2.0	-187.50 9
3.0	-312.65 9
4.0	-938.40 9
5.0	938.83
6.0	313.08
7.0	187.93
8.0	134.29
9.0	104.49
10.0	85.53
11.0	72.39
12.0	62.76
13.0	55.40
14.0	49.58
15.0	44.88
16.0	40.99
17.0	37.72
18.0	34.94
19.0	32.53
20.0	30.44
21.0	28.61
22.0	26.98
23.0	25.53
24.0	24.22
25.0	23.05
26.0	21.98
27.0	21.01
28.0	20.12
29.0	19.30
30.0	18.55
31.0	17.85
32.0	17.21
33.0	16.60
34.0	16.04
35.0	15.52
36.0	15.03
37.0	14.57
38.0	14.14
39.0	13.73
40.0	13.35
41.0	12.98
42.0	12.64
43.0	12.31
44.0	12.00
45.0	11.71
46.0	11.43
47.0	11.16
48.0	10.90
49.0	10.66
50.0	10.43

based on the data presented above is illustrated graphically in Table (4-1) where, when the curve crosses the middle of the graph (at P_o=52.00¢) the approximate root is (K_e) 13.55%. The approximate root is then substituted into the process for Newton's method so as to calculate the exact root, which in this case is (K_e) 13.5573. The programme developed to calculate the approximate roots and Newton's exact root is given in Appendix 4.

The important factor in solving Equation (4-7) for K_e, is that the value obtained is the one which equates the expected future dividends as perceived by investors at the margin with the current market price of the shares. Because both expected growth in dividends and the number of years investors think the growth in dividends will continue are not directly observable they must be estimated. However, it is generally considered that for reasonable stable patterns of past growth, one might project this trend into the future,[(12)] Robichek and Myers take this view when commenting, "it seems reasonable that investors will tend to extrapolate past rates of growth in estimating the trend of future dividends."[(13)] While with regard to the length of the investors time horizon Jen suggests that investors will consider,

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12. See Edwin J. Elton and Martin J. Gruber, "Earnings Estimates and the Accuracy of Expectational Data", Management Science, 18 (April 1972), 409-24, for an analysis of the accuracy of earnings per share forecasts produced by various mechanical forecasting techniques using past data.

13. Alexander A. Robichek and Stewart C. Myers, Optimal Financing Decisions (Prentice-Hall Inc., Englewood Cliffs, New Jersey, 1965), 65.

> ". . . such firm and economic factors as the financial conditions, the management and the past growth record of the corporation, the future of the industry, the investor's attitude toward common stocks and the general economic trend in order to arrive at an equitable horizon."(14)

The techniques used in this dissertation when attempting to measure the various expectational data values are discussed later in this chapter.

To date, measurement of the equity capitalization rate has relied upon projection of future earnings and dividends for an individual firm, consideration will now be given to its measurement in a market context.

2) The Risk-Index Model - RIM

First, recall in Chapter 1 it was mentioned that an investor when purchasing a share expects to receive a stream of future dividends, under conditions of certainty the appropriate rate of discount for this stream would be the risk-free rate. However, under conditions of uncertainty, the rational investor will discount these dividends at a rate higher than the risk-free rate. In other words, the investor will require an expected return in excess of the risk-free rate in order to compensate him for the risk associated with receiving the expected dividend stream. The greater the uncertainty, the greater the expected return that the investor will require. Thus the required rate of return, E(R) for an investor can be seen to consist of the risk-free rate, R_f, plus a premium, θ, to account

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14. Jen, "Common Stock Valuation: . . .", *op. cit.*, 294.

for the uncertainty associated with receiving the expected return, that is:

$$(4\text{-}7) \qquad E(R) = R_f + \theta$$

From Equation (4-7) it would seem that the most appropriate point to commence in calculating the required rate of return is with the current risk-free rate which an investor could receive by investing in short-dated government securities. Clearly since an investor is accepting an element of risk, he will expect a rate of return which is greater than the risk-free rate; the question is how much greater?

If the investor were investing in the market portfolio, M, that is, the portfolio containing all securities in exactly the proportions they are supplied in equilibrium, the increase in the rate of return he would expect is exactly equal to the difference between the return on the market portfolio, $E(R_m)$ and the risk-free rate. The rate of return the investor would expect (when investing in the market portfolio) is therefore equal to:

$$(4\text{-}8) \qquad E(R_m) = R_f + [E(R_m)-R_f]$$

which in turn is equal to, the average return on the whole equity market. However, since an individual firm usually offers investors a different risk than the markets overall average it is necessary to adjust $[E(R_m)-R_f]$ by a 'Risk Index', RI. The rate of return an investor would expect (when investing in an individual firm) can now be given as:

$$(4\text{-}9) \qquad E(R_i) = R_f + [E(R_m) - R_f]RI_i$$

Expressed in words, the riskier a security, the higher its index, the higher the term $[E(R_m)-R_f]RI$ and the higher the investors required rate of return. This required return represents the equity capitalization rate of the firm in a market context. The techniques for estimating this required rate of return are discussed later in this chapter.

3) <u>The Capital-Asset Pricing Model - CPM</u>

An alternative method of calculating the required rate of return in a market context is to use the capital-asset pricing model. According to this model, the expected return of an individual security can be expressed as:(15)

$$(4\text{-}10) \qquad E(R_i) = R_f + \frac{E(R_m) - R_f}{Var(R_m)} Cov(R_i, R_m)$$

or alternatively

$$(4\text{-}11) \qquad E(R_i) = R_f + [E(R_m) - R_f]\beta_i$$

where $E(R_i)$ is the equilibrium expected return for the i^{th} security, R_f is the risk-free rate of interest, $E(R_m)$ is the equilibrium expected return for the market portfolio, $Cov(R_i, R_m)$ is the covariance of returns for the i^{th} security with the market portfolio, $Var(R_m)$ is the variance of the probability distributions of possible returns for the market portfolio and β_i is the beta coefficient. In market equilibrium the capital-asset pricing model implies

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15. For a theoretical development of the Capital-Asset Pricing Model see Appendix 1.

an expected return-risk relationship for all individual securities. The risk an investor associates with realising a stream of future returns depends upon the correlation of that stream with the expected return streams available from other securities in the market. The risk of an individual security to the investor is the marginal effect it has on the dispersion of the distribution of possible portfolio returns. Thus, the greater the covariance of a security with the market portfolio, the greater the risk and the greater the expected return that is required. By the same token, the lower the covariance of a security with the market portfolio, the less its risk, the more valuable it becomes, and the lower the expected return that is required. This required return again represents the equity capitalization rate of the firm in a market context. The techniques for estimating this required rate of return are discussed later in this chapter.

C] <u>THE DEPENDENT VARIABLE-AVERAGE CAPITALIZATION RATE</u>

In theory, the average capitalization rate may be regarded as the weighted average of the capitalization rates for the classes of securities comprising the capital structure of the firm. The weight for each class of security is the ratio of the market value of the securities representing the source of capital to the market value of all securities issued by the firm. To illustrate this position, suppose a firm is financed partially by debt and partially by equity, the anticipated earnings stream of the firm will be divided into two components, one for each class of security. Thus, the interest on debt is subtracted from pre-tax earnings, and then the taxes are deducted in order to determine the earnings available to ordinary shareholders. The total amount being paid to the security holders is equal to the ordinary dividends plus the interest on the debt. Therefore the total value of the securities can be expressed as follows (assuming constant perpetual returns):

$$V_T = \sum_{t=1}^{\infty} \frac{D+I}{(1+K_o)^t}$$

which reduces to:

$$V_T = \frac{D+I}{K_o} \qquad (4\text{-}12)$$

where:

V_T is the total market value of all securities

D is the dividends on ordinary shares

I is the interest on debt and

K_o is the average capitalization rate.

Alternatively, the total value of the securities can be expressed as the sum of the capitalized values of the return on each class of security, that is:

$$V_T = V_S + V_D$$

which simplifies to:

$$V_T = \frac{D}{K_e} + \frac{I}{K_i} \qquad (4\text{-}13)$$

where:

V_S is the total market value of equity

V_D is the total market value of debt

K_i is the debt capitalization rate and again

K_e is the equity capitalization rate.

The relationship between Equations (4-12) and (4-13) can be clarified by solving Equation (4-12) for K_o, which gives:

$$(4\text{-}14) \qquad K_o = \frac{D+I}{V_T}$$

However, the dividends are equal to the equity capitalization rate times the market value of equity and the interest is equal to the debt capitalization rate times the market value of debt, that is:

$$D = K_e V_S$$

$$I = K_i V_D$$

Substituting these values into Equation (4-14) yields:

$$(4\text{-}15) \qquad K_o = \frac{K_e V_S + K_i V_D}{V_T}$$

Equation (4-15) therefore illustrates that the average capitalization rate is the weighted average of the capitalization rates of the component securities.

Equations (4-12), (4-13) and (4-14) can be easily expanded to include other forms of financing, such as preferred shares as well as debt. The resultant expressions are as follows:

$$(4\text{-}16) \qquad V_T = \frac{D+I+P}{K_o}$$

where P is the dividends on preferred shares, and

$$(4\text{-}17) \qquad V_T = \frac{D}{K_e} + \frac{I}{K_i} + \frac{P}{K_p}$$

where K_p is the preference share capitalization rate

($K_p = P/V_p$) where V_p is the total market value of preferred shares) and

$$(4\text{-}18) \qquad K_o = \frac{D+I+P}{V_T}$$

Since the preference dividends are equal to the preference capitalization rate times the market value of preferred shares i.e., $P = K_p V_p$, then following the introduction of preferred financing Equation (4-15) becomes:

$$(4\text{-}19) \qquad K_o = \frac{K_e V_S + K_i V_D + K_p V_p}{V_T}$$

Relaxing the assumption of constant perpetual returns causes only modest changes in the equations for the determination of K_o, however Equation (4-19) will not be affected at all. The techniques for measuring the various components of the average capitalization rate are discussed later in this chapter.

D] <u>THE INDEPENDENT VARIABLES</u>

1) <u>Leverage</u>

Given estimates of both the equity and average capitalization rates, it is possible to test for the effects of leverage by regressing these rates on the ratios of senior securities (debt and preferred) to ordinary equity and senior securities to total value (debt, preferred and equity) respectively, that is:

$$(4\text{-}20) \qquad K_e = a_o + a_1 \frac{V_D}{V_S}$$

$$(4\text{-}21) \qquad K_o = a_o + a_1 \frac{V_D}{V_T}$$

By comparing the coefficients of a_1 with the values they are expected to have under the various leverage theories, it should be possible to evaluate the results. In order to present conclusive evidence on capital structure effects, the statistical evidence must distinguish between the traditional and the net operating income theories, as well as between the net income and the net operating income theories.

It is useful at this point to summarize, algebraically, the relationships between both the equity and average capitalization rates with leverage as specified by each of the three (net income, net operating income and traditional) theories. Commencing with the equity capitalization rate, given the general function:

$$K_e = a + b \frac{V_D}{V_S}$$

Equations (1-3), (1-5) and (1-14) can be used to interpret the regression results. The differences among the theories arise in the values specified for b, the slope of the equity capitalization rate-leverage function. These differences are shown in Table (4-2). Continuing with the average capitalization rate, given the general function:

$$K_o = a + b \frac{V_D}{V_T}$$

Equations (1-2), (1-7) and (1-12) can be used to interpret the regression results. As the the equity capitalization rates, the difference among the three theories arise in the value specified for b, the slope of the average

TABLE (4-2)

EQUITY CAPITALIZATION RATE-LEVERAGE RELATIONSHIPS IMPLIED BY ALTERNATIVE THEORIES OF CAPITAL STRUCTURE EFFECTS

	Without Taxes	With Taxes
Net Income	$b=0$	$b=0$
Modigliani and Miller	$b=(K_e^*-r)$	$b=(1-\tau)(K_e^*-r)$
Traditional or Intermediate	$0<b<(K_e^*-r)$	$0<b<(1-\tau)(K_e^*-r)$

where:

b is the slope of the equity capitalization rate-leverage function

K_e^* is the equity capitalization rate for non-levered firms in a given risk class

r is the interest rate on debt obligations

τ is the marginal corporate income tax rate

capitalization rate-leverage function. These differences are shown in Table (4-3). The relationships shown in Tables (4-2) and (4-3) provide a basis for interpreting the regression results and discriminating among the three theories of capital structure effects.

However, Equations (4-20) and (4-21) do not provide for the curvlinear relationships presumed by the traditional theory and illustrated in Figure (1-1). Therefore, it is necessary to add second-degree terms to Equations (4-20) and (4-21) to allow for the proper description of the

TABLE (4-3)

AVERAGE CAPITALIZATION RATE-LEVERAGE RELATIONSHIPS IMPLIED BY ALTERNATIVE THEORIES OF CAPITAL STRUCTURE EFFECTS

	Without Taxes	With Taxes
Net Income	$b=(K_o^*-r)$	$b=(K_o^*-r)$
Modigliani and Miller	$b=0$	$b=\tau(K_o^*-r)$
Traditional	$(K_o^*-r)<b<0$	$(K_o^*-r)<b<\tau(K_o^*-r)$

where:

b is the slope of the average capitalization rate-leverage function

K_o^* is the average capitalization rate for non-levered firms in a given risk class

traditional theory, after which the regression equations will appear as follows:

$$(4\text{-}22) \qquad K_e = a_o + a_1 \frac{V_D}{V_S} + a_2 \left[\frac{V_D}{V_S}\right]^2$$

$$(4\text{-}23) \qquad K_o = a_o + a_1 \frac{V_D}{V_S} + a_2 \left[\frac{V_D}{V_T}\right]^2$$

The coefficient of the second-degree term should be significant only under the traditional theory. Both the indifference theory and the modified indifference theory call for linear relationships.

Because of the general, tax-induced insignificance of preferred shares as a means of financing industrial firms in Australia, no attempt will be made to test for its effect of the equity and average capitalization rates, but, in an effort to separate out the effects of preference and debt leverage as against senior securities (debt plus preferred) leverage, allowances are made for the effects of existent preference shares in the sample firms, as shown by Equations (4-24) and (4-25) as follows:

$$(4\text{-}24)\qquad K_e = a_o + a_1\left[\frac{V_D}{V_S}\right]^2 + a_3\,\frac{V_p}{V_S} + a_4\left[\frac{V_p}{V_S}\right]^2$$

$$(4\text{-}25)\qquad K_o = a_o + a_1\,\frac{V_D}{V_T} + a_2\left[\frac{V_D}{V_T}\right]^2 + a_3\,\frac{V_p}{V_T} + a_4\left[\frac{V_p}{V_T}\right]^2$$

2) <u>Retention</u>

To test for the effects of retention, it is necessary to add a variable to allow for differences in retention rates among firms. The traditional theory, that current dividends are more important than reinvested earnings, seems to suggest a linear relationship between both the equity and average capitalization rates and the retention rate. Since the presumed relationship is not clearly defined in the literature, a second-degree term will be added to allow for a curvilinear relationship, resulting in the following expanded regression equations (where RN represents the retention rate):

$$(4\text{-}26)\qquad K_e = a_o + a_1\,\frac{V_D}{V_S} + a_2\left[\frac{V_D}{V_S}\right]^2 + a_3RN + a_4RN^2$$

$$(4\text{-}27)\quad K_o = a_o + a_1 \frac{V_D}{V_T} + a_2 \left[\frac{V_D}{V_T}\right]^2 + a_3 RN + a_4 RN^2$$

$$(4\text{-}28)\quad K_e = a_o + a_1 \frac{V_D}{V_S} + a_2 \left[\frac{V_D}{V_S}\right]^2 + a_3 \frac{V_p}{V_S} + a_4 \left[\frac{V_p}{V_S}\right]^2 + $$

$$+ a_5 RN + a_6 RN^2$$

$$(4\text{-}29)\quad K_o = a_o + a_1 \frac{V_D}{V_T} + a_2 \left[\frac{V_D}{V_T}\right]^2 + a_3 \frac{V_p}{V_T} + a_4 \left[\frac{V_p}{V_T}\right]^2 + $$

$$+ a_5 RN + a_6 RN^2$$

If the dividend indifference hypothesis is valid not only will coefficients a_3 and a_4 but also a_5 and a_6 approximate zero; if the dividend indifference hypothesis is not valid, either a_3 and/or a_4 or a_5 and/or a_6 will be significantly greater than zero.

3) <u>Corrective Variables (Size, Industry and Business Risk)</u>

Equations (4-26), (4-27), (4-28) and (4-29 are adequate to test the leverage and dividend indifference hypotheses if there are no systematic errors in the estimation of the dependent variables. However, both the equity and average capitalization rates may be expected to vary with, the size of the firm, the industry classification of the firm and the basic business risk of the firm. In order to take account of these factors it is necessary to add the appropriate variables to the regression equations presented above. However, prior to presenting the complete regression equations let us examine the three corrective variables in more detail.

It is frequently contended that both the equity and debt capitalization rates (and consequently the average capitalization rate) of small firms are greater than those of large firms. The reasons given for this behaviour are best summarised by Brigham and Smith as,

> "First of all, as firm size increases, the risk position of the firm should improve, as does the liquidity of firm ownership. These aspects tend to lower the rate of return required by investors. In addition, when debt financing is employed, large firms are usually able to get it at a lower rate of interest. Furthermore, when new external equity is acquired, the associated flotation costs favour large issues, those which would typically be placed by large firms."(16)

While good evidence exists that the debt capitalization rate varies with the size of the firm, information on the influence of firm size on the equity capitalization rate is both scarce and fragmented. On the one hand, Miller and Modigliani in their study on the cost of capital in the electric utility industry concluded that firm size played a negligible role in the determination of equity cost. The weight to be placed on their conclusion however has to be tempered by the fact that Miller and Modigliani chose as their sample the larger of the utilities so as to, "avoid having to find valuations for many small companies whose securities are not widely held or actively traded."(17) Further support for the Miller and Modigliani position

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16. Eugene F. Brigham and Keith V. Smith, "Cost of Capital to the Small Firm", Engineering Economist, 13 (Fall 1967), 23.

17. Miller and Modigliani, "Some Estimates of the Cost of Capital . . .", *op. cit.*, 334.

though was provided by Archer and Faerber[18] in their study of the manufacturing industry where they also found that the size of the firm had no significant impact on its equity cost. However, more recently Alberts and Archer[19] have provided evidence of the existence of a negative relationship between firm size and the variability of returns of industrial firms. Using this evidence as a base, they extend their results to conclude that, the equity capitalization rate must be higher for smaller firms. The Alberts and Archer study is not free from criticism either, for Goudzwaard has commented that,

> "If in a subsequent study the authors could test differences in K_e among firms in the same industrial classification and could hold constant the effect of financial leverage, then I think we could be more confident in asserting that size difference alone result in higher costs of equity for small firms."(20)

As a result of the controversy surrounding the impact of firm size on the equity capitalization rate a size variable is added to allow for this possibility.

The shortcomings of industry classification as a measure of business risk was discussed in Chapter 2.

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18. Stephen H. Archer and Le Roy G. Faerber, "Firm Size and the Cost of Equity Capital", Journal of Finance, 21 (March 1966), 69-84.

19. William W. Alberts and Stephen H. Archer, "Some Evidence on the Effect of Company Size on the Cost of Equity Capital", Journal of Financial and Quantitative Analysis, 8 (March 1973), 229-42.

20. M.B. Goudzwaard, "Comment: Some Evidence on the Effect of Company Size on the Cost of Equity Capital", Journal of Financial and Quantitative Analysis, 8 (March 1973), 245.

Nevertheless, industry classification is not irrelevant. Industry factors are believed to have a major impact on the security prices of all firms in an industry. King,[21] for example, found that the typical share has about 50 per cent of its variance explained by an element of price change that affects the whole market and that about 25 per cent of the remaining variance was explained by factors that affect the entire industry. Since our analysis is being conducted on groups of firms containing more than one industry, it was decided to add dummy variables to allow for possibly consistent industry differences. The coefficients of the dummy variables, where significant shift the intercept of the regression equation for each industry.

The importance of holding constant the basic business risk of a firm in an empirical analysis attempting to determine the relationship between the investor's required rate of return and financial risk was also discussed at some length in Chapter 2 and will not be repeated here. However, relying on the analysis presented in that chapter a business risk variable was added to the regression equation.

The addition of these three corrective variables resulted in the following complete regression equations:

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21. King, "Market and Industry Factors in Stock Price Behaviour", *op. cit.*

$$(4\text{-}30)\quad K_e = a_o + a_1 \frac{V_D}{V_S} + a_2 \left[\frac{V_D}{V_S}\right]^2 + a_3 RN + a_4 RN^2 + $$
$$+ a_5 S + a_6 \cdots_{15} ID + a_{16}\ BR$$

$$(4\text{-}31)\quad K_o = a_o + a_1 \frac{V_D}{V_T} + a_2 \left[\frac{V_D}{V_T}\right]^2 + a_3 RN + a_4 RN^2 + $$
$$+ a_5 S + a_6 \cdots_{15} ID + a_{16}\ BR$$

$$(4\text{-}32)\quad K_e = a_o + a_1 \frac{V_D}{V_S} + a_2 \left[\frac{V_D}{V_S}\right]^2 + a_3 \frac{V_p}{V_S} + a_4 \left[\frac{V_p}{V_S}\right]^2 + $$
$$+ a_5 RN + a_6 RN^2 + a_7 S + a_8 \cdots_{17} ID + a_{18} BR$$

$$(4\text{-}33)\quad K_o = a_o + a_1 \frac{V_D}{V_T} + a_2 \left[\frac{V_D}{V_T}\right]^2 + a_3 \frac{V_p}{V_T} + a_4 \left[\frac{V_p}{V_T}\right]^2 + $$
$$+ a_5 RN + a_6 RN^2 + a_7 S + a_8 \cdots_{17} ID + a_{18} BR$$

where:

K_e is the equity capitalization rate

K_o is the average capitalization rate

V_D is the market value of senior securities (In Equations (4-30) and (4-31) V_D includes V_p)

V_p is the market value of preferred securities

V_S is the market value of equity

V_T is the market value of all securities

RN is the retention rate

S is the size of the firm

ID is the industry dummy variable (there is a dummy variable for each industry except one)

BR is the business risk of the firm.

The equity and average market capitalization rates were calculated by using the following formulaes:

$$(4\text{-}34)\quad P_o = \frac{D_o(1+g_s)}{(K_e-g_s)} - \frac{D_o(1+g_s)(1+g_s)^N}{(K_e-g_s)(1+K_e)^N} + \frac{D_o(1+g_s)^N(1+g_n)}{(K_e-g_n)(1+K_e)^N}$$

$$(4\text{-}35)\quad E(R_i) = R_f + [E(R_m)-R_f]RI_i$$

$$(4\text{-}36)\quad E(R_i) = R_f + [E(R_m)-R_f]\beta_i$$

$$(4\text{-}37)\quad K_o = \frac{K_iV_D + K_pV_p + K_SV_S}{V_T}$$

where:

P_o is the value of a share of equity at time 0

D_o is the dividend per share at time 0

g_s is the rate of growth in dividends per share for N periods

g_n is the rate of growth in dividends per share from the N^{th} period to infinity

N is the investor's dividend growth horizon

$E(R_i)$ is the investor's required rate of return (equity capitalization rate) for the i^{th} security

R_f is the risk-free rate of interest

$E(R_m)$ is the expected return for the market portfolio

RI_i is the risk-index coefficient for the i^{th} security

β_i is the beta coefficient for the i^{th} security

K_i is the debt capitalization rate

K_p is the preference capitalization rate.

Equations (4-30), (4-31), (4-32) and (4-33) satisfactorily test for the effects of leverage, retention and size on both the equity and average capitalization rates where business risk is included as a variable. However, to test whether the effects of these variables are partially a function of the level of business risk, the following regression equations are used:

$$(4\text{-}38)\quad K_e = a_o + a_1 \frac{V_D}{V_S} + a_2 \left[\frac{V_D}{V_S}\right]^2 + a_3 RN + a_4 RN^2 + + a_5 S + a_{6 \cdots 15} ID$$

$$(4\text{-}39)\quad K_o = a_o + a_1 \frac{V_D}{V_T} + a_2 \left[\frac{V_D}{V_T}\right]^2 + a_3 RN + a_4 RN^2 + + a_5 S + a_{6 \cdots 15} ID$$

$$(4\text{-}40)\quad K_e = a_o + a_1 \frac{V_D}{V_S} + a_2 \left[\frac{V_D}{V_S}\right]^2 + a_3 \frac{V_p}{V_S} + a_4 \left[\frac{V_p}{V_S}\right]^2 + + a_5 RN + a_6 RN^2 + a_7 S + a_{8 \cdots 17} ID$$

$$(4\text{-}41)\quad K_o = a_o + a_1 \frac{V_D}{V_T} + a_2 \left[\frac{V_D}{V_T}\right]^2 + a_3 \frac{V_p}{V_T} + a_4 \left[\frac{V_p}{V_T}\right]^2 + + a_5 RN + a_6 RN^2 + a_7 S + a_{8 \cdots 17} ID$$

The techniques for measuring the various components of the regression equations are examined in the next section of this chapter.

E] THE MEASUREMENT OF THE VARIABLES

1) The Market Price per Share (P_o) and the Market Value of Equity (V_S)

The market price per share, in the cross-section year, was measured as the simple average of the high-low price per share in that year, adjusted for capitalization changes. These adjusted prices were obtained from arrays 96-119 in the research file. The market value of the shares in the cross-section year, was computed by multiplying the market price per share by the simple average of the number of equivalent fully paid shares at the beginning and end of that year. The number of equivalent fully paid shares was obtained from array 53 in the research file.

Both the market price and the equivalent number of fully paid shares on issue measures are approximations; the simple average of the high-low prices has been used by a number of researchers in the area. The question of how closely the average of yearly high-low prices approximates the "true" average of price throughout the year has been examined by Edwards and Hilton. They concluded that,

> ". . . although the differences between the two calculations of average price may be rather large for some stocks, on the average the yearly high-low average prices of widely held common stocks are not seriously different from the averages of their prices throughout the year."[22]

However, in an extended study utilizing Australian share prices, Castagna, Henderson and van der Mye[23] examined four alternative procedures commonly adopted in deriving a measure of a firm's "normalised" market price. The study showed that, the sampling method employed in determining a firm's "normalised" market price introduces a bias, which

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22. C.E. Edwards and J.G. Hilton, "A Note on the High-Low Price Averages as an Estimator of Annual Average Stock Prices", Journal of Finance, 11 (March 1966), 112-15.

23. Anthony D. Castagna, Douglas L. Henderson and Walter S. van der Mye, "Share Prices in Empirical Testing - The Australian Experience: 1963-1972", Forthcoming Paper, Department of Finance, University of N.S.W.

would not be serious, except for the finding that the bias is inconsistent over time and is strongly related to the years selected. Since the simple average of the high-low share prices are apt to be distorted by sharp, short-lived price rises or declines, the share price charts for each firm were examined (monthly bar charts) for extraordinary price behaviour. No such behaviour was detected for the sample firms. Furthermore, the simple average of the number of equivalent fully paid shares is only an approximation of the shares outstanding during the year.

2) Dividend Growth Rates (g_s,g_n) and the Dividend in the Cross-Section Year (D_o)

The expected rate of growth in dividends is not directly observable and hence must be estimated. The estimating procedure adopted in this dissertation was to extrapolate the past rates of growth (g_s) over two finite periods (N) - (a) five years and (b) ten years - and then assume growth from the finite horizon to infinity at some "normal" rate (g_n). This approach was considered reasonable since by the sample selection process the firms on which the analysis is being conducted exhibit reasonably stable patterns of past growth. In selecting such an estimating process it was assumed that the variation between a firm's past growth and the markets expectations for future growth would be random. If the projected growth rates are consistently too high or too low throughout the sample, the regression results will be subject to the same type of indeterminate bias as was discussed in Chapter 2 with regard to the use of the earnings:price ratio as a dependent variable.

The method used to calculate the past rate of growth in dividends for each firm was to fit a trend line of the form shown in Equation (4-42) below to the actual observations of dividends per share for the 5 year period ending in the cross-section year.

(4-42) $$X = a_e^{bt}$$

where:

X is the adjusted dividends per share

t is the time period in which the dividend is paid

e is the base of natural logarithms and

a and b are constants to be determined such that they best fit the observed series of X values.[24]

The average annual growth rate is then:

(4-43) $$g_s = 100(e^b - 1)\%$$

Once the past rates of growth (or decline) have been determined, these are extrapolated over the two finite periods (N) of 5 and 10 years. These periods were chosen as they are the ones most commonly suggested for use in this area. However, prior to proceeding with these two periods, other values for N were tested and in no instances did the other values provide more stable realistic values

24. The 'best' values of 'a' and 'b' are those which minimize the sum of the weighted squares of the deviations of the logarithms of the observed values from the logarithmic trend line

$$\log(X) = \log(a) + bt$$

The weights used are the X values themselves. This procedure compensates for the tendency of the logarithmic transformation to under-rate the importance of the larger X values in the fitting criterion. A discussion of this technique will be found in E.S. Keeping, Introduction to Statistical Inference (D. Van Nostrand and Company, Inc., Princeton, N.J., 1962), Chapter 12.

of K_e than the ones suggested in the literature (i.e. 5 and 10). Finally on the question of growth, in considering a value for the rate of growth in dividends after the finite horizon (g_n) several alternative values were considered. These values should reflect the expected rate of growth for the economy in general, going on past experience the final value selected for g_n was 4.5%.

Dealing with the question of the dividend in the cross-section years (D_o), this was taken to be a "normalised" dividend per share and was measured as the last observation from the logarithmic regression of dividends per share on time over the 5 year period ending in the cross-section year.

In the above calculations the dividend per share values were obtained from array 92 of the research file.

3) The Risk Index Coefficient (RI_i)

An investors equity risk can be measured by the likelihood that he will be able to sell his shares tomorrow (dividends included) at to-days price. Thus, if a firm's share price is expected to change very little, the investor's risk will be small; the converse risk for an individual firm is its share prices average volatility. The 'Risk Index' then is, the ratio of the average volatility of a firm's share price to the average volatility of the market as a whole. Several different measures of volatility have been suggested in the literature,[25] the measure adopted

[25] George E. Pinches and William R. Kinney, Jnr., "The Measurement of the Volatility of Common Stock Prices", Journal of Finance, 26 (March 1971), 119-25.

for use in this thesis was the variance. Equations (4-44) and (4-45) show how the volatility of an individual firm's share price (V_i) and that of the market as a whole (V_m) were calculated:

$$(4\text{-}44) \qquad V_i = \sum_{t=1}^{N} (P_t - \overline{P})^2/N$$

$$(4\text{-}45) \qquad V_m = \sum_{t=1}^{N} (AO_t - \overline{AO})^2/N$$

where:

P_t is the adjusted month-end price for a sub-period of time

$\overline{P}$ is the arithmetic mean of the adjusted month end prices over the period

AO_t is the value of the market index for a sub-period of time (the market index used was <u>The All Ordinaries Index</u>)

$\overline{AO}$ is the arithmetic mean of the market index over the period and

N is the number of sub-periods, which in this thesis is equal to 60.

The 'Risk Index' can now be represented by Equation (4-46):

$$(4\text{-}46) \qquad RI_i = \frac{V_i}{V_m}$$

4) <u>The Beta Coefficient (β_i)</u>

An individual firm's beta coefficient may be obtained from its characteristic line, that is, the line describing the period-by-period interaction between the rates of change in some market index (r_{mt}). The characteristic line can be represented as follows:

$$r_{it} = \alpha_i + \beta_i r_{mt} + e_t$$

Given that the past relationship between returns on the i^{th} security and those of the market can be used as a proxy for the future, β_i is calculated by regressing the actual return on the i^{th} security against the actual return for the market index. The procedure used in calculating the market return in any time period is shown by Equation (4-47) as follows:

$$r_{mt} = \frac{AO_{t+1} - AO_t}{AO_t} \qquad (4\text{-}47)$$

where:

AO_{t+1} is the value of the index at the end of period t and

AO_t is the value of the index at the beginning of period t (the market index used was again The All Ordinaries Index).

Because dividends are excluded in the All Ordinaries Index, the period-by-period rates of change in the market index will be downward biased estimates of the average returns available in the market. The procedure used in calculating an individual securities return in any time period is shown by Equation (4-48) as follows:

$$r_{it} = \frac{P_{t+1} - P_t}{P_t} \qquad (4\text{-}48)$$

where:

P_t is the market price for the i^{th} security at the beginning of the period and

P_{t+1} is the market price for the i^{th} security at the end of the period.

Normally an individual securities returns would be calculated as follows:

$$r_{it} = \frac{D_t - P_{t+1} - P_t}{P_t}$$

where:

P_t and P_{t+1} are the same as defined above and

D_t is the cash dividend in period t.

However, in order to keep the calculation of an individual securities return on par with that of the market return the procedure shown in Equation (4-48) was followed.[(26)] The beta coefficients for each firm were calculated based on the monthly rates of return for the 60 months prior to the cross-section year. The prices used in calculating the individual firms rates of return were the monthly adjusted end prices and were obtained from arrays 120-131 of the research file.

5) <u>The Senior Securities (V_D,V_p) and their Rates of Return (K_i,K_p)</u>

Conceptually, the market values and rates of return for senior securities offer little difficulty. However, measurement of these values in the market proved quite difficult, for about two-thirds of the debt and about

26. William F. Sharpe and Guy M. Cooper, "Risk-Return Classes of New York Stock Exchange Common Stocks: 1931-1967", <u>Financial Analysts Journal</u> (March-April 1972), 46-54 and 81 have referred to the beta coefficient determined on the bases of Equations (4-47) and (4-48) as the 'Market Sensitivity' coefficient.

one-half of the preferred shares for the sample firms were not traded frequently and as a result it was difficult to determine an accurate measure of their value. Therefore, book values were used in place of market values for both debt and preferred. The measure of debt was taken to be, total non-trading debt; array 28 of the research file, which contains both long-term (secured and unsecured) debt and short-term (secured and unsecured) debt plus bank bank overdraft, array 19 of the research file.[27] The measure of preferred was taken to be issued preferred capital; array 4 of the research file.

Additionally, since a large proportion of senior securities were rarely traded, the determination of market rates of return was difficult, and furthermore, nominal interest rates on debt were rarely published in firm annual reports. As a result whenever possible, the market rates of return on actively traded senior securities were used, otherwise the nominal rates of return were used when available from firm reports or stock exchange bulletins; in the remaining cases, rates typical for the type of security were used.

For the first four cross-section years, 1967-1970, the use of book values and (for want of a better word) approximated rates of return did not appear to cause any appreciable measurement errors since the interest rates

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27. Bank overdraft has been included in the measure of debt because even though traditionally banks have regarded an overdraft as a short-term loan to finance current asset needs, in practice, it is frequently used to finance longer-term investments and this practice has met with bank approval.

were fairly stable and the nominal rates of return were generally quite close to the market rates of return. In 1971, however, the market rates of return began rising and in 1972 they were significantly higher than they had been in 1967. The measurement errors implied by this occurrence unlike other measurement errors (such as the measurement error in the value of equity) are not random but consistent. The net effect for 1972 would be to exert a slight downward bias on the average capitalization rate and a somewhat greater upward bias on the leverage variable. These biases must be remembered when interpreting the results for 1972. For 1971, the bias is generally lessened and for 1967-1970 it is essentially non-existent due to the close correspondence between the market and nominal rates of return.

6) The Risk-Free Rate of Interest (R_f) and the Marginal Corporate Tax Rate (τ)

Whilst the risk-free rate of return is easily identified conceptually, the measurement of this rate in a market context is quite troublesome. The difficulty arises because of the numerous issues of government securities, with each issue being characterised by a different maturity date, e.g. Treasury notes (120 days), 2 year bonds, 10 year bonds and 20 year bonds. It was finally decided that the risk-free rate of return was best approximated by the rate of return on 2 year bonds. The decision rested on the fact that this rate appeared to be the prime determiner of share price movements. The values of the 2 year bond rate used were; 1967 - 4.55%; 1968 - 4.82%; 1969 - 5.02%; 1970 - 6.07%; 1971 - 5.85%;

1972 - 4.91%, these values were the average of the 12 monthly rates for each year.

Measuring the marginal rate of corporate tax provided no difficulties as it is given in 'The Rating Act' and the values were; 1967 - 42.5%; 1968 - 45.0%; 1969 - 47.5%; 1970 - 47.5%; 1971 - 47.5%; 1972 - 47.5%.

7) Retention (RN)

The retention rate was measured by dividing the normalized retained earnings per share (i.e., normalized earnings per share minus normalized dividends per share) by the normalized earnings per share, where the normalized earnings per share is given as the last observation from the logarithmic regression of adjusted earnings per share; array 94 of the research file, on time over the five-year period ending in the cross-section year. The normalized earnings were used rather than the actual earnings in order to keep the measurement of retention consistent with the measurement of growth.

8) Size (S)

A wide variety of measures may be utilised to illustrate the size of a firm, including book value of total assets, book value of net assets, sales, stock-market valuation and employment. Hart,[28] in a discussion of alternative measures of the size of firms has illustrated the high degree of correlation between various measures, and

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28. P.E. Hart, Studies in Profit, Business Saving and Investment in the U.K. 1920-1962 (Allen and Unwin, London, Volume 1, 1965).

concluded that often the choice of measure can depend largely on convenience, availability and ease of calculation. In this thesis firm size was measured as the logarithm of total assets averaged between the beginning and end of the year; the logarithm of array 49 of the research file. This measure was chosen to reduce the impact upon the variable-size of the firm due to the fact that a significant number of firms were leasing some of their facilities.

9) <u>Business Risk (BR)</u>

Following the principle established with the measurement of dividend growth, it was assumed that the variability of past operating earnings would serve as an indication of the variability of future operating earnings. The justification for adopting this approach is well bought out by Wippern who comments that, "A measure of the cyclical variability of past earnings is the most widely-used basis from which inferences are drawn regarding the uncertainty of the receipt of future earnings."[29]

By taking a measure of operating earnings per share over some time period and performing a logarithmic regression against time for each firm in the sample, a comparable measure of operating earnings variability which can be used as a surrogate of business risk can be derived. If the income data are not transformed into logarithmic firm, a firm with a very favourable growth trend in operating

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29. Wippern, "A Note on the Equivalent Risk Class Assumption", *op. cit.*, 14.

earnings would exhibit a wide variability in relation to a firm which has had very little growth over the same period of investigation. Any bias, either for or against growth in earnings, is considerably reduced by log-trend regression.

A stream of earnings is desired which will reflect the earnings of the firm before it meets any of its financing charges. Financial literature has commonly used earnings before interest and taxes (EBIT) as the relevant stream of income for this purpose. It is also thought that, as firms use several methods of depreciating assets, and because depreciation is a major non-cash expense, a measure of earnings before depreciation and taxes would be more relevant in influencing the financing pattern of the firm. Hence, the measure of operating earnings which will be used in this thesis is that of earnings before interest and taxes; array 61 of the research file; plus notional interest adjustment; array 70 of the research file;/marginal tax rate all divided by the number of equivalent fully paid shares; array 53 of the research file.

The measure of variability of operating earnings is calculated as the annual percentage of the standard deviation of observed points about the logarithmic trend line, $X=ae^{bt}$. Thus if

$$S = \sqrt{\frac{[\log(X)-\log(a)-bt]^{t}}{N}}$$

then the business risk is:

(4-49) $$BR = 100(e^{S}-1)\%$$

In determining BR, the operating earnings per share values are those in the 5-year period ending in the cross-section year.

When investigating whether the effects of the financial variables on the cost of capital are partially a function of the level of business risk, four business risk groupings were established as follows, after the business risk values were calculated, the numerical values were ranked in a rising sequence. Based on this ranking, firms were divided into quartiles, the firms in the top quartile (i.e., those with the highest business risks) were considered to be in group 4 at the time of classification. The firms in the next lowest quartile were considered to be in group 3, etc.

F] CONCLUSIONS

At the commencement of this chapter the three deficiencies of the prior empirical research discussed in Chapter 2 were mentioned. The following sections described the empirical models to be used including the measurement techniques adopted in an endeavour to help overcome these deficiencies. The next chapter analyzes the results of the empirical testing carried out using the models developed in this chapter.

CHAPTER 5

THE EMPIRICAL RESULTS

"No amount of experimentation can ever prove me right, one experiment at any time may prove me wrong."

Einstein

A] ANALYSIS OF RESULTS USING RISK AS A VARIABLE

As the first phase of the analysis, regressions were run for each of the six cross-section years (1967-1972), with all four risk groups combined, therefore the risk measure was included as a variable. The equations used in the initial analysis are as follows:

$$(5\text{-}1)\quad K_e = a_o + a_1 \frac{V_D}{V_S} + a_2 \left[\frac{V_D}{V_S}\right]^2 + a_3 RN + a_4 RN^2 + a_5 S + a_{6\cdots15} ID + a_{16} BR$$

$$(5\text{-}2)\quad K_o = a_o + a_1 \frac{V_D}{V_T} + a_2 \left[\frac{V_D}{V_T}\right]^2 + a_3 RN + a_4 RN^2 + a_5 S + a_{6\cdots15} ID + a_{16} BR$$

$$(5\text{-}3)\quad K_e = a_o + a_1 \frac{V_D}{V_S} + a_2 \left[\frac{V_D}{V_S}\right]^2 + a_3 \frac{V_p}{V_S} + a_4 \left[\frac{V_p}{V_S}\right]^2 + a_5 RN + a_6 RN^2 + a_7 S + a_{8\cdots17} ID + a_{18} BR$$

$$(5\text{-}4)\quad K_o = a_o + a_1 \frac{V_D}{V_T} + a_2 \left[\frac{V_D}{V_T}\right]^2 + a_3 \frac{V_p}{V_T} + a_4 \left[\frac{V_p}{V_T}\right]^2 + a_5 RN + a_6 RN^2 + a_7 S + a_{8\cdots17} ID + a_{18} BR$$

where:

K_e is the equity capitalization rate

K_o is the average capitalization rate

V_D is the market value of senior securities (In Equations (4-1) and (4-2) V_D includes V_p)

V_p is the market value of preferred securities

V_S is the market value of equity

V_T is the market value of all securities (i.e., $V_r=V_S+V_D$ or alternatively $V_T=V_S+V_D+V_p$)

RN is the retention rate

S is the size of the firm

ID is the industry dummy variable (there is a dummy variable for each industry except one)

BR is the business risk of the firm.

Tables (5A-1) to (5A-16) inclusive present the regression coefficients based on the results obtained from running Equations (5-1) to (5-4) inclusive, with Tables (5A-1) to (5A-4) inclusive relating to Equation (5-1), Tables (5A-5) to (5A-8) inclusive relating to Equation (5-2). Tables (5A-9) to (5A-12) inclusive relating to Equation (5-3) and Tables (5A-12) to (5A-16) inclusive relating to Equation (5-4) respectively.[1]

With regard to Tables (5A-1) to (5A-16) inclusive the first point of note is the lack of year-to-year variation in the size and sign of the regression coefficients, this

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1. There are four tables for each equation, due to the existence of the four measures for the equity capitalization rate - see Chapter 3 for the appropriate formulaes. All regression tables are presented in Appendix 5.

is no doubt due to the care with which the firms were selected for the analysis and the standardization procedures which were initiated in an effort to ensure that the data inputted into the analysis was comparable on both a firm-to-firm and year-to-year basis. Furthermore, the analysis of variance for the regression models indicated that a significant ($p<0.01$) proportion of variance was explained in each case, although the coefficients of multiple determination ($\overline{R}^2$) were only moderate; a fact due no doubt to a large extent to the difficulties of measuring expectational concepts of risk and growth when using historical data. Additionally, the values of the constant, a_o are highly significant for each year, regardless of the manner in which the K's were computed. This is to be expected since the constants are estimates of the equity and average capitalization rates with the effects of leverage, retention and the corrective variables removed and such values will be significantly different from zero.

The values of the a_1 and a_2 coefficients (both signs and magnitudes) i.e., the measure of the effect of leverage, clearly refute both the extreme net income and net operating income valuation theories. Tables (5A-1) to (5A-4) inclusive and (5A-9) to (5A-12) inclusive all reveal an increasing relationship between the equity capitalization rate and leverage, while Tables (5A-5) to (5A-8) inclusive a nd (5A-13) to (5A-16) inclusive all reveal a decreasing relationship between the average capitalization rate and leverage. The principal task here, however, is to extend the analysis so that the evidence can be used to discriminate between the Modigliani and Miller and the Intermediate or Traditional view of capital structure effects. As was shown in Tables (4-2) and (4-3) this distinction is dependent upon the ability to specify the yield differentials between either or both the equity and average capitalization rates for non-levered firms with the interest rates on debt obligations. However, it is extremely difficult to determine precise estimates of the differentials on which the interpretations depend, mainly due to the fact that estimates of both the equity and average capitalization rates for non-levered firms are difficult to establish. One basis for estimation is to use the intercepts of the regression equations, a_o, derived from the empirical tests. As mentioned previously these intercepts will reflect the level of the capitalization rates with the effects of leverage, retention and the corrective variables removed. Therefore, to the extent that the independent variables have been correctly selected and the past magnitudes are accurate proxies for the expected future values of those variables, the intercepts may be regarded as valid estimates of the required capitalization rates.

It was shown in Tables (4-2) and (4-3) that to support the Modigliani and Miller thesis given tax effects, the observed equity and average capitalization rate-leverage coefficients, must be equal to the magnitudes $(1-\tau)(K_e^*-r)$ and $\tau(K_o^*-r)$ respectively. Whereas, observed equity coefficients less than $(1-\tau)(K_e^*-r)$ but greater than zero and observed average coefficients less than $\tau(K_o^*-r)$ but greater than (K_o^*-r) would support the intermediate or traditional view of leverage effects. The relationships between the predicted and observed leverage coefficients are shown in Tables (5-17) and (5-18). Table (5-17 shows the relationships based on the data from Tables (5A-1) to (5A-8) inclusive, whereas Table (5-18) shows the relationships based on the data from Tables (5A-9) to (5A-16) inclusive.

Examination of Tables (5-17) and (5-18) reveals that the values of the observed coefficients (a_1) obtained from Equations (5-1) to (5-4) inclusive, of both the equity and average capitalization rates for all the six cross-section years are respectively below and above the values predicted by the Modigliani and Miller theory, in many cases by wide margins. These results provide quite clear and strong support for the intermediate or traditional theory of capital structure effects, that is, they confirm that there are advantages over and above the tax deductibility of interest when employing fixed commitment financing. Moreover, there is suggestion of a U-shaped schedule of the cost of capital, since the leverage-squared coefficients are consistently positive in sign and significant, although only at low levels. These results coincide with the traditional position that there is an optimal capital structure. A further point regarding the optimal capital structure, that is, that structure minimising the cost of capital, is that it can be calculated from the leverage coefficients as follows, $a_1/2a_2$. If the leverage coefficients have been well estimated by the empirical model

TABLE (5-17)

RELATIONSHIP BETWEEN PREDICTED AND OBSERVED DEBT LEVERAGE COEFFICIENTS - AGGREGATE ANALYSIS

Leverage Coefficients		1967	1968	1969	1970	1971	1972
K_e^*	DVM	10.540	9.706	9.459	11.228	11.814	9.882
$(1-\tau)(K_e^*-r)$	DVM	3.444	2.659	2.330	2.707	3.131	2.610
a_1	DVM	1.701	1.231	1.185	1.483	1.599	1.537
K_e^*	DVM	10.548	9.229	9.285	10.468	10.845	9.463
$(1-\tau)(K_e^*-r)$	DVM	3.448	2.424	2.239	2.308	2.622	2.379
a_1	DVM	1.965	1.284	0.973	1.100	1.206	1.115
K_e^*	RIM	10.401	9.081	9.850	11.699	12.382	10.388
$(1-\tau)(K_e^*-r)$	RIM	3.364	2.343	2.535	2.955	3.429	2.875
a_1	RIM	1.824	1.246	1.082	1.524	1.786	1.598
K_e^*	CPM	9.629	9.868	9.139	11.506	12.045	10.055
$(1-\tau)(K_e^*-r)$	CPM	2.920	2.776	2.162	2.853	3.252	2.701
a_1	CPM	1.460	1.435	1.178	1.195	1.492	1.234
K_o^*	DVM	9.810	9.181	9.885	10.773	12.173	10.129
$\tau(K_o^*-r)$	DVM	2.235	1.962	2.310	2.233	3.003	2.479
a_1	DVM	3.624	3.070	3.395	3.484	4.603	3.470
K_o^*	DVM	9.840	9.705	9.752	11.574	11.165	9.694
$\tau(K_o^*-r)$	DVM	2.248	2.198	2.247	2.614	2.524	2.272
a_1	DVM	4.046	3.443	3.496	3.654	3.741	3.760
K_o^*	RIM	9.545	9.019	9.294	10.246	10.585	9.594
$\tau(K_o^*-r)$	RIM	2.122	1.889	2.030	1.983	2.249	2.224
a_1	RIM	3.911	2.972	3.167	2.923	3.248	3.433
K_o^*	CPM	10.778	9.999	9.831	10.547	10.898	9.594
$\tau(K_o^*-r)$	CPM	2.646	2.330	2.285	2.126	2.397	2.224
a_1	CPM	4.739	3.847	3.507	3.304	3.690	3.705

TABLE (5-18)

RELATIONSHIP BETWEEN PREDICTED AND OBSERVED DEBT LEVERAGE COEFFICIENTS - AGGREGATE ANALYSIS

Leverage Coefficients		1967	1968	1969	1970	1971	1972
K_e^*	DVM	9.976	9.175	9.803	10.181	10.139	9.681
$(1-\tau)(K_e^*-r)$	DVM	3.119	2.395	2.511	2.158	2.251	2.504
a_1	DVM	1.497	0.996	1.305	1.130	0.927	1.364
K_e^*	DVM	10.463	9.435	9.835	11.857	10.960	10.249
$(1-\tau)(K_e^*-r)$	DVM	3.399	2.538	2.527	3.038	2.682	2.802
a_1	DVM	1.760	1.466	1.475	1.254	1.075	1.232
K_e^*	RIM	9.456	9.096	9.742	10.238	12.258	10.236
$(1-\tau)(K_e^*-r)$	RIM	2.820	2.351	2.479	2.188	3.364	2.796
a_1	RIM	1.218	0.963	1.224	0.975	1.789	1.476
K_e^*	CPM	10.410	9.882	9.957	11.761	10.576	9.316
$(1-\tau)(K_e^*-r)$	CPM	3.369	2.784	2.591	2.987	2.481	2.313
a_1	CPM	1.819	1.380	1.432	1.272	1.332	1.080
K_o^*	DVM	9.828	9.063	9.384	10.375	12.109	9.302
$\tau(K_o^*-r)$	DVM	2.243	1.909	2.072	2.044	2.973	2.086
a_1	DVM	3.895	3.063	3.054	3.245	4.199	2.955
K_o^*	DVM	10.353	9.632	9.163	11.792	12.401	10.432
$\tau(K_o^*-r)$	DVM	2.466	2.165	1.976	2.717	3.111	2.622
a_1	DVM	4.183	3.633	3.173	4.177	4.972	4.147
K_o^*	RIM	10.282	9.131	9.154	11.415	12.140	9.323
$\tau(K_o^*-r)$	RIM	2.436	1.939	1.963	2.538	2.987	2.096
a_1	RIM	4.350	3.332	3.137	3.885	4.698	3.146
K_o^*	CPM	9.575	9.704	9.095	10.197	10.592	10.245
$\tau(K_o^*-r)$	CPM	2.144	2.197	1.935	1.960	2.252	2.534
a_1	CPM	3.955	3.843	3.215	3.272	3.082	3.638

then they should give a good approximation of the optimal capital structure. Table (5-19) gives the estimated optimal leverage ratios (V_D^*/V_T) derived by running Equations (5-2) and (5-4) together with the observed mean leverage ratios (V_D/V_T). The first group of estimated optimal leverage ratios are based on the leverage coefficients obtained from Tables (5A-5) to (5A-8) inclusive and the second group are based on the leverage coefficients obtained from Tables (5A-13) to (5A-16) inclusive. Table (5-19) indicates that in all cases the estimated optimal leverage ratios are higher than the observed mean leverage ratios, indicating that additional cost advantages are available to firms increasing the proportion of fixed commitment financing in their capital structures.

Examination of the values of the a_3 and a_4 coefficients i.e., the measure of the effect of preference capital in Tables (5A-9) to (5A-16) inclusive leads to the conclusion that preference capital is regarded by investors as being more a form of fixed-interest borrowing than equity. However, although Tables (5A-9) to (5A-12) inclusive and Tables (5A-13) to (5A-16) inclusive all reveal an increasing relationship between the equity capitalization rate and leverage and a decreasing relationship between the average capitalization rate and leverage respectively, the magnitudes of the coefficients are insignificant, an occurrence undoubtedly due not only to the wide disparity in the amount of preference capital present in each firms capital structure but also to the low actual mean value for all firms when grouped together. Tables (5A-9) to (5A-16)

TABLE (5-19)

RELATIONSHIP BETWEEN ESTIMATED OPTIMAL LEVERAGE RATIOS, V_D^*/V_T AND OBSERVED LEVERAGE RATIOS, V_D/V_T-AGGREGATE ANALYSIS

Ratios	1967	1968	1969	1970	1971	1972	Average
V_D^*/V_T (DVM)	0.291	0.323	0.316	0.321	0.300	0.335	0.314
V_D^*/V_T (DVM)	0.310	0.322	0.288	0.289	0.298	0.321	0.304
V_D^*/V_T (RIM)	0.366	0.406	0.406	0.339	0.403	0.401	0.386
V_D^*/V_T (CPM)	0.401	0.401	0.357	0.356	0.405	0.341	0.376
Average V_D^*/V_T	0.342	0.363	0.341	0.326	0.351	0.349	0.345
V_D/V_T	0.254	0.236	0.237	0.279	0.307	0.262	0.262
V_D^*/V_T (DVM)	0.269	0.301	0.304	0.304	0.294	0.288	0.293
V_D^*/V_T (DVM)	0.322	0.317	0.267	0.325	0.296	0.292	0.303
V_D^*/V_T (RIM)	0.384	0.332	0.388	0.375	0.375	0.378	0.372
V_D^*/V_T (CPM)	0.340	0.325	0.386	0.369	0.361	0.353	0.355
Average V_D^*/V_T	0.328	0.318	0.336	0.343	0.331	0.327	0.330
V_D/V_T	0.237	0.221	0.223	0.265	0.292	0.250	0.248

inclusive also indicate that there is no evidence to suggest that the cost of capital starts to increase once the firm has reached some acceptable level of preferential leverage, as in all cases although the leverage-squared coefficients were positive in value they were again insignificant - undoubtedly due to the same reasoning as applied to the linear variable.

Regarding the retention coefficients, a_3 and a_4 in Tables (5A-1) to (5A-8) inclusive and a_5 and a_6 in Tables (5A-9) to (5A-16) inclusive, they are positive in all cases with the linear coefficients generally significant at the 5, 10 and 20 per cent levels while the squares coefficients are either insignificant or significant only at the 20 per cent level. These results indicate that not only do investors have a preference for current dividends over capital gains but also that as the retention rate increases the investors required rate of return also increases so as to take account of the greater uncertainty with which they view their returns. This result has considerable significance because in Australia where there is no tax on capital gains but dividends attract the full rate the empiricist might be led to expect a retention coefficient of negative proportions. The significance of our result is that it shows that in Australia the payment of current dividends appears to resolve to a large extent the uncertainty in the minds of investors and that this resolution carries more weight with investors than the attractiveness of tax-free capital gains.

The values of the size coefficient, a_5 in Tables

(5A-1) to (5A-8) inclusive and a_7 in Tables (5A-9) to (5A-16) inclusive are consistently negative in sign and furthermore significant at the 1 per cent level in all cases, thus suggesting a strong inverse relationship between size and the cost of capital. This relationship can be explained in terms of differences in production fuctions, imperfections in reporting information to investors, and the inability of financial institutions to provide capital to smaller firms at market-determined rates.

As mentioned in Chapter 3, the dummy variables were introduced in order to detect any systematic differences which are attributable to industry classes. The values of the Textile and Clothing, Steel and Engineering and Automobile industry coefficients are the only ones to exhibit statistical significance from zero over the six cross-section years in any consistent form. The values of the remaining industry coefficients however reflect varying patterns of significance level and sign. It is not surprising to observe these variations in the magnitudes, sign and significance level of the industry dummy variables over time. Changes in fundamental economic characteristics of the industries such as product innovation, technology, regulation and taxation would be expected to create shifts in the degree of investor interest in these industries.

Finally, the values of the business risk coefficient, a_{16} in Tables (5A-1) to (5A-8) inclusive and a_{18} in Tables (5A-9) to (5A-16) inclusive, are both positive and significant (at the 1 and 5 per cent levels) in all cases, thus indicating the existence of a direct relationship between the cost of capital and the variability of a firm's operating income. This result confirms the importance of business risk in establishing an investor's required rate of return and highlights the necessity of incorporating a separate variable to measure business risk in any analysis attempting to determine the impact of financial risk on the cost of capital.

Since only a part of the analysis has thus far been performed, it would be inappropriate to draw any general conclusions. However, several observations can be made at this point. First, the values of the leverage and dividend coefficients strongly indicate that both hypotheses one and two (the indifference of the cost of capital to changes in leverage and dividend policies for firms with equivalent degrees of business risk) are invalid, and furthermore they indicate that the investors required rate of return rises more rapidly once acceptable levels of leverage and retention have been passed. Second, the values of the size coefficient shows up a strong inverse relationship between firm size and the cost of capital, while on the other hand the values of the busines risk coefficient shows a strong direct relationship between firm business risk and the cost of capital. It is this last relationship (i.e., between business risk and the cost of capital) which sets the stage for the second part of the analysis, which is to test whether the effect of the financial variables on the cost of capital varies at differing levels of business risk.

B] ANALYSIS OF RESULTS BY RISK CLASS

One of the most obvious problems which arises from regressing the risk classes independently is that the samples are smaller and therefore the results are likely to be subject to greater variation. Given that warning, the equations used in the second part of the analysis are as follows:

$$(5\text{-}5)\quad K_e = a_o + a_1 \frac{V_D}{V_S} + a_2 \left[\frac{V_D}{V_S}\right]^2 + a_3RN + a_4RN^2 + + a_5S + a_{6\cdots15}ID$$

$$(5\text{-}6)\quad K_o = a_o + a_1 \frac{V_D}{V_T} + a_2 \left[\frac{V_D}{V_T}\right]^2 + a_3RN + a_4RN^2 + + a_5S + a_{6\cdots15}ID$$

$$(5\text{-}7)\quad K_e = a_o + a_1 \frac{V_D}{V_S} + a_2 \left[\frac{V_D}{V_S}\right]^2 + a_3 \frac{V_p}{V_S} + a_4 \left[\frac{V_p}{V_S}\right]^2 + + a_5RN + a_6RN^2 + a_7S + a_{8\cdots17}ID$$

$$(5\text{-}8)\quad K_o = a_o + a_1 \frac{V_D}{V_T} + a_2 \left[\frac{V_D}{V_T}\right]^2 + a_3 \frac{V_p}{V_T} + a_4 \left[\frac{V_p}{V_T}\right]^2 + + a_5RN + a_6RN^2 + a_7S + a_{8\cdots17}ID$$

where, all the terms are as previously defined.

Tables (5A-20) to (5A-83) inclusive present the regression coefficients based on the results obtained from running Equations (5-5) to (5-8) inclusive, with Tables (5A-20) to (5A-35) inclusive relating to Equations (5-5), Tables (5A-36) to (5A-51) relating to Equation (5-6), Tables (5A-52) to (5A-67) relating to Equation (5-7) and Tables (5A-68) to

(5A-83) relating to Equation (5-8) respectively.[2]

As with the aggregate analysis, the first point of note is the absence of year-to-year variation in the size and sign of the regression coefficients. This reinforces once again the previously mentioned importance of establishing a sound and logical system for selecting the sample of firms to be analyzed and the design of standardized procedures so that the data inputted into the analysis is comparable on both a year-to-year and firm-to-firm basis. Furthermore, the analysis of variance for the regression models indicated that a significant ($p<0.01$) proportion of variance was explained in each case; although the coefficients of multiple determination ($\overline{R}^2$) were again only moderate. Additionally, the values of the constant, a_o are again highly significant for each year, regardless of the manner in which the K's are computed but the values can now be seen to increase when proceeding from risk group 1 - the group consisting of firms having the least variability in operating income - to risk group 4 - the group consisting of firms having the greatest variability in operating income. This result can be related back to the values of the business risk coefficients in the aggregate analysis, which indicated a direct relationship between the cost of capital and the variability of a firm's operating income.

The values of the a_1 and a_2 coefficients (both signs

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2. Each group of 16 tables is composed of four sub-groups containing four tables each, the four sub-groups relate to the four business risk classes and the four tables in each sub-group reflect the four alternative methods for estimating the dependent variable.

and magnitudes) i.e., the measure of the effect of leverage, again clearly refute both the extreme net income and net operating income valuation theories. Tables (5A-20) to (5A-35) inclusive and Tables (5A-52) to (5A-67) inclusive all reveal an increasing relationship between the equity capitalization rate and leverage, while Tables (5A-36) to (5A-51) inclusive and Tables (5A-68) to (5A-83) inclusive all reveal a decreasing relationship between the average capitalization rate and leverage. However, by further close examination of the tables it becomes apparent that in proceeding from risk group 1 to risk group 4, the magnitude of the above-mentioned relationships alter, such that, at higher levels of business risk, increases in financial risk (leverage) raise the equity capitalization rate by a greater amount than at lower levels of business risk (given an equal addition of financial risk). This result can be easily explained in that when debt as a percentage of total capital increases, the variance of earnings per dollar on ordinary share investment will rise, and the higher the level of operating income variability (business risk) the higher becomes the probability of bankruptcy given equal additions of debt.

The analysis is again extended so as to discriminate between the Modigliani and Miller and the Intermediate or Traditional view of capital structure effects. As such the relationships between the predicted and observed leverage coefficients are shown in Tables (5-84) to (5-91) inclusive. Table (5-84) shows the relationships based on the data from Tables (5A-20) to (5A-23) inclusive and Tables (5A-36) to

(5A-39) inclusive, Table (5-85) shows the relationships based on the data from Tables (5A-24) to (5A-27) inclusive and Tables (5A-40) to (5A-43) inclusive, Table (5-86) shows the relationships based on the data from Tables (5A-28) to (5A-31) inclusive and Tables (5A-44) to (5A-47) inclusive, Table (5-87) shows the relationships based on the data from Tables (5A-32) to (5A-35) inclusive and Tables (5A-48) to (5A-51) inclusive, Table (5-88) shows the relationships based on the data from Tables (5A-52) to (5A-55) inclusive and Tables (5A-68) to (5A-71) inclusive, Table (5-89) shows the relationships based on the data from Tables (5A-56) to (5A-59) inclusive and Tables (5A-72) to (5A-77) inclusive, Table (5-90) shows the relationships based on the data from Tables (5A-60) to (5A-63) inclusive and Tables (5A-76) to (5A-79) inclusive and Table (5-91) shows the relationships based on the data from Tables (5A-64) to (5A-69) inclusive and Tables (5A-80) to (5A-83) inclusive.

Examination of Tables (5-84) to (5-91) confirms the findings of the aggregate analysis in that, the values of the observed coefficients (a_1) obtained from Equations (5-5) to (5-8) inclusive, of both the equity and average capitalization rates for all six-cross section years are respectively below and above the values predicted by the Modigliani and Miller theory. Therefore, these results again provide quite clear and strong support for the intermediate or traditional theory of capital structure effects suggesting that the capital markets are not sufficiently perfect to validate the Modigliani and Miller theory and in addition to tax effects firms do gain by employing fixed commitment financing. However, a closer examination of the tables shows that the margins between the predicted and observed coefficients varies with the level of business risk. The variation is such that for business risk group 1, the values more readily support the traditional theory while for business risk group 4, they more readily support the Modigliani and Miller theory. Moreover, there is again the suggestion of a U-shaped schedule of the cost of capital since the leverage-squared coefficients are consistently both positive in sign and significant, such results lend additional support to the traditional position of the presence of an optimal capital structure. As previously mentioned the optimal capital structure can be calculated from the leverage coefficients as follows, $a_1/2a_2$. Tables (5-92) and (5-93) gives the estimated optimal leverage ratios (V_o^*/V_r) derived by running Equations (5-6) and (5-8) for the four risk groups together with the observed mean leverage ratios (V_D/V_T). In Table (5-92) the first group of estimated optimal leverage ratios are based on the leverage coefficients obtained from Tables (5A-36) to (5A-39) inclusive, the second group are based on the leverage coefficients obtained from Tables (5A-40) to (5A-43) inclusive, the third group are based on the leverage coefficients obtained from Tables (5A-44) to (5A-47) inclusive and the fourth group are based on the leverage coefficients obtained from Tables (5A-48) to (5A-51) inclusive. In Table (5-93) the first group of estimated optimal leverage ratios are based on the leverage coefficients obtained from Tables (5A-68) to (5A-71)

TABLE (5-84)

RELATIONSHIP BETWEEN PREDICTED AND OBSERVED DEBT LEVERAGE COEFFICIENTS - RISK GROUP 1 ANALYSIS

Risk Group Analysis		1967	1968	1969	1970	1971	1972
K_e^*	DVM	9.595	8.846	9.330	10.611	11.259	9.415
$(1-\tau)(K_e^*-r)$	DVM	2.900	2.214	2.262	2.384	2.839	2.365
a_1	DVM	1.131	0.708	0.565	0.929	0.951	0.650
K_e^*	DVM	8.966	9.273	8.866	10.418	10.982	9.272
$(1-\tau)(K_e^*-r)$	DVM	2.539	2.449	2.019	2.282	2.694	2.290
a_1	DVM	0.914	0.808	0.575	0.844	0.915	0.595
K_e^*	RIM	8.804	9.476	8.820	9.842	10.020	8.779
$(1-\tau)(K_e^*-r)$	RIM	2.446	2.560	1.995	1.980	2.189	2.031
a_1	RIM	0.856	0.806	0.498	0.732	0.656	0.517
K_e^*	CPM	9.426	8.631	9.397	10.509	11.335	9.395
$(1-\tau)(K_e^*-r)$	CPM	2.803	2.096	2.297	2.230	2.879	2.354
a_1	CPM	1.093	0.628	0.585	0.813	0.878	0.600
K_o^*	DVM	9.041	8.883	8.990	9.880	10.235	9.044
$\tau(K_o^*-r)$	DVM	1.908	1.828	1.885	1.809	2.082	1.963
a_1	DVM	4.059	3.823	3.684	3.448	4.117	3.749
K_o^*	DVM	9.487	9.208	9.214	10.073	10.459	8.908
$\tau(K_o^*-r)$	DVM	2.098	1.974	1.992	1.901	2.189	1.899
a_1	DVM	4.482	4.129	3.774	3.734	4.346	3.714
K_o^*	RIM	8.642	9.204	9.347	9.757	10.085	8.922
$\tau(K_o^*-r)$	RIM	1.739	1.972	2.055	1.751	2.011	1.905
a_1	RIM	3.838	4.081	4.058	3.325	3.858	3.803
K_o^*	CPM	9.481	8.555	8.781	10.449	11.253	9.440
$\tau(K_o^*-r)$	CPM	2.095	1.680	1.786	2.080	2.566	2.138
a_1	CPM	4.571	3.481	3.426	4.015	5.078	4.169

TABLE (5-85)

RELATIONSHIP BETWEEN PREDICTED AND OBSERVED DEBT LEVERAGE COEFFICIENTS - RISK GROUP 2 ANALYSIS

Risk Group Analysis		1967	1968	1969	1970	1971	1972
K_e^*	DVM	9.534	8.908	9.697	11.139	10.602	9.538
$(1-\tau)(K_e^*-r)$		2.865	2.248	2.455	2.661	2.494	2.429
a_1		1.446	1.056	1.080	1.423	1.209	1.056
K_e^*	DVM	10.244	9.440	9.462	11.393	10.970	10.361
$(1-\tau)(K_e^*-r)$		3.429	2.541	2.332	2.794	2.688	2.861
a_1		1.714	1.181	0.991	1.424	1.276	1.201
K_e^*	RIM	10.301	8.699	9.528	10.525	11.675	9.387
$(1-\tau)(K_e^*\ r)$		3.306	2.133	2.366	2.338	3.058	2.350
a_1		1.735	1.045	1.017	1.250	1.406	0.940
K_e^*	CPM	10.142	8.854	9.763	10.372	10.547	10.254
$(1-\tau)(K_e^*-r)$		3.215	2.218	2.490	2.258	2.465	2.805
a_1		1.703	1.064	1.008	1.208	1.121	1.192
K_o^*	DVM	9.491	8.952	9.102	10.610	11.363	9.952
$\tau(K_o^*-r)$		2.099	1.859	1.938	2.156	2.618	2.394
a_1		4.185	3.512	3.318	3.768	4.432	4.215
K_o^*	DVM	10.142	9.359	9.326	12.021	11.779	9.916
$\tau(K_o^*-r)$		2.376	2.042	2.045	2.826	2.816	2.377
a_1		4.540	3.731	3.595	5.058	4.938	4.164
K_o^*	RIM	9.211	9.578	8.992	12.174	11.885	10.429
$\tau(K_o^*-r)$		1.980	2.141	1.886	2.899	2.866	2.621
a_1		3.938	3.873	3.348	5.163	4.942	4.586
K_o^*	CPM	9.436	9.366	9.198	11.792	10.382	9.538
$\tau(K_o^*-r)$		2.076	2.045	1.984	2.717	2.152	2.198
a_1		3.908	3.855	3.359	4.817	3.679	3.836

TABLE (5-86)

RELATIONSHIP BETWEEN PREDICTED AND OBSERVED DEBT LEVERAGE COEFFICIENTS - RISK GROUP 3 ANALYSIS

Risk Group Analysis		1967	1968	1969	1970	1971	1972
K_e^*		10.222	9.463	10.565	10.181	11.945	9.973
$(1-\tau)(K_e^*-r)$	DVM	3.261	2.553	2.911	2.158	3.199	2.658
a_1		1.532	1.340	1.673	1.035	1.727	1.515
K_e^*		10.880	9.867	10.260	10.943	11.218	9.466
$(1-\tau)(K_e^*-r)$	DVM	3.639	2.775	2.751	2.558	2.818	2.391
a_1		1.746	1.498	1.540	1.035	1.727	1.515
K_e^*		10.057	9.935	9.588	10.004	12.215	9.293
$(1-\tau)(K_e^*-r)$	RIM	3.166	2.813	2.398	2.065	3.341	2.301
a_1		1.804	1.533	1.366	1.218	1.703	1.357
K_e^*		11.018	9.155	10.418	11.262	12.160	9.447
$(1-\tau)(K_e^*-r)$	CPM	3.719	2.384	2.833	2.725	3.312	2.381
a_1		2.119	1.239	1.303	1.539	1.788	1.095
K_o^*		10.941	9.251	9.629	11.374	12.296	9.567
$\tau(K_o^*-r)$	DVM	2.716	1.993	2.189	2.519	3.061	2.212
a_1		3.987	2.720	2.922	3.299	3.880	2.919
K_o^*		10.131	10.045	9.943	10.521	10.906	10.106
$\tau(K_o^*-r)$	DVM	2.371	2.351	2.338	2.114	2.401	2.468
a_1		3.348	3.140	3.037	2.799	3.230	3.216
K_o^*		10.820	8.975	10.624	11.484	10.593	10.073
$\tau(K_o^*-r)$	RIM	2.664	1.869	2.661	2.571	2.252	2.452
a_1		3.887	2.663	3.412	3.259	2.954	3.242
K_o^*		9.872	10.156	9.395	9.813	10.791	10.297
$\tau(K_o^*-r)$	CPM	2.261	2.401	2.078	1.777	2.346	2.558
a_1		3.209	3.431	2.795	2.425	3.038	3.366

TABLE (5-87)

RELATIONSHIP BETWEEN PREDICTED AND OBSERVED DEBT LEVERAGE COEFFICIENTS - RISK GROUP 4 ANALYSIS

Risk Group Analysis		1967	1968	1969	1970	1971	1972
K_e^*	DVM	11.473	9.699	9.578	11.358	12.011	9.938
$(1-\tau)(K_e^*-r)$	DVM	3.980	2.683	2.392	2.776	3.234	2.639
a_1	DVM	2.945	1.797	1.506	1.943	2.166	1.636
K_e^*	DVM	10.534	10.245	9.544	12.157	12.966	10.634
$(1-\tau)(K_e^*-r)$	DVM	3.440	2.983	2.375	3.195	3.735	3.005
a_1	DVM	2.511	1.998	1.472	2.316	2.521	1.818
K_e^*	RIM	10.254	9.482	9.990	12.252	11.219	10.542
$(1-\tau)(K_e^*-r)$	RIM	3.279	2.564	2.609	3.425	2.818	2.956
a_1	RIM	2.098	1.705	1.943	2.174	1.902	2.143
K_e^*	CPM	11.636	10.361	9.140	10.736	11.078	9.819
$(1-\tau)(K_e^*-r)$	CPM	4.074	3.047	2.163	2.449	2.744	2.577
a_1	CPM	2.505	1.980	1.557	1.579	1.838	1.906
K_o^*	DVM	11.592	10.208	9.949	12.317	11.638	10.215
$\tau(K_o^*-r)$	DVM	2.992	2.424	2.341	2.967	2.749	2.519
a_1	DVM	3.549	2.931	2.592	3.279	3.166	2.790
K_o^*	DVM	10.682	9.640	10.072	11.199	13.358	10.367
$\tau(K_o^*-r)$	DVM	2.606	2.169	2.399	2.436	3.566	2.592
a_1	DVM	3.102	2.607	2.652	2.692	3.956	2.941
K_o^*	RIM	11.491	10.160	10.115	12.485	13.286	10.708
$\tau(K_o^*-r)$	RIM	2.949	2.403	2.420	3.047	3.532	2.754
a_1	RIM	3.470	2.728	2.613	3.278	4.045	3.067
K_o^*	CPM	10.079	9.278	9.392	10.925	13.472	9.699
$\tau(K_o^*-r)$	CPM	2.349	2.006	2.076	2.306	3.620	2.274
a_1	CPM	2.770	2.242	2.229	2.456	4.138	2.490

TABLE (5-88)

RELATIONSHIP BETWEEN PREDICTED AND OBSERVED DEBT LEVERAGE COEFFICIENTS - RISK GROUP 1 ANALYSIS

Risk Group Analysis		1967	1968	1969	1970	1971	1972
K_e^*	DVM	9.497	8.781	9.346	10.369	10.161	9.277
$(1-\tau)(K_e^*-r)$	DVM	2.844	2.178	2.271	2.256	2.263	2.292
a_1	DVM	1.023	0.718	0.590	0.891	0.712	0.595
K_e^*	DVM	9.603	8.908	9.175	9.924	11.335	9.078
$(1-\tau)(K_e^*-r)$	DVM	2.905	2.248	2.181	2.023	2.879	2.188
a_1	DVM	1.016	0.685	0.621	0.708	0.935	0.623
K_e^*	RIM	8.965	8.833	9.346	10.369	10.154	8.762
$(1-\tau)(K_e^*-r)$	RIM	2.538	2.207	2.271	2.256	2.259	2.022
a_1	RIM	0.977	0.761	0.658	0.800	0.734	0.586
K_e^*	CPM	8.717	9.316	8.692	9.836	11.100	8.926
$(1-\tau)(K_e^*-r)$	CPM	2.396	2.472	1.927	1.977	2.756	2.108
a_1	CPM	0.910	0.840	0.558	0.731	0.854	0.569
K_o^*	DVM	9.063	9.397	8.727	9.781	10.309	9.395
$\tau(K_o^*-r)$	DVM	1.918	2.059	1.760	1.762	2.118	2.130
a_1	DVM	4.224	4.252	3.428	3.428	4.129	4.229
K_o^*	DVM	9.013	8.781	8.958	10.547	11.196	8.860
$\tau(K_o^*-r)$	DVM	1.896	1.782	1.870	2.126	2.539	1.876
a_1	DVM	4.132	3.656	3.741	4.248	5.009	3.645
K_o^*	RIM	9.621	8.614	8.802	10.254	11.363	9.315
$\tau(K_o^*-r)$	RIM	2.155	1.707	1.796	1.987	2.618	2.092
a_1	RIM	4.589	3.517	3.490	3.819	4.972	4.052
K_o^*	CPM	9.492	9.152	9.183	10.369	10.000	9.551
$\tau(K_o^*-r)$	CPM	2.100	1.949	1.977	2.042	1.971	2.204
a_1	CPM	4.497	4.072	3.834	3.920	3.768	4.367

TABLE (5-89)

RELATIONSHIP BETWEEN PREDICTED AND OBSERVED DEBT LEVERAGE COEFFICIENTS - RISK GROUP 2 ANALYSIS

Risk Group Analysis		1967	1968	1969	1970	1971	1972
K_e^*	DVM	10.196	9.344	9.226	10.755	10.717	10.493
$(1-\tau)(K_e^*-r)$	DVM	3.246	2.488	2.208	2.459	2.555	2.931
a_1	DVM	1.769	1.219	0.905	1.303	1.200	1.187
K_e^*	DVM	9.355	9.064	9.562	12.179	11.879	10.297
$(1-\tau)(K_e^*-r)$	DVM	2.762	2.334	2.384	3.207	3.165	2.828
a_1	DVM	1.491	1.061	1.025	1.747	1.503	1.230
K_e^*	RIM	9.260	9.536	9.564	11.948	11.859	9.539
$(1-\tau)(K_e^*-r)$	RIM	2.708	2.593	2.385	3.085	3.154	2.430
a_1	RIM	1.394	1.244	1.061	1.557	1.450	1.057
K_e^*	CPM	10.380	9.308	9.123	12.139	10.563	10.231
$(1-\tau)(K_e^*-r)$	CPM	3.352	2.468	2.154	3.186	2.474	2.793
a_1	CPM	1.810	1.172	0.936	1.672	1.138	1.117
K_o^*	DVM	9.543	9.535	9.043	10.510	11.618	9.615
$\tau(K_o^*-r)$	DVM	2.122	2.121	1.910	2.109	2.739	2.234
a_1	DVM	4.049	3.894	3.379	3.658	4.862	3.891
K_o^*	DVM	10.364	8.875	9.753	11.974	10.578	9.479
$\tau(K_o^*-r)$	DVM	2.470	1.824	2.248	2.804	2.245	2.170
a_1	DVM	4.872	3.389	3.862	4.740	3.867	3.682
K_o^*	RIM	10.194	8.640	8.939	10.355	10.381	9.381
$\tau(K_o^*-r)$	RIM	2.398	1.719	1.861	1.928	2.152	2.123
a_1	RIM	4.667	3.059	3.264	3.590	3.769	3.634
K_o^*	CPM	9.426	8.880	9.783	10.518	11.647	10.406
$\tau(K_o^*-r)$	CPM	2.072	1.827	2.262	2.112	2.753	2.610
a_1	CPM	3.983	3.280	4.043	3.576	4.898	4.523

TABLE (5-90)

RELATIONSHIP BETWEEN PREDICTED AND OBSERVED DEBT LEVERAGE COEFFICIENTS - RISK GROUP 3 ANALYSIS

Risk Group Analysis		1967	1968	1969	1970	1971	1972
K_e^*	DVM	10.057	8.975	10.624	9.813	12.315	10.297
$(1-\tau)(K_e^*-r)$	DVM	3.166	2.285	2.942	1.965	3.394	2.828
a_1	DVM	1.456	1.245	1.706	0.972	1.781	1.682
K_e^*	DVM	11.018	9.935	9.588	10.104	10.593	9.293
$(1-\tau)(K_e^*-r)$	DVM	3.719	2.813	2.398	2.117	2.490	2.301
a_1	DVM	1.840	1.504	1.354	0.963	1.269	1.311
K_e^*	RIM	9.829	9.129	10.688	9.883	10.796	9.481
$(1-\tau)(K_e^*-r)$	RIM	3.035	2.369	2.975	2.001	2.596	2.399
a_1	RIM	1.745	1.184	1.457	1.100	1.323	1.091
K_e^*	CPM	10.006	9.923	9.338	10.083	10.507	10.227
$(1-\tau)(K_e^*-r)$	CPM	3.137	2.806	2.266	2.106	2.444	2.791
a_1	CPM	1.741	1.529	1.121	1.200	1.270	1.325
K_o^*	DVM	9.872	10.156	10.418	11.262	12.215	9.447
$\tau(K_o^*-r)$	DVM	2.261	2.401	2.564	2.466	3.023	2.155
a_1	DVM	3.395	3.270	3.460	3.203	4.016	2.885
K_o^*	DVM	10.820	9.155	9.395	11.484	10.791	10.297
$\tau(K_o^*-r)$	DVM	2.664	1.950	2.078	2.571	2.346	2.558
a_1	DVM	4.062	2.744	2.686	3.513	3.167	3.259
K_o^*	RIM	11.063	8.992	9.575	11.415	12.380	9.297
$\tau(K_o^*-r)$	RIM	2.768	1.877	2.163	2.538	3.101	2.083
a_1	RIM	3.914	2.707	2.937	3.458	4.035	2.772
K_o^*	CPM	10.883	10.184	10.421	11.295	12.144	10.055
$\tau(K_o^*-r)$	CPM	2.691	2.697	2.565	2.481	2.989	2.443
a_1	CPM	3.894	3.638	3.283	3.239	3.952	3.097

TABLE (5-91)

RELATIONSHIP BETWEEN PREDICTED AND OBSERVED DEBT LEVERAGE COEFFICIENTS - RISK GROUP 4 ANALYSIS

Risk Group Analysis		1967	1968	1969	1970	1971	1972
K_e^*	DVM	11.497	10.166	9.944	11.001	13.225	10.539
$(1-\tau)(K_e^*-r)$		3.994	2.940	2.585	2.588	3.871	2.955
a_1		2.835	1.969	1.667	1.863	2.593	1.832
K_e^*	DVM	11.636	9.278	9.140	12.252	11.078	10.542
$(1-\tau)(K_e^*-r)$		4.074	2.451	2.163	3.245	2.744	2.956
a_1		2.872	1.666	1.330	2.368	1.811	1.788
K_e^*	RIM	10.247	9.282	9.136	12.222	11.015	10.728
$(1-\tau)(K_e^*-r)$		3.275	2.454	2.160	3.229	2.711	3.054
a_1		2.046	1.595	1.576	2.001	1.775	2.259
K_e^*	CPM	10.054	9.479	10.177	10.740	11.248	9.825
$(1-\tau)(K_e^*-r)$		3.162	2.562	2.707	2.567	2.833	2.580
a_1		1.913	1.767	1.894	1.540	1.898	1.806
K_o^*	DVM	10.079	9.482	9.392	10.925	11.219	9.819
$\tau(K_o^*-r)$		2.349	2.097	2.076	2.306	2.550	2.331
a_1		2.808	2.410	2.242	2.456	2.904	2.670
K_o^*	DVM	10.254	10.361	10.115	12.485	13.472	10.708
$\tau(K_o^*-r)$		2.424	2.493	2.420	3.047	3.620	2.754
a_1		3.063	2.836	2.695	3.310	3.925	3.043
K_o^*	RIM	11.644	10.347	9.378	10.934	13.453	9.671
$\tau(K_o^*-r)$		3.014	2.487	2.070	2.310	3.611	2.261
a_1		3.596	2.807	2.274	2.602	4.181	2.623
K_o^*	CPM	11.461	10.135	9.990	12.496	13.215	10.560
$\tau(K_o^*-r)$		2.937	2.391	2.360	3.052	3.498	2.683
a_1		3.628	2.684	2.544	3.450	3.918	2.904

inclusive, the second group are based on the leverage coefficients obtained from Tables (5A-72) to (5A-75) inclusive, the third group are based on the leverage coefficients obtained from Tables (5A-76) to (5A-79) inclusive and the fourth group are based on the leverage coefficients obtained from Tables (5A-80) to (5A-83) inclusive. Both Tables (5-92) and (5-93) confirm the result obtained in the aggregate analysis that in all cases the estimated optimal leverage ratios are higher than the observed mean leverage ratios, indicating again that additional cost advantages are available to firms increasing the proportion of fixed commitment financing in their capital structures. However, the tables also indicate that the level of the estimated optimal leverage ratios varies directly with the level of operating income variability. This relationship can be explained by the fact that the degree of variability in operating income determines to a large extent the amount of fixed commitment financing that may safely be undertaken by the firm.

Examination of the values of the a_3 and a_4 coefficients, i.e., the measure of the effect of preference capital in Tables (5A-52) to (5A-83) inclusive, support the conclusions obtained in the aggregate analysis that preference capital is regarded by investors as being more a form of fixed-interest borrowing than equity. Tables (5A-52) to (5A-67) inclusive and Tables (5A-68) to (5A-83) inclusive all reveal an increasing relationship between the equity capitalization rate and leverage and a decreasing relationship between the average capitalization rate and leverage

TABLE (5-92)

RELATIONSHIP BETWEEN ESTIMATED OPTIMAL LEVERAGE RATIOS, V_D^*/V_T AND OBSERVED LEVERAGE RATIOS, V_D/V_T - RISK GROUPS 1 TO 4 ANALYSIS

Ratios	1967	1968	1969	1970	1971	1972	Average
V_D^*/V_T (DVM)	0.380	0.394	0.326	0.360	0.336	0.308	0.350
V_D^*/V_T (DVM)	0.380	0.340	0.383	0.364	0.323	0.339	0.354
V_D^*/V_T (RIM)	0.366	0.360	0.364	0.393	0.481	0.413	0.396
V_D^*/V_T (CPM)	0.357	0.356	0.455	0.349	0.415	0.447	0.396
Average V_D^*/V_T	0.370	0.362	0.382	0.366	0.396	0.376	0.375
V_D/V_T	0.247	0.261	0.281	0.323	0.392	0.312	0.302
V_D^*/V_T (DVM)	0.336	0.299	0.339	0.321	0.317	0.325	0.322
V_D^*/V_T (DVM)	0.297	0.325	0.322	0.335	0.297	0.334	0.318
V_D^*/V_T (RIM)	0.351	0.394	0.340	0.354	0.380	0.343	0.360
V_D^*/V_T (CPM)	0.358	0.338	0.368	0.382	0.336	0.387	0.361
Average V_D^*/V_T	0.335	0.339	0.342	0.348	0.332	0.347	0.340
V_D/V_T	0.235	0.265	0.261	0.298	0.294	0.268	0.270
V_D^*/V_T (DVM)	0.323	0.278	0.279	0.287	0.303	0.333	0.300
V_D^*/V_T (DVM)	0.325	0.302	0.331	0.308	0.322	0.279	0.311
V_D^*/V_T (RIM)	0.375	0.387	0.331	0.363	0.365	0.329	0.358
V_D^*/V_T (CPM)	0.323	0.338	0.340	0.346	0.354	0.338	0.339
Average V_D^*/V_T	0.336	0.326	0.320	0.326	0.336	0.319	0.327
V_D/V_T	0.292	0.221	0.212	0.250	0.289	0.255	0.253
V_D^*/V_T (DVM)	0.269	0.265	0.280	0.265	0.255	0.265	0.266
V_D^*/V_T (DVM)	0.279	0.271	0.291	0.301	0.252	0.276	0.278
V_D^*/V_T (RIM)	0.341	0.340	0.324	0.343	0.327	0.338	0.335
V_D^*/V_T (CPM)	0.336	0.316	0.303	0.298	0.318	0.306	0.312
Average V_D^*/V_T	0.306	0.298	0.299	0.301	0.288	0.296	0.298
V_D/V_T	0.241	0.198	0.194	0.246	0.253	0.212	0.224

TABLE (5-93)

RELATIONSHIP BETWEEN ESTIMATED OPTIMAL LEVERAGE RATIOS, V_D^*/V_T AND OBSERVED LEVERAGE RATIOS, V_D/V_T - RISK GROUPS 1 TO 4 ANALYSIS

Ratios	1967	1968	1969	1970	1971	1972	Average
V_D^*/V_T (DVM)	0.366	0.333	0.285	0.288	0.305	0.356	0.322
V_D^*/V_T (DVM)	0.341	0.304	0.293	0.333	0.293	0.323	0.314
V_D^*/V_T (RIM)	0.443	0.475	0.471	0.427	0.468	0.400	0.447
V_D^*/V_T (CPM)	0.405	0.450	0.464	0.391	0.352	0.465	0.421
Average V_D^*/V_T	0.388	0.390	0.378	0.359	0.354	0.386	0.375
V_D/V_T	0.236	0.243	0.262	0.301	0.375	0.298	0.285
V_D^*/V_T (DVM)	0.307	0.323	0.254	0.252	0.313	0.326	0.295
V_D^*/V_T (DVM)	0.318	0.302	0.306	0.284	0.294	0.299	0.300
V_D^*/V_T (RIM)	0.333	0.332	0.345	0.343	0.366	0.346	0.344
V_D^*/V_T (CPM)	0.319	0.331	0.360	0.348	0.358	0.342	0.343
Average V_D^*/V_T	0.319	0.322	0.316	0.306	0.332	0.328	0.320
V_D/V_T	0.219	0.246	0.246	0.284	0.277	0.260	0.255
V_D^*/V_T (DVM)	0.302	0.306	0.284	0.319	0.299	0.289	0.299
V_D^*/V_T (DVM)	0.300	0.324	0.319	0.286	0.264	0.287	0.296
V_D^*/V_T (RIM)	0.312	0.356	0.349	0.362	0.369	0.348	0.349
V_D^*/V_T (CPM)	0.343	0.337	0.350	0.356	0.340	0.349	0.345
Average V_D^*/V_T	0.314	0.330	0.325	0.330	0.318	0.318	0.322
V_D/V_T	0.270	0.210	0.200	0.238	0.283	0.240	0.240
V_D^*/V_T (DVM)	0.241	0.265	0.265	0.264	0.283	0.241	0.259
V_D^*/V_T (DVM)	0.261	0.243	0.248	0.266	0.262	0.262	0.257
V_D^*/V_T (RIM)	0.307	0.333	0.333	0.318	0.291	0.345	0.321
V_D^*/V_T (CPM)	0.288	0.300	0.294	0.320	0.302	0.299	0.300
Average V_D^*/V_T	0.274	0.285	0.285	0.292	0.284	0.286	0.284
V_D/V_T	0.223	0.187	0.185	0.237	0.233	0.203	0.211

respectively. However, as with the aggregate analysis, the magnitudes of the coefficients were all insignificant. Furthermore, as with the debt-leverage relationships just discussed it is apparent that in proceeding from risk group 1 to risk group 4, the magnitude of the abovementioned relationship alter, such that, at higher levels of business risk, increases in preference capital raise the equity capitalization rate by a greater amount than at lower levels of business risk (given an equal addition of preference capital). Unlike the debt-leverage relationship however, the alteration is not easily discernable. Finally, Tables (5A-68) to (5A-83) inclusive, again support the aggregate analysis in indicating that there is no evidence to suggest that the cost of capital starts to increase once the firm has reached some acceptable level of preferential leverage, as in all cases although the leverage-squared coefficients were positive in value they were insignificant.

Considering the retention coefficients, a_3 and a_4 in Tables (5A-20) to (5A-51) inclusive and a_5 and a_6 in Tables (5A-52) to (5A-83) inclusive, they are positive in all cases but with the linear coefficients being either insignificant or significant only at the 10 and 20 per cent levels in business risk group 1 while being significant at the 1, 5 and 10 per cent levels in business risk group 4. Additionally, the squares coefficients are insignificant in business risk group 1 while being either insignificant or significant only at the 10 and 20 per cent levels in business risk group 4. These results do more than just indicate that not only do investors have a preference for current dividends over capital gains but that as the retention rate increases so does the investor's required rate of return so as to take account of the greater uncertainty with which they view their returns. This raises the question, does the market place less emphasise on current dividends for firms with lower levels of business risk? This would seem to be a distinct possibility. If investors prefer current dividends to larger future dividends under conditions of uncertainty (as shown in the aggregate analysis) then it is logical that their preference for current dividends may decline as the degree of uncertainty declines.

The values of the size coefficient a_5 in Tables (5A-20) to (5A-51) inclusive and a_7 in Tables (5A-52) to (5A-83) inclusive are again consistently negative in sign and also significant at the 1 per cent level in all cases, these results support the conclusion established in the aggregate analysis that on balance capital costs decline as firm size increases. Furthermore, the values of the coefficients bear no relationship to the level of operating income variability, a result that should be expected.

Finally, the values of the industry dummy coefficients again reflect varying patterns of significance level and sign,(3) and follow quite closely the pattern established in the aggregate analysis, with the Textile and Clothing, Steel and Engineering and Automobile industries being the only ones to exhibit statistical significance from zero over

3. In the years when there are no coefficients for the dummy variables it indicates that for that year, there were no firms in that risk class.

the six cross-section years in any consistent manner.

At the end of the aggregate analysis, it was concluded that both the leverage and dividend indifference hypotheses were invalid, the results of the risk-group analysis supports this conclusion. Additionally, however, it can now be concluded that the market appears to value both leverage and dividends differently at differing levels of business risk.

C] OTHER POINTS OF ANALYSIS

In order to interpret the coefficients for the independent variables, it must be ascertained that these variables are relatively independent of each other. This is particularly important for the leverage and retention variables, since they are the primary variables being rested in this thesis. As the simple correlations for all cases were quite low, interpretations of the coefficients for the independent variables must assume a high level of validity.

On the question of heteroskedasticity, since the models being used in this thesis are designed in the form of ratios rather than absolute values, hetero-skedasticity was not expected. That is, the size of the error terms was not expected to depend on the size of the independent variables. However, in order to test for heteroskedasticity, the residuals which resulted from Equations (5-1) to (5-4) inclusive and (5-5) to (5-8) inclusive were plotted against the dependent variables. In general, the range of dispersion of the residuals appeared constant over the range of observations, thus the disturbances appear to be homoskedastic.

As a final step in our analysis, the differences between the constant, a_0 coefficients (from Tables (5A-1) to (5A-16) inclusive and (5A-20) to (5A-83) inclusive) and the risk-free rate of interest were computed. These differences are presented in Tables (5-94) to (5-98) inclusive. The values in these tables should be interpreted as follows, if the test equations are not misspecified and if the K's are measured correctly, then the difference between a_0 and the risk-free rate of interest represents the "risk premium" between the cost of capital for an all-equity, no-retention firm and an (essentially) riskless long-term bond. The values in Tables (4-94) to (5-98) inclusive are presented primarily as interesting information, since no conclusion as to the actual "risk premium" is possible until additional empirical evidence is obtained on the question of how the cost of capital is best measured. However, as is to be expected, the "risk premium" increases when proceeding from risk group 1 to risk group 4, i.e., for higher levels of operating income variability.

D] CONCLUSIONS

The general conclusions to be drawn from this chapter have already been stated and they simply are that; (1) the judicious use of financial leverage will lower the firm's cost of capital, (2) investors have a preference for current dividends and (3) on balance a firm's cost of capital declines as its size increases. These results further

TABLE (5-94)

DIFFERENCE BETWEEN THE VALUES OF THE a_o COEFFICIENTS BASED ON EQUATIONS (5-1), (5-2), (5-3) AND (5-4) AND THE 2-YEAR BOND YIELDS-AGGREGATE ANALYSIS

	a_o - 2 year Bond Yield						
Rate of Return	1967	1968	1969	1970	1971	1972	Average
K_e^*(DVM)	5.990	4.836	4.439	5.158	5.964	4.972	5.234
K_e^*(DVM)	5.998	4.409	4.265	4.398	4.995	4.533	4.769
K_e^*(RIM)	5.851	4.261	4.830	5.629	6.532	5.478	5.430
K_e^*(CPM)	5.079	5.048	4.119	5.436	6.195	5.145	5.170
K_o^*(DVM)	5.260	4.361	4.865	4.703	6.323	5.219	5.121
K_o^*(DVM)	5.290	4.885	4.732	5.504	5.315	4.784	5.085
K_o^*(RIM)	4.995	4.199	4.274	4.176	4.735	4.684	4.510
K_o^*(CPM)	6.228	5.179	4.811	4.477	5.048	4.684	5.071
K_e^*(DVM)	5.426	4.355	4.783	4.111	4.289	4.771	4.622
K_e^*(DVM)	5.913	4.615	4.815	5.787	5.110	5.339	5.263
K_e^*(RIM)	4.906	4.276	4.722	4.168	6.408	5.326	4.967
K_e^*(CPM)	5.860	5.062	4.937	5.691	4.726	4.406	5.113
K_o^*(DVM)	5.278	4.243	4.364	4.305	6.259	4.392	4.806
K_o^*(DVM)	5.803	4.812	4.143	5.722	6.551	5.522	5.425
K_o^*(RIM)	5.732	4.311	4.134	5.345	6.290	4.413	5.037
K_o^*(CPM)	5.045	4.884	4.075	4.127	4.742	5.335	4.701

TABLE (5-95)

DIFFERENCE BETWEEN THE VALUES OF THE a_o COEFFICIENTS BASED ON EQUATIONS (5-5), (5-6), (5-7) and (5-8) AND THE 2-YEAR BOND YIELDS - RISK GROUP 1

	a_o - 2 year Bond Yield						
Rate of Return	1967	1968	1969	1970	1971	1972	Average
K_e^*(DVM)	5.045	4.026	4.310	4.541	5.409	5.132	4.639
K_e^*(DVM)	4.416	4.453	3.846	4.348	4.505	4.362	4.426
K_e^*(RIM)	4.254	4.656	3.800	3.772	4.170	3.869	4.086
K_e^*(CPM)	4.876	3.811	4.377	4.439	5.485	4.485	4.578
K_o^*(DVM)	4.491	4.063	3.970	3.810	4.385	4.134	4.142
K_o^*(DVM)	4.937	4.388	4.194	4.003	4.609	3.998	4.354
K_o^*(RIM)	4.092	4.384	4.327	3.687	4.235	4.012	4.122
K_o^*(CPM)	4.931	3.735	3.761	4.379	5.403	4.503	4.456
K_e^*(DVM)	4.947	3.961	4.326	4.299	4.311	4.367	4.368
K_e^*(DVM)	5.053	4.088	4.155	3.854	5.485	4.168	4.467
K_e^*(RIM)	4.415	4.013	4.326	4.299	4.304	3.852	4.201
K_e^*(CPM)	4.167	4.496	3.672	3.766	5.250	4.016	4.227
K_o^*(DVM)	4.513	4.577	3.707	3.711	4.459	4.485	4.242
K_o^*(DVM)	4.463	3.961	3.938	4.477	5.346	3.950	4.355
K_o^*(RIM)	5.071	3.794	3.782	4.184	5.513	4.405	4.458
K_o^*(CPM)	4.942	4.332	4.163	4.299	4.150	4.641	4.421

TABLE (5-96)

DIFFERENCE BETWEEN THE VALUES OF THE a_o COEFFICIENTS BASED ON EQUATIONS (5-5), (5-6), (5-7) AND (5-8) AND THE 2-YEAR BOND YIELDS RISK GROUP 2

	a_o - 2 year Bond Yield						
Rate of Return	1967	1968	1969	1970	1971	1972	Average
K_e^*(DVM)	4.984	4.088	4.677	5.069	4.752	4.628	4.699
K_e^*(DVM)	5.694	4.620	4.442	5.323	5.120	5.451	5.108
K_e^*(RIM)	5.751	3.879	4.508	4.455	5.825	4.477	4.815
K_e^*(CPM)	5.592	4.034	4.743	4.302	4.697	5.344	4.785
K_o^*(DVM)	4.941	4.132	4.082	4.540	5.513	5.042	4.708
K_o^*(DVM)	5.592	4.539	4.306	5.951	5.929	5.006	5.220
K_o^*(RIM)	4.661	4.758	3.972	6.104	6.035	5.519	5.174
K_o^*(CPM)	4.886	4.546	4.178	5.722	4.532	4.628	4.748
K_e^*(DVM)	5.646	4.545	4.206	4.685	4.867	5.583	4.918
K_e^*(DVM)	4.805	4.244	4.542	6.109	6.029	5.387	5.186
K_e^*(RIM)	4.710	4.716	4.544	5.878	6.009	4.629	5.081
K_e^*(CPM)	5.830	4.488	4.103	6.069	4.713	5.321	5.087
K_o^*(DVM)	4.993	4.715	4.023	4.440	5.768	4.705	4.774
K_o^*(DVM)	5.814	4.055	4.733	5.904	4.728	4.569	4.967
K_o^*(RIM)	5.644	3.820	3.919	4.285	4.531	4.471	4.445
K_o^*(CPM)	4.876	4.060	4.763	4.448	5.797	5.496	4.906

TABLE (5-97)

DIFFERENCE BETWEEN THE VALUES OF THE a_o COEFFICIENTS BASED ON EQUATIONS (5-5), (5-6), (5-7) AND (5-8) AND THE 2-YEAR BOND YIELDS RISK GROUP 3

	a_o - 2 year Bond Yield						
Rate of Return	1967	1968	1969	1970	1971	1972	Average
K_e^*(DVM)	5.672	4.643	5.545	4.111	6.095	5.063	5.188
K_e^*(DVM)	6.330	5.047	5.240	4.873	5.368	4.556	5.235
K_e^*(RIM)	5.507	5.115	4.568	3.934	6.365	4.383	5.023
K_e^*(CPM)	6.468	4.335	5.398	5.192	6.310	4.537	5.373
K_o^*(DVM)	6.391	4.431	4.609	5.304	6.446	4.657	5.306
K_o^*(DVM)	5.581	5.225	4.923	4.451	5.056	5.196	5.072
K_o^*(RIM)	6.270	4.155	5.604	5.414	4.743	5.163	5.224
K_o^*(CPM)	5.322	5.336	4.375	3.743	4.941	5.387	4.850
K_e^*(DVM)	5.507	4.155	5.604	3.743	6.465	5.387	5.143
K_e^*(DVM)	6.468	5.115	4.568	4.034	4.743	4.383	4.885
K_e^*(RIM)	5.279	4.309	5.668	3.813	4.946	4.571	4.764
K_e^*(CPM)	5.456	5.103	4.318	4.013	4.657	5.317	4.810
K_o^*(DVM)	5.322	5.336	5.398	5.192	6.365	4.537	5.358
K_o^*(DVM)	6.270	4.335	4.375	5.414	4.941	5.387	5.120
K_o^*(RIM)	6.513	4.172	4.555	5.345	6.530	4.387	5.250
K_o^*(CPM)	6.333	5.994	5.401	5.225	6.294	5.145	5.732

TABLE (5-98)

DIFFERENCE BETWEEN THE VALUES OF THE a_o COEFFICIENTS BASED ON EQUATIONS (5-5), (5-6), (5-7) AND (5-8) AND THE 2-YEAR BOND YIELDS RISK GROUP 4

a_o - 2 year Bond Yield							
Rate of Return	1967	1968	1969	1970	1971	1971	Average
K_e^*(DVM)	6.923	4.879	4.558	5.288	6.161	5.028	5.472
K_e^*(DVM)	5.984	5.425	4.524	6.087	7.116	5.724	5.810
K_e^*(RIM)	5.704	4.662	4.970	6.182	5.369	5.632	5.419
K_e^*(CPM)	7.086	5.541	4.120	4.666	5.228	4.909	5.258
K_o^*(DVM)	7.042	5.388	4.929	6.247	5.788	5.305	5.783
K_o^*(DVM)	6.132	4.820	5.052	5.129	7.508	5.457	5.683
K_o^*(RIM)	6.941	5.340	5.095	6.415	7.436	5.798	6.170
K_o^*(CPM)	5.529	4.458	4.372	4.855	7.622	4.789	5.270
K_e^*(DVM)	6.947	5.346	4.924	4.931	7.375	5.629	5.858
K_e^*(DVM)	7.086	4.458	4.120	6.182	5.228	5.632	5.451
K_e^*(RIM)	5.697	4.462	4.116	6.152	5.165	5.818	5.235
K_e^*(CPM)	5.504	4.659	5.157	4.890	5.398	4.915	5.087
K_o^*(DVM)	5.529	4.662	4.372	4.855	5.369	4.909	4.949
K_o^*(DVM)	5.704	5.541	5.095	6.415	7.622	5.798	6.029
K_o^*(RIM)	7.094	5.527	4.358	4.864	7.603	4.761	5.701
K_o^*(CPM)	6.911	5.315	4.970	6.426	7.365	5.650	6.106

support those of Wright, Young and Barton, and Rao and Litzenberger that, in a developing economy, where the capital market is not well organized and market imperfections are far greater than in a developed country, the more traditional approach to valuation appears to be applicable.

CHAPTER 6

SUMMARY AND CONCLUSIONS

"For many things we can find substitutes, but there is not now, nor will there ever be, a substitute for creative thought."

Greenewatt

The stated objective of this thesis was to determine the effects of financial variables on both the equity and average capitalization rates within a sample of industrial firms in Australia and to interpret the results in the context of opposing theoretical positions. The thesis used previously untested models in developing measures of the investor's required rate of return and additionally investigated whether, the effect of the financial variables is partially a function of the level of business risk.

Following a brief discussion concerning the concept of the cost of capital and its importance to firm decision-making, an examination of the theoretical foundations regarding the effect of leverage and dividend policy on the value of the firm was made. Based on this examination the following three hypotheses were presented for testing:

First, the ratio of debt to equity has no effect on either the equity or average capitalization rates for firms with equivalent degrees of business risk.

Second, the earnings retention rate has no effect on either the equity or average capitalization rates for firms with equivalent degrees of business risk.

Third, the relative effects of leverage and earnings retention on either the equity or average capitalization rates for firms are not dependent upon the level of business risk.

Even though all three hypotheses were stated as indifference hypotheses, it did not imply that they were valid as stated, but only that they were stated in testable form.

Although many empirical studies have been conducted (of which only 14 were examined), the evidence as to the true relationship between leverage and/or earnings retention with the equity and/or average capitalization rates was seen to be little more than suggestive. Few studies were seen to have used a theoretically sound econometric model and additionally each previous study suffered from at least two of the following three deficiencies. First, the absence of an unbiased measure of leverage, in that frequently book values for equity were used rather than market values in the measurement of leverage; second, regression analysis was commonly conducted on a sample of firms chosen from an industry group, since it was assumed that firms within the same industry manifest equivalent degrees of business risk, and third, the equity capitalization rate was frequently measured by either the ratio of current dividends to market price or current earnings to market price, such measures are however unsatisfactory since they fail to recognize that the stream of payments to shareholders may either grow, decline or randomly fluctuate from some current base. Of the three deficiencies the third can be regarded as being the most serious, because it introduces a

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bias which is predictable neither in size nor direction.

Following a three-stage process designed so as to achieve a sample of firms exhibiting a high degree of homogeneity among factors such as freedom from government regulation, and the absence of any major capital reconstruction and yet a high degree of heterogeneity among factors such as growth trends, cost and demand patterns and the relative influences of economic cycles, 220 firms covering 11 industries were selected for analysis. In an effort to ensure that the data inputted into the analysis was comparable on both a firm-to-firm and year-to-year basis a system of standardized procedures was introduced and the development of a computerized data bank of individual firm statistics resulted. The regression equations used in this thesis have been set out previously but for summary purposes they are repeated again, together with the formulaes used in deriving the values of the dependent variables. In the testing of hypotheses one and two, the following equations were used:

$$(6\text{-}1) \quad K_e = a_o + a_1 \frac{V_D}{V_S} + a_2 \left[\frac{V_D}{V_S}\right]^2 + a_3 RN + a_4 RN^2 + \\ + a_5 S + a_{6 \cdots 15} ID + a_{16} BR$$

$$(6\text{-}2) \quad K_o = a_o + a_1 \frac{V_D}{V_T} + a_2 \left[\frac{V_D}{V_T}\right]^2 + a_3 RN + a_4 RN^2 + \\ + a_5 S + a_{6 \cdots 15} ID + a_{16} BR$$

$$(6\text{-}3)\quad K_e = a_o + a_1 \frac{V_D}{V_S} + a_2 \left[\frac{V_D}{V_S}\right]^2 + a_3 \frac{V_p}{V_S} + a_4 \left[\frac{V_p}{V_S}\right]^2 + + a_5 RN + a_6 RN^2 + a_7 S + a_{8 \cdots 17} ID + a_{18} BR$$

$$(6\text{-}4)\quad K_o = a_o + a_1 \frac{V_D}{V_T} + a_2 \left[\frac{V_D}{V_T}\right]^2 + a_3 \frac{V_p}{V_T} + a_4 \left[\frac{V_p}{V_T}\right]^2 + + a_5 RN + a_6 RN^2 + a_7 S + a_{8 \cdots 17} ID + a_{18} BR$$

where:

K_e is the equity capitalization rate

K_o is the average capitalization rate

V_D is the market value of senior securities (In Equations (5-1) and (5-2) V_D includes V_p)

V_p is the market value of preferred securities

V_S is the market value of equity

V_T is the market value of all securities (i.e., $V_T = V_S + V_D$ or alternatively $V_T = V_D + V_p$)

RN is the retention rate

S is the size of the firm

ID is the industry dummy variable

BR is the business risk of the firm.

The equity and average capitalization rates were calculated by using the following formulaes:

$$(6\text{-}5)\quad P_o = \frac{D_o(1+g_s)}{(K_e - g_s)} - \frac{D_o(1+g_s)(1+g_s)^5}{(K_e - g_s)(1+K_e)^5} + \frac{D_o(1+g_s)^5(1+g_n)}{(K_e - g_n)(1+K_e)^5}$$

$$(6\text{-}6)\quad P_o = \frac{D_o(1+g_s)}{(K_e - g_s)} - \frac{D_o(1+g_s)(1+g_s)^{10}}{(K_e - g_s)(1+K_e)^{10}} + \frac{D_o(1+g_s)^{10}(1+g_n)}{(K_e - g_n)(1+K_e)^{10}}$$

$$(6\text{-}7)\quad E(R_i) = R_f + [E(R_m) - R_f] RI_i$$

$$(6\text{-}8)\quad E(R_i) = R_f + [E(R_m) - R_f]\beta_i$$

$$(6\text{-}9)\quad K_o = \frac{K_i V_D + K_p V_p + K_s V_S}{V_T}$$

where:

P_o is the value of a share of equity at time 0

D_o is the dividend per share at time 0

g_s is the rate of growth in dividends per share for N periods

g_n is the rate of growth in dividends per share from the N^{th} period to infinity

5,10(N) is the investor's dividend growth horizon

$E(R_i)$ is the investor's required rate of return (equity capitalization rate) for the i^{th} security

R_f is the risk-free rate of interest

$E(R_m)$ is the expected return for the market portfolio

RI_i is the risk-index coefficient for the i^{th} security

β_i is the beta coefficient for the i^{th} security

K_i is the debt capitalization rate

K_p is the preference capitalization rate.

Equations (6-1), (6-2), (6-3) and (6-4) satisfactorily tested for the effects of leverage, retention and size on both the equity and average capitalization rates where business risk was included as a variable. This thesis was also however concerned with the question of whether the effects of those variables was partially a function of the level of business risk. As such, the following regression equations were used in this additional investigation:

$$(5\text{-}10)\quad K_e = a_o + a_1 \frac{V_D}{V_S} + a_2 \left[\frac{V_D}{V_S}\right]^2 + a_3 RN + a_4 RN^2 + a_5 S + a_{6 \cdots 15} ID$$

$$(5\text{-}11)\quad K_o = a_o + a_1 \frac{V_D}{V_T} + a_2 \left[\frac{V_D}{V_T}\right]^2 + a_3 RN + a_4 RN^2 + a_5 S + a_{6 \cdots 15} ID$$

$$(5\text{-}12)\quad K_e = a_o + a_1 \frac{V_D}{V_S} + a_2 \left[\frac{V_D}{V_S}\right]^2 + a_3 \frac{V_p}{V_S} + a_4 \left[\frac{V_p}{V_S}\right]^2 + a_5 RN + a_6 RN^2 + a_7 S + a_{8 \cdots 17} ID$$

$$(5\text{-}13)\quad K_o = a_o + a_1 \frac{V_D}{V_T} + a_2 \left[\frac{V_D}{V_T}\right]^2 + a_3 \frac{V_p}{V_T} + a_4 \left[\frac{V_p}{V_T}\right]^2 + a_5 RN + a_6 RN^2 + a_7 S + a_{8 \cdots 17} ID$$

where: all the terms are as previously defined.

In the first part of the analysis where risk was incorporated as a variable, stable statistically significant parameters were found measuring the influence of leverage, retention and size on the cost of capital. More specifically, first it appears that there are substantial cost advantages to be gained by increasing leverage in the range within which most of the leverage ratios lie. There is strong evidence however, that beyond a certain point further increases in the leverage ratio will lead to increases in the overall cost of capital. Thus these results cast doubt on the Modigliani and Miller hypothesis of the invariance of a firm's cost of capital to changes in its capital structure. Second, the regression results also suggest a consistency with the traditional theory that investors have a preference for current dividends, that is, they are prepared to sacrifice some return for an early resolution of uncertainty. Finally, from the regression results it is also possible to conclude that the cost of capital of small industrial firms is greater than that of large industrial firms.

In the second part of the analysis, covering the question of whether the effect of financial variables on the cost of capital is partially a function of the level of business risk the answer was in the affirmative. Thus it appears that the lower the level of business risk the closer investors become to being indifferent with regard to both the debt financing and retention policies of firms.

As well as the findings relating to the influence of leverage and retention on the cost of capital, this thesis also reported on the question of estimating the 'risk-premium' on ordinary equity.

APPENDIX 1

A widely used model dealing with the expected return and risk for all securities in the market when equilibrium prevails is variously known as, 'the capital asset pricing model', 'capital market theory' or 'market line theory'. The theory is based on the assumptions underlying portfolio analysis since it is essentially the logical, mathematical and economic implications of portfolio analysis. This analysis is a valid optimum-seeking analysis for investors who are described by the following assumptions:[(1)]

1. An investor's judgment of the uncertain outcome from holding a risky asset can be represented by a probability distribution with a finite mean and variance.
2. The perceived risk of an investment to an investor is represented by the variance (alternatively, the standard deviation) of the expected return.
3. Investors are averse to risk, that is, between any two investment opportunities with the same perceived risk, investors will prefer the investment offering the greater expected return. Or alternatively, between any two investments with the same expected return, investors will prefer the investment offering the smaller perceived risk.
4. All investments are for a single uniform length; assets are infinitely divisible, and there are no transaction

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1. Portfolio analysis owes its origin to Dr. Harry Markowitz and for a further discussion of the assumptions see, Harry Markowitz, "Portfolio Selection", Journal of Finance, 7 (March 1952), 77-91, and Harry Markowitz, Portfolio Selection (New York: Wiley, 1959).

costs or taxes.

Operating within the above assumptions Markowitz developed a mathematical procedure to analyze the expected return, risk, and covariance statistics for a group of assets and delineate the efficient frontier which may be expected if these assets are combined into optimum portfolios. These optimum portfolios or efficient portfolios dominate the individual assets in risk-return space and are therefore highly desirable investments. Markowitz portfolio analysis tells what assets are held in each efficient portfolio and their exact proportions in the portfolio. Mathematically, the objective of portfolio analysis is to maximize the portfolios expected return, as defined in Equation (1A-1):

$$E(R_p) = \sum_{i=1}^{n} W_i E(R_i) \qquad \text{(1A-1)}$$

at each risk class, as defined in Equation (1A-2):

$$\text{var}(R_p) = \sum_{i=1}^{n} \sum_{j=1}^{n} W_i W_j \text{cov}(R_i R_j) \qquad \text{(1A-2)}$$

subject to the constant of Equation (1A-3)

$$\sum_{i=1}^{n} W_i = 1 \qquad \text{(1A-3)}$$

where $E(R_i)$ is the equilibrium expected return for the i^{th} security

$E(R_p)$ is the expected return for the portfolio

$Var(R_p)$ is the variance of the distribution of possible portfolio returns

W_i is the proportion of funds invested in asset i

W_j is the proportion of funds invested in asset j

$cov(R_i, R_j)$ is the covariance of returns for the i^{th} asset with the j^{th} asset.

The covariance is defined by Equation (1A-4):

$$\text{(1A-4)} \qquad cov(R_i R_j) = \sigma_i \sigma_j R_{ij}$$

where:

σ_i is the standard deviation about the expected return for asset i

σ_j is the standard deviation about the expected return for asset j

R_{ij} is the correlation between returns for assets i and j.[2]

If the risk and return of all individual assets on all security exchanges were plotted in risk-return, [σ,E(R)] space, they would be dominated by portfolios. Figure (1A-1) represents the set of investment opportunities available in the securities markets. The escalloped quarter-moon-shaped opportunity set in Figure (1A-1) contains individual assets in the lower right-hand side represented by dots. The efficient frontier is represented by the heavy dark curve, AB. Only portfolios will lie along the efficient frontier. Portfolios will always dominate individual assets because of the risk reducing benefits of Markowitz diversification

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2. The correlation between returns may be positive, negative or zero, depending on the nature of the association. A correlation coefficient of +1.00 indicates that variations in the return of one asset are associated with proportional changes in the return for the other asset; a correlation coefficient of -1.00 indicates that they vary inversely in the same proportions; and a zero coefficient indicates an absence of correlation.

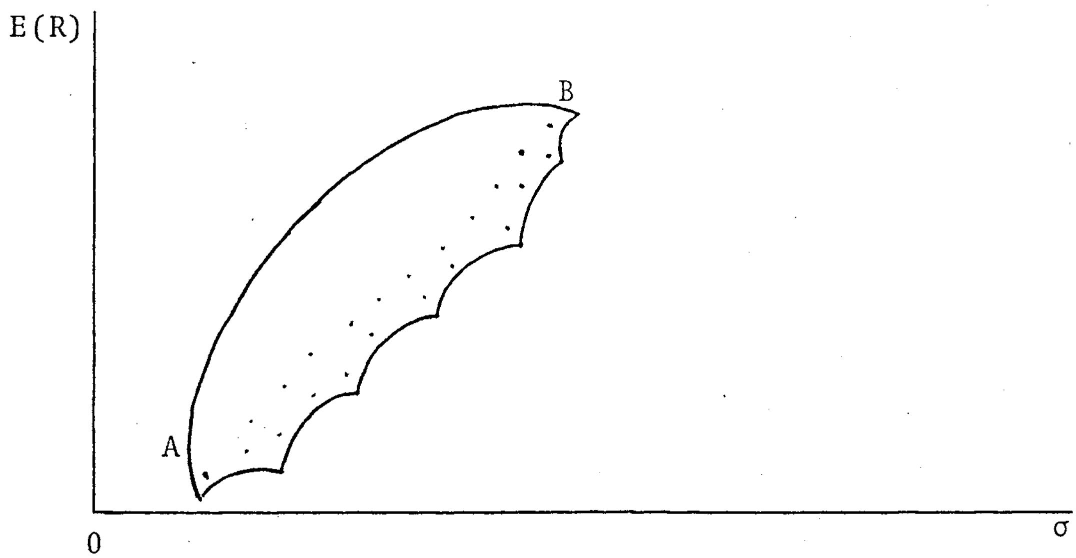

FIGURE (1A-1) THE OPPORTUNITY SET IN RISK-RETURN SPACE

which portfolios enjoy.[3] However, the highest return portfolio, B in Figure (1A-1), is likely to be a one-asset portfolio.

The opportunity set is constructed of curves which are all convex toward the E(R) axis. This is because all assets have correlation coefficients between positive and negative unity, resulting in a locus of portfolios which may be created that traces a curve which is convex to the E(R) axis in risk-return space.[4]

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3. Markowitz efficient diversification involves combining investment with less than perfect positive correlation in order to reduce risk in the portfolio without sacrificing any of the portfolio's return. Not all portfolios will lie on the efficient frontier; some will dominate others. However, if Markowitz diversification is applied to all marketable assets, the resulting portfolio would be the efficient set of portfolios which forms the efficient frontier in Figure (1A-1).

4. Perfectly positively correlated assets will generate linear combinations of risk and return; however, under no circumstances will a portfolio possibility locus ever

Given the background of portfolio analysis, it is now possible to introduce the theory of capital market behaviour.[5] The assumptions on which the theory is based are:

1. All investors are Markowitz efficient diversifiers who delineate and seek to attain the efficient frontier.
2. Any amount of money can be borrowed or lent at the risk-free rate of interest, R_f. No other borrowing is permitted.
3. Idealized uncertainty prevails; that is, all investors visualize identical probability distributions for future rates of return - they have homogeneous expectations.
4. The amount of risky securities in the market is given; all securities that were to be issued for the coming period have been issued, and all firm financial decisions have been made.
5. All investors have a single-period planning horizon, and they forecast the probability distributions of the rates of return on securities and portfolios of

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curve away from the E(R) axis in risk-return space. For a mathematical derivation of the efficient frontier of the opportunity set see, Jack Hirschleifer, "Efficient Allocation of Capital in an Uncertain World", American Economic Review, 54 (May 1964), 79.

5. For an extended derivation of capital market theory see, William F. Sharpe, "Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk", Journal of Finance, 19 (September 1964), 425-42; John Lintner, "The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets", Review of Economics and Statistics, 47 (February 1965), 13-37.

securities for the coming period.

6. Investors are indifferent between equal dollar amounts of dividend and capital gains income furthermore there is no inflation and no change in the level of interest rates (or all changes are fully anticipated).
7. The capital market is perfectly competitive; there are no taxes and no transactions costs; all securities are completely divisible and the capital market is in equilibrium.

Assumptions (1-7) establish a world in which individuals differ in their attitudes toward risk and the amounts they will be investing, but they agree on the characteristics of the securities available, are all averse to risk, and agree on what constitutes risk. They can freely invest in any combination of securities desired and can borrow and lend at the same rate of interest. At best this world is an idealization of the actual case, but it may serve as a useful approximation of reality.

Given that any amount of money can be borrowed or lent at the risk-free rate of interest (assumption 2), the investment opportunities shown in Figure (1A-1) may be extended, that is, by combining the riskless asset with a risky asset, new portfolios could be created which are not shown in that figure. The opportunity locus in risk-return space representing the portfolios which may be formed from a risky asset and the riskless asset is generated by drawing a straight line out from the riskless rate into risk-return space.(6) Figure (1A-2) shows three of the infinite number of opportunity loci representing portfolios containing the riskless asset and a risky asset. Rational investors who use Markowitz diversification will recognize

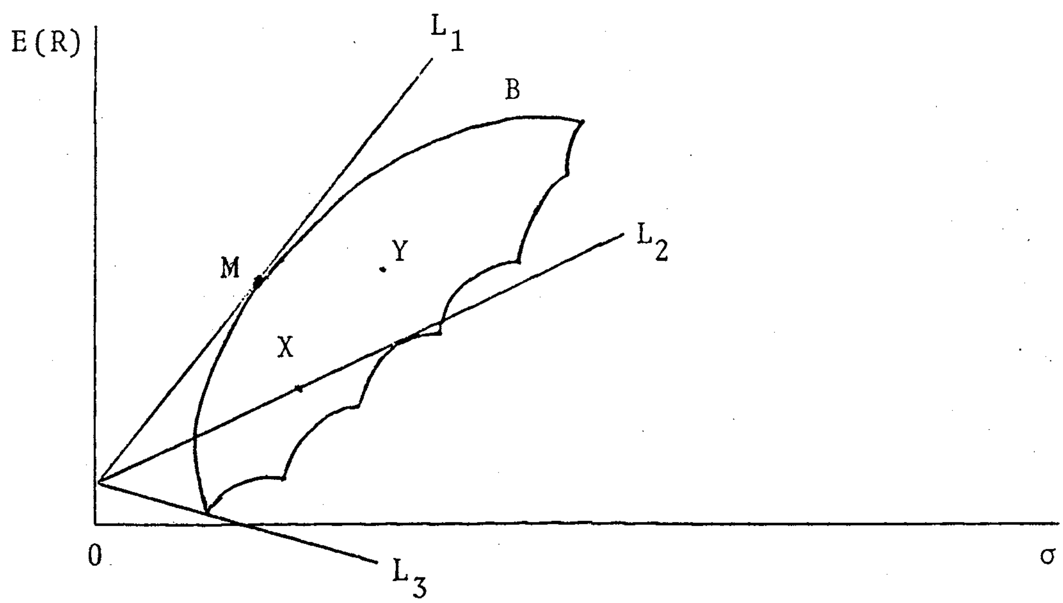

FIGURE (1A-2) OPPORTUNITY LOCI FOR PORTFOLIOS CONTAINING THE RISKLESS ASSET

the various opportunities shown in Figure (1A-2). These investors will also recognize that the opportunity locus designated L_1 dominates all other opportunities. The portfolios which can be created from the riskless asset and risky assets other than M (for example, along L_2 and L_3) are dominated by the opportunities represented by the line L_1 in

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6. The introduction of a riskless asset was made by James Tobin, "Liquidity Preference as Behavour Towards Risk", Review of Economic Studies, 26 (February 1958), 65-86. For a simple proof that the opportunity loci for all possible portfolios of the riskless asset and a risky asset is linear in risk-return space see, Jack Francis and Stephen Archer, Portfolio Analysis, (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1971), 116.

Figure (1A-2). Therefore, investors will all want the portfolio denoted as M (the market portfolio) in Figure (1A-2) because this is the risky asset which is needed to generate the dominant opportunity locus L_1.(7) Hereafter, L_1 will be called the capital market line, or merely the CML, and is defined by its intercept and slope as shown in Equation (1A-5):

$$(1A\text{-}5) \qquad E(R_p) = R_f + \frac{E(R_m) - R_f}{\sigma_m} \sigma_p$$

where:

σ_m is the standard deivation of the probability distributions of possible returns for M

σ_p is the standard deviation of the rate of return on the portfolio.

Thus far the analysis has determined that in a equilibrium situation characterized by the given assumptions, the expected return of portfolios is a linear function of the portfolio's standard deviation of returns. This linear relation has been called the CML. Our discussion must now turn to the determination of the equilibrium rate of return on individual assets and/or portfolios. Individual assets will be located within the opportunity set instead of on the CML. In terms of Figure (1A-2) they will be located at points like X and Y.

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7. The return on the market portfolio is the weighted average return on all securities in the market. Although in reality there is no market portfolio, it is a useful theoretical construct since the return on M could be the return on the All Ordinaries Index. For a discussion of the market portfolio see Eugene F. Fama, "Risk, Return and Equilibrium - Some Clarifying Comments", Journal of Finance, 23 (March 1968), 29-40.

Recall that for an n-security portfolio, the portfolio variance was given by Equation (1A-2) as:

$$\text{(1A-2)} \qquad var(R_p) = \sum_{i=1}^{n} \sum_{j=1}^{n} W_i W_j cov(R_i R_j)$$

Note that within the expression for the risk of a portfolio of any size are covariance terms between all possible pairs of securities in the portfolio. The essence of Markowitz diversification is to find securities with low positive or negative covariances. Demand for individual securities or portfolios which have low positive or negative covariances of returns with the market portfolio will be high; whereas securities which have high covariance with the market portfolio will experience low demand. As a result the prices of securities with high covariance will fall and prices of securities with low covariance will rise. Since equilibrium rates of return move inversely with the price of a security, securities having a high covariance with the market will experience high expected returns; whereas securities having a low covariance with the market will experience low expected returns. The relationship describing the equilibrium rate of return on an individual asset is called the security market line or merely the SML and is given by Equation (1A-6) as:

$$\text{(1A-6)} \qquad E(R_i) = R_f + \frac{E(R_m)-R_f}{Var(R_m)} cov(R_i, R_m)$$

where:

$Var(R_m)$ is the variance of the probability distributions of possible returns for the market portfolio.

The SML may also be expressed in terms of a securities systematic risk.[8] An index of systematic risk is the beta coefficient which is defined by Equation (1A-7) as:

$$\text{(1A-7)} \quad \text{Beta Coefficient } (\beta_i) = \frac{cov(R_i, R_m)}{var(R_m)}$$

Equation (1A-6) may now be restated in terms of the beta coefficient as Equation (1A-8)

$$\text{(1A-8)} \qquad E(R_i) = R_f + [E(R_m) - R_f]\beta_i$$

8. For an examination of the nature of systematic risk see, William F. Sharpe, "A Simplified Model for Portfolio Analysis", Management Science, 10 (January 1963), 277-93.

APPENDIX 2

	Firm Name	Home Exchange	Main Activities	AASE Code	Balance Date	Category
1	Acorn Gowns Limited	Melbourne	Manufacturers and Merchants of Wearing Apparel	7	June	
2	Adams (Herbert) Holdings Limited	Melbourne	Manufacturer of Bread, Cakes and Pastry	6	June	
3	Adams (William) & Company Limited	Sydney	Distributors of Steel, Aluminium, Machine Tools and Power Transmission Equipment	9	April	*
4	Adelaide Brighton Cement Limited	Adelaide	Cement Manufacturers	10	May	*
5	Adelaide Holdings Limited	Adelaide	Clothing Manufacturers	7	November	
6	Adelaide Motors Investments Limited	Adelaide	Motor Vehicle Distributor	12	June	
7	Adelaide Steamship Company Limited, The	Adelaide	Operator of Interstate Carriers and Tugs	4	June	*
8	Advertiser Newspapers Limited	Adelaide	Newspaper and Radio Station Proprietor and General Printer	5	December	*
9	Aeron Limited	Sydney	Ventilating and Air-conditioning Engineers	9	June	

	Firm Name	Home Exchange	Main Activities	AASE Code	Balance Date	Category
10	Alaska Foods Limited	Adelaide	Butter, Cheese and Dairy Foods Manufacturer	6	June	
11	Alexanders Securities Limited	Brisbane	Investors	2	June	D
12	Aldus Limited	Melbourne	Manufacturer of Printing, Paper Converting and Paper Making Machinery	9	June	*
13	Allen (Samuel) & Sons	Brisbane	Builders' Supplies and General Merchant, Air-conditioning and Refrigeration Engineers	5	June	
14	Allen's Confectionery Limited	Melbourne	Manufacturers of Confectionery	6	June	*
15	Allgas Energy Limited	Brisbane	Gas Supplier	14	June	C
16	Alliance Holdings Limited	Sydney	Financiers and Hire Purchase Facilities	2	June	D
17	Allied Meat Industries Limited	Melbourne	Wholesale and Retail Butchers and Smallgoods Manufacturers	6	June	A
18	Allied Mills Limited	Sydney	Flour Millers and Manufacturers of Margarine	6	August	*

	Firm Name	Home Exchange	Main Activities	AASE Code	Balance Date	Category
19	Amagraze Limited	Brisbane	Meat and Prawn Processor	6	September	A
20	Amalgamated Chemicals Limited	Sydney	Formulators and Distributors of Agricultural Chemicals	8	December	A
21	Amalgamated Holdings Limited	Sydney	Picture Theatre Operators and Property Owners	5	June	*
22	Amalgamated Industries Limited	Perth	Wholesale Hardware, Glass and Paint Merchants	5	June	A
23	Amalgamated Wireless (Australia) Limited	Sydney	Electronic Engineers, Television and Radio Equipment Manufacturers	11	June	*
24	Ampol Petroleum Limited	Sydney	Importers, Refiners and Marketers of Petroleum and Petroleum Products	14	September	*
25	Anderson (Eric) Consolidated Limited	Sydney	Electrical Retailer	11	June	
26	Angus & Coote (Holdings) Limited	Sydney	Retail and Manufacturing Jewellers, Specialists in Hearing Aids	5	July	A
27	Ansett Transport Industries Limited	Melbourne	Air and Road Transport and Freighting Operations	4	June	*
28	A.P.A. Holdings Limited	Sydney	Life, Fire and General	1	September	C

	Firm Name	Home Exchange	Main Activities	AASE Code	Balance Date	Category
29	A.R.C. Industries Limited	Melbourne	Manufacturers of Reinforcing Fabrics, Welded Fencing and Barbed Wire	10	June	*
30	Argo Investments Limited	Adelaide	Investors	2	March	D
31	Associated Broadcasting Services Limited	Melbourne	Radio Station Proprietor	5	June	
32	Associated Dairies Limited	Melbourne	Manufacturers and Vendors of Dairy Products	6	June	
33	Associated Foods Limited	Sydney	Wholesaler of Health Foods, Catering Supplies and Frozen Foods	5	June	
34	Associated Pulp and Paper Mills Limited	Melbourne	Wood-pulp, Paper, Timber and Flakeboard Manufacturers	8	June	*
35	Associated Rural Industries Limited	Sydney	Television Station Proprietor, Rice Merchants and Pearl Culture	6	June	B
36	Associated Securities Limited	Sydney	Financiers - Motor Vehicle, Industrial and Property	2	June	D
37	Atel Limited	Sydney	Sawmiller, Timber Processor and Furniture Manufacturer	10	June	

	Firm Name	Home Exchange	Main Activities	AASE Code	Balance Date	Category
38	Atkins Carlyle Limited	Perth	Merchant and Electrical Engineer handling Electrical Goods and Automotive Supplies	12	May	
39	Atkins (William) Holdings Limited	Sydney	Distributors of Steel, Aluminium, Paints and Engineering Supplies	9	June	*
40	Austral Bakeries (Holdings) Limited	Melbourne	Manufacturer and Distributor of Bread	6	June	*
41	Austral Motors Holdings Limited	Melbourne	Motor Vehicle and Tractor Distributor	12	June	
42	Australian Bacon Limited	Melbourne	Bacon Curers and Small-goods Manufacturers	6	April	
43	Australian Chemical Holdings Limited	Sydney	Manufacturers of Chemicals, Engineering Components and Plastics	8	November	A
44	Australian Consolidated Industries Limited	Melbourne	Manufacturers of Glass, Fibre Packaging and Plastics	8	March	A
45	Australian Controls Limited	Melbourne	Manufacturers of Thermostatic Controls and Electronic Equipment	9	June	*

	Firm Name	Home Exchange	Main Activities	AASE Code	Balance Date	Category
46	Australian Cotton Manufacturing Co. Limited	Sydney	Manufacturers and Distributors of Carpet and Insulating Felts, Raw Cotton and Raw Cotton Waste	7	June	
47	Australian Fertilizers Limited	Sydney	Sulphuric Acid and Fertilizer Manufacturer	8	September	A
48	Australian Foundation Investment Co. Limited	Melbourne	Investors	2	June	D
49	Australian Gas Light Company, The	Sydney	Manufacturers and Distributors of Town-Gas and By-Products	14	December	C
50	Australian Guarantee Corporation Limited	Sydney	Financiers - Motor Vehicle, Industrial and Property	2	June	A
51	Australian Gypsum Industries Limited	Melbourne	Manufacturers of Gypsum Board, Insulating Material and Plaster	10	June	*
52	Australian Investment & Development Limited	Sydney	Investors and Underwriters	2	June	D
53	Australian Motor Industries Limited	Melbourne	Manufacturer and Distributor of Motor Vehicles and Tractors	12	June	
54	Australian National Industries Limited	Sydney	Manufacturers and Merchandisers of Forgings, Engines and Mining Equipment	9	June	*

	Firm Name	Home Exchange	Main Activities	AASE Code	Balance Date	Category
55	Australian Newsprint Mills Holdings Limited	Hobart	Manufacturer of Newsprint	8	June	*
56	Australian Paper Manufacturers Limited	Melbourne	Manufacturers of Woodpulp, Board and Paper also Fibre Containers and Cartons	8	June	*
57	Australian United Corporation Limited	Melbourne	Investors, Underwriters and Financial Services	2	June	D
58	Australian United Investment Company Limited	Melbourne	Investors	2	June	D
59	Auto Investments Limited	Perth	Financier, Motal Chain and Food Franchise Operator	2	June	D
60	Automatic Totalisators Limited	Sydney	Manufacturer of Totalisator Equipment, Toolmaker and Precision Engineer	9	June	*
61	Bagot's Executor and Trustee Company Limited	Adelaide	Executor, Trustee and Agency Company	1	March	C
62	Bali Plantations Limited	Sydney	Copra and Cocoa Plantation Owner	6	August	
63	Ballarat & Western Victoria Television Limited	Melbourne	Operator of Television	5	June	

	Firm Name	Home Exchange	Main Activities	AASE Code	Balance Date	Category
64	Ballarat Brewing Company Limited, The	Melbourne	Owner of Hotel Properties and Shares in Carlton & United Breweries Limited	5	May	*
65	Ballarat Woollen and Worsted Company Limited	Melbourne	Operator of Woollen and Worsted Mills	7	September	
66	Bank of New South Wales	Sydney	Banking Services	1	September	C
67	Bank of Adelaide, The	Adelaide	Banking Services	1	September	C
68	Bank of Queensland Limited	Brisbane	Banking Services	1	August	C
69	Bankers & Traders Insurance Company Limited	Sydney	Life, Marine, Fire and Accident Insurance	1	March	C
70	Barnes Milling Limited	Brisbane	Flour and Provender Millers, Bakers and Poultry Processors	6	January	
71	Barrett Burston (Australia) Limited	Melbourne	Malsters	6	January	*
72	Bateman (J. & W.) Limited	Perth	Wholesale Grocery, Hardware, Wine and Spirit Merchants	5	June	
73	Beacon Investment Limited	Melbourne	Investors	2	December	D

	Firm Name	Home Exchange	Main Activities	AASE Code	Balance Date	Category
74	Beith Chemical Materials Limited	Sydney	Importers, Manufacturers and Distributors of Chemicals, Solvents and Glues	8	June	*
75	Bellambi Coal Company Limited, The	Sydney	Colliery Owner and Producer of Metallurgical and Foundry Coke	14	June	*
76	Belmont Stoneware Pipe Holdings Limited	Sydney	Manufacturer of Stoneware Pipes and Fittings	10	June	
77	Bendix Consolidated Industries Limited	Melbourne	Manufacturers of Hospital, Office, Domestic and Industrial Steel Equipment	9	June	
78	Beneficial Finance Corporation Limited	Adelaide	Financier	2	March	D
79	Bennett & Fisher Limited	Adelaide	Wool Brokers, Stock and Station Agents	3	June	*
80	Bennett & Wood Limited	Sydney	Merchants of Motor Parts and Accessories, Garage Equipment, Motor Cycles and Motor Scooters	12	June	A
81	Berk (Ira L. and A.C.) (Holdings) Limited	Sydney	Distributor of Motor Vehicles, Beverage and Vending Machinery	12	June	

	Firm Name	Home Exchange	Main Activities	AASE Code	Balance Date	Category
82	Berrima District Meats Limited	Sydney	Wholesalers and Exporters of Meat	6	June	
83	Besley & Pike Holdings Limited	Brisbane	Envelope Manufacturers	5	December	
84	Besser (Q'ld) Limited	Brisbane	Manufacturers of Concrete Masonry Products	10	June	
85	Birch, Carroll and Coyle Limited	Brisbane	Picture Theatre Operator	5	June	
86	Bisley Clothing Limited	Sydney	Manufacturer of Men's Clothing	7	December	
87	Blackwood (J.) & Son Limited	Sydney	Industrial and Engineers' Supplier and Steel Merchant	9	June	*
88	Blakistons Limited	Melbourne	Road Hauliers and Forwarders	4	June	
89	Bliss Welded Products Limited	Sydney	Specialists in Heavy Duty Metal Working Machinery	8	May	A
90	Blue Metal Industries Limited	Sydney	Quarrymaster, Ready Mixed Concrete Distributor, Engineering and Bituminous Products	10	June	A

	Firm Name	Home Exchange	Main Activities	AASE Code	Balance Date	Category
91	Boans Limited	Perth	Retail Department Store Operator	5	February	
92	Boral Limited	Sydney	Bitumen Manufacturers, Road Surfacing, Gas Distributors, Quarries and Coal Mining	14	June	*
93	Borg-Warner (Australia) Limited	Sydney	Manufacturer of Transportation Equipment, Air-conditioning and Refrigeration Equipment and Industrial Products	12	December	
94	Bounty Investments Limited	Adelaide	Investors	2	February	D
95	Bowling Centres (Holdings) Limited	Sydney	Operator of Tenpin Bowling Centres	5	June	
96	Bowra Holdings Limited	Perth	Engineers and Manufacturers of Tractor Equipment	9	June	
97	Bradford Insulation Holdings (S.A.) Limited	Adelaide	Manufacturer of Insulating Products	10	June	*
98	Bradford, Kendall Limited	Sydney	Steel Founders and Manufacturers of Rolling Stock	9	June	*

	Firm Name	Home Exchange	Main Activities	AASE Code	Balance Date	Category
99	Bradley Bros. Limited	Sydney	Manufacturers and Distributors of Automotive Spare Parts, Accessories and Garage Equipment	12	June	
100	Bradmill Industries Limited	Sydney	Cotton Spinners, Weavers, Dyers, Finishers, Knitters and Garment Manufacturers	7	June	*
101	Braemar Industries Limited	Melbourne	Manufacturer of Hot Water Services, Industrial Valves, Automotive Equipment and Materials Handling Equipment	9	June	*
102	Brambles Industries Limited	Sydney	Transport Services, Industrial Contracting, Materials Handling and Plant Hire Services	4	June	*
103	Brash Holdings Limited	Melbourne	Retailer and Wholesaler of Musical Instruments and Domestic Appliances	5	June	
104	Brash MacArthur (W.) Limited	Sydney	Wholesaler of Carpets, Clothing Materials and Softgoods	5	June	
105	Brenton Investments (Australia) Limited	Melbourne	Investors	2	July	D

	Firm Name	Home Exchange	Main Activities	AASE Code	Balance Date	Category
106	Brick and Pipe Industries Limited	Melbourne	Manufacturer of Bricks and Pipes	10	March	*
107	Brickworks Limited	Sydney	Brick and Pipe Manufacturers	10	June	*
108	Brisbane (H.L.) and Wunderlich Limited	Perth	Manufacturer of Roofing Tiles, Clay Pipes, Hotel and Domestic Crockery also Glass Merchants	10	June	
109	Brisbane TV Limited	Brisbane	Television Station Proprietor	5	June	
110	British Tobacco Company (Australia) Limited	Sydney	Manufacturer and Distributor of Tobacco Products, also production and Distribution of Foods and Beverages	6	October	*
111	Broken Hill Holdings Limited	Sydney	Operator of a Bakery and Commercial Laundry	5	June	
112	Broken Hill Proprietary Company Limited, The	Melbourne	Miner, Manufacturer and Distributor of Iron and Steel Products, Ship-owners, Oil and Gas Producer	9	May	*
113	Brolite Industries Limited	Melbourne	Manufacturers of Paints, Paint and Rust Removers and Brush Cleaners	8	September	*

	Firm Name	Home Exchange	Main Activities	AASE Code	Balance Date	Category
114	Brooke Bond Monbulk Limited	Melbourne	Manufacturers of Jams and Canned Fruits also Wholesale Meat Distributors	6	September	
115	Brooker Holdings Limited	Sydney	Manufacturer of Aluminium Boats and Boat Trailers, Concrete and Slipform Equipment	9	June	*
116	Brooklands (Holdings) Limited	Melbourne	Distributors of Motor Vehicles and Spare Parts	12	April	*
117	Brown & Dureau Limited	Melbourne	Manufacturers' Representatives, Importers and Exporters	5	June	
118	Brown-Gouge Limited	Melbourne	Dry Cleaners and Dyers	5	June	
119	Bruck (Australia) Limited	Melbourne	Cotton Spinner, Weavers, Knitters, Dyers and Wholesalers of Manmade Fibre Fabrics	7	June	*
120	Bryce Limited	Brisbane	Cartage Contractors and Bonded Warehousemen	5	June	
121	Bryce (Robert) & Co. Limited	Melbourne	Merchants and Importers	5	December	A

	Firm Name	Home Exchange	Main Activities	AASE Code	Balance Date	Category
122	Buckley and Nunn Limited	Melbourne	Retail Department Store Operator	5	July	*
123	Building Guarantee & Discount Company Limited	Melbourne	Financier and Investor	2	June	A
124	Bunning Timber Holdings Limited	Perth	Sawmillers, Timber Merchants and General Builders' Suppliers	10	June	
125	Bunny Industries Limited	Melbourne	Hardware Merchants and Property Owners	10	June	
126	Burns Philp & Co. Limited	Sydney	Merchant, Shipping and General Agent, Retailer	5	June	A
127	Bushells Investments Limited	Sydney	Tea and Coffee Merchants	6	March	*
128	Caesar Fabrics Limited	Sydney	Textile Manufacturers and Importers	7	June	
129	Cahills Holdings Limited	Sydney	Restaurants	5	December	A
130	Cambridge Credit Corporation Limited	Sydney	Financier - Motor Vehicle, Mortgage and Hire Purchase	2	June	D
131	Camelec Limited	Adelaide	Manufacturers of Electric Cables, Wiring Looms, Disposable Medical and Plastic Products	11	June	

	Firm Name	Home Exchange	Main Activities	AASE Code	Balance Date	Category
132	Campbell (A.G.) Holdings Limited	Sydney	Wholesale Grocery Store Operator	5	June	*
133	Campbell Brothers Limited	Brisbane	Manufacturers of Chemicals Detergents, Soaps, Refractories and Acids	8	September	
134	Campbell's Holdings Limited	Sydney	General Merchants and Storekeepers	5	June	
135	Canberra Television Limited	Sydney	Television Station Proprietor	5	June	
136	Capel Court Investment Company (Australia) Limited	Melbourne	Investor	2	December	D
137	Caris Holdings Limited	Perth	Retail Jewellers	5	June	
138	Carlton Investment Limited	Sydney	Investor and Hotel Owner	2	June	D
139	Carpenter (W.R.) Holdings Limited	Sydney	Merchant, Financier, Investor and General Insurer	2	June	A
140	Carpenters Investment Trading Co. Limited	Sydney	Investors, Underwriters and Agents	2	June	D
141	Carpet Manufacturers Limited	Sydney	Manufacturer of Carpets	7	June	*

	Firm Name	Home Exchange	Main Activities	AASE Code	Balance Date	Category
142	Carricks Limited	Brisbane	Sawmillers and Plywood Manufacturers, Building Materials and Timber Merchants	10	December	
143	Carrier Air Conditioning (Holdings) Limited	Sydney	Manufacturers of Air-conditioning, Drying and Refrigeration Equipment	9	June	
144	Cascade Brewery Company Limited, The	Hobart	Brewers and Hotel Proprietors	6	March	A
145	Castlemaine Brewery Company Melbourne Limited, The	Melbourne	Investor	2	September	D
146	Castlemaine Perkins Limited	Brisbane	Brewers, Wine and Spirit Merchants, Hotel Proprietors	6	July	*
147	Cemac Associated Limited	Sydney	Manufacturers and Suppliers of Veneer and Plywood Products, Modular Pre-fabricated Components	10	June	*
148	Central Queensland Salt Industries Limited	Brisbane	Salt Refiner and Distributor	6	June	
149	Century Storage Battery Co. Limited	Sydney	Manufacturer of Lead Acid Storage Batteries, Zinc Sheets and Chemicals for Process Engravers	12	June	*

	Firm Name	Home Exchange	Main Activities	AASE Code	Balance Date	Category
150	Chalmers Limited	Melbourne	Cartage Contractors	5	June	
151	Chamberlain Holdings Limited	Perth	Manufacturer of Farm and Industrial Tractors and Agricultural Implements	9	June	
152	Chapmans Limited	Sydney	Manufacturer of Bedding, Quilts and Matresses also Manchester and Furnishings Warehouse	7	June	
153	Charlick (William) Limited	Adelaide	Packaging, Milling, Shipping and Transport, Overseas Interests	5	June	
154	Chatham Investment Co. Limited	Sydney	Investor	2	June	D
155	Cheynes Beach Holdings Limited	Perth	Whalers	6	November	
156	Choiseul Plantations (Holdings) Limited	Sydney	Copra and Cocoa Plantation Owner	6	June	A
157	Chown (A.J.) Holdings Limited	Sydney	Timber Millers and Merchants, Wholesale Builders Hardware, Glass Merchants and Importers of Kitchenware	10	June	*

	Firm Name	Home Exchange	Main Activities	AASE Code	Balance Date	Category
158	City Motors Holdings Limited	Perth	Motor Vehicle Distributor	12	June	
159	Clackline Refractories Limited	Perth	Manufacturers of Fire-bricks	10	June	
160	Clark Rubber Stores Limited	Melbourne	Retail and Wholesale Rubber Merchants	8	June	*
161	Clarke Bros. Holdings Limited	Sydney	Furniture and Joinery Manufacturer	10	June	
162	Clarkson Limited	Adelaide	Glass, Paint and Hardware Merchants	5	June	
163	Cleckheaton Limited	Melbourne	Manufacturers of Worsted Yarns and Property Owners	7	June	*
164	Clements Marshall Consolidated Limited	Hobart	Agricultural Produce Merchants	5	September	A
165	Clifton Brick Holdings Limited	Melbourne	Brick Manufacturer	10	June	*
166	Clonmore Investments (Australia) Limited	Melbourne	Investor	2	October	D
167	Clyde Industries Limited	Sydney	Manufacturer of Loco-motives, Paints, Chemicals and Batteries	9	June	*

Firm	Name	Home Exchange	Main Activities	AASE Code	Balance Date	Category
168	Coal & Allied Industries Limited	Sydney	Colliery Owner	14	June	*
169	Coffey (Alan) Motor Investments Limited	Melbourne	Motor Vehicle Distributor	12	June	
170	Coles (G.J.) & Coy. Limited	Melbourne	Chain Store Proprietor	5	June	*
171	Collie (Australia) Limited	Melbourne	Manufacturers of Inks and Distributors of Printers' Requisits	5	June	*
172	Colonial Gas Holdings Limited	Melbourne	Distributors of Natural and Liquid Petroleum Gas	14	June	C
173	Colonial Sugar Refining Co. Limited, The	Sydney	Sugar Grower and Processor, Manufacturers of Building Materials and Chemicals	6	June	*
174	Comeng Holdings Limited	Sydney	Manufacturers of Locomotives, Passenger and Freight Rolling Stock	9	June	*
175	Commercial and General Acceptance Limited	Sydney	Hire Purchase and General Financier	2	June	D
176	Commercial Bank of Australia Limited, The	Melbourne	Banking Services	1	June	C
177	Commercial Banking Company of Sydney Limited, The	Sydney	Banking Services	1	June	C

	Firm Name	Home Exchange	Main Activities	AASE Code	Balance Date	Category
178	Commercial Union Assurance Company of Australia Limited	Melbourne	Life, Fire, Accident and Marine Insurance	1	June	C
179	Commonwealth Industrial Gases Limited	Sydney	Manufacturers and Distributors of Industrial and Medical Gases	8	September	*
180	C.O.N. Holdings Limited	Brisbane	Manufacturers of Plumbers' Fittings and Supplies	10	June	
181	Concrete Industries (Monier) Limited	Sydney	Manufacturers of Concrete and Fibreglass Building Products	10	June	
182	Conkey & Sons Limited	Sydney	Meat Processor and Wholesaler	6	June	
183	Conquip Limited	Sydney	Manufacturers and Distributors of Earth-Moving and Tractor Equipment	9	June	
184	Consolidated Auto Parts Co. Limited	Adelaide	Distributors of Automotive Supplies	12	June	
185	Consolidated Foods Limited	Melbourne	Milk Processors, Retail and Wholesale Dairymen and Bread Manufacturers	6	June	*

	Firm Name	Home Exchange	Main Activities	AASE Code	Balance Date	Category
186	Consolidated Home Industries Limited	Melbourne	Real Estate Developer and Contractor	10	June	
187	Consolidated Motels Limited	Sydney	Motels Owner	5	June	
188	Consolidated Press Holdings Limited	Sydney	Publisher and Television Station Proprietor	5	June	C
189	Consolidated Quarries Limited	Melbourne	Quarrymaster and Concrete Manufacturer	10	June	*
190	Containers Limited	Melbourne	Manufacturers of Metal, Fibre and Plastic Containers, Flexible Packages and Packing	9	June	*
191	Cooke (Sidney) Limited	Melbourne	Importers and Merchants of Printing Machinery and Supplies	5	April	*
192	Co-operative Motors Limited	Hobart	Motor Vehicle Distributor	12	April	
193	Country Television Services Limited	Sydney	Television Station Proprietor and Radio Station Operator	5	June	
194	Cowell Bros. Holdings Limited	Adelaide	Timber and Hardware Merchants	10	June	

Firm	Name	Home Exchange	Main Activities	AASE Code	Balance Date	Category
195	Crane (G.E.) Holdings Limited	Sydney	Manufacturer and Distributor of Copper and Aluminium Products, Plumbers' and Engineers' Supplies	9	June	*
196	Crestknit Industries Limited	Melbourne	Knitting Manufacturers	7	June	*
197	Crisp Holdings Limited	Brisbane	Investor and Service Station Operator	2	June	D
198	Croda Federal Chemicals Limited	Melbourne	Manufacturers and Distributors of Chemicals	8	December	A
199	Crosby (William) (Holdings) Limited	Melbourne	Cartage Contractors, Reprographics and Builders' Supplies	5	June	*
200	Cryer (W.J.) & Co. Limited	Sydney	Printers and Stationers	5	February	B
201	C.T.L. Holdings Limited	Brisbane	Glass and Aluminium Merchants, Builders and Plumbers Supplies	5	June	
202	Cumming Smith and Company Limited	Melbourne	Manufacturer of Chemicals and Fertilisers	8	December	*
203	Currie and Richards Industries Limited	Melbourne	Manufacturers and Marketers of Specialised Sharpening Equipment and Metal Stampers	9	June	

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204	Custom Credit Corporation Limited	Sydney	Hire Purchase and General Financiers	2	September	A
205	Cyclone Company of Australia Limited	Melbourne	Manufacturers of Metal Gates, Wire Fencing and Scaffolding	10	June	*
206	Dalton Brothers Holdings Limited	Sydney	Paper Merchants, Graphic Arts Machinery Merchants, Flour Millers and Bakers	8	June	*
207	Danks Holdings Limited	Melbourne	Wholesale Hardware, Manufacturer of Plumbers and Builders Supplies	10	June	
208	Darling Downs TV Limited	Brisbane	Television Station Proprietor	5	June	
209	Davies Brothers Limited	Hobart	Newspaper Publisher, Printer and Boxmaker	5	June	
210	Davies (R.B.) Industries Limited	Sydney	Manufacturers of Builders' Hardware	10	June	
211	Davis (Charles) Limited	Hobart	Hardware and Building Suppliers, Retail Department Store and Shopping Arcade Developers	5	June	

	Firm Name	Home Exchange	Main Activities	AASE Code	Balance Date	Category
212	Davis Consolidated Industries Limited	Sydney	Manufacturers of Gelatine, Glues, Tallow, Adhesives and Waterproofing Compounds	6	June	*
213	Deering (Hastings) Finance & Investment Company Limited	Sydney	Financier - Motor Vehicle and Hire Purchase	2	June	D
214	Denham Bros. Limited	Brisbane	Foodstuff Manufacturer and Retailer, Manufacturer of Concrete Masonry Blocks	5	September	
215	Dennys, Lascelles Limited	Melbourne	Wool, Stock, Land Insurance and Shipping Agents	3	June	*
216	Development Finance Corporation Limited	Sydney	Investor and Merchant Banker	2	June	D
217	Development Underwriting Limited	Sydney	Investment Banking, Property Development and General Financing	2	June	D
218	Dickson Primer (Consolidated)	Sydney	Manufacturers of Builders Hardware and Electricity Distribution Equipment	10	June	*
219	Direct Acceptance Corporation Limited	Sydney	Financier - Hire Purchase and Mortgage	2	July	D

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220	Draffin Everhot Limited	Melbourne	Manufacturers of Hot Water Systems, Slow Combustion and Electric Cooking Ranges	11	March	
221	Drummond (Wm.) & Co. Limited	Melbourne	Manufacturing and Retail Jewellers	5	June	
222	Duncan Industries Limited	Adelaide	Distributors of Automotive Parts and Accessories	5	June	
223	Duncan's Holdings Limited	Sydney	Sawmillers and Timber Merchants	10	June	
224	Dunlop Australia Limited	Melbourne	Manufacturers of Motor Tyres, Sportsgoods and Clothing	8	June	*
225	Duro Travel Goods Limited	Sydney	Manufacturers and Importers of Bags and Trunks	5	June	
226	Dwyers Motors Limited	Sydney	Motor Vehicle Distributors	12	June	
227	Dylup Plantations Limited	Sydney	Copra and Cocoa Plantation Owners	6	January	
228	Eagers Holdings Limited	Brisbane	Motor Vehicle Distributors	12	April	
229	East African Coffee Plantations Limited	Melbourne	Tea Plantation Owners and Growers	6	May	

	Firm Name	Home Exchange	Main Activities	AASE Code	Balance Date	Category
230	East End Market Company Limited	Adelaide	Wholesale Market Proprietor	5	June	
231	E.D. Holdings Limited	Sydney	Reinvestments	2	June	D
232	Edwards Dunlop and Company Limited	Sydney	Paper and Printing Machinery Merchants	8	April	*
233	Elastic Webbing Industries Limited	Melbourne	Manufacturers of Woven and Braided Elastic	7	June	
234	Elder Smith Goldsbrough Mort Limited	Adelaide	Wool and Produce Brokers, Stock and Station, Shipping, Chartering and Insurance Agents	3	June	*
235	Electrical Equipment of Australia Limited	Sydney	Manufacturers of Electrical Equipment and Importing Merchants	11	June	*
236	Electrical Investments Limited	Adelaide	Financiers	2	June	D
237	Elphinstones Limited	Brisbane	Wholesaler of Automotive Replacement Parts, Accessories and Garage Equipment	12	February	
238	Email Limited	Sydney	Manufacturer of Electrical and Industrial Equipment Domestic Appliances	11	December	*

	Firm Name	Home Exchange	Main Activities	AASE Code	Balance Date	Category
239	Embelton Limited	Melbourne	Sheet Metal Engineer Manufacturer and Distributor of Cork Products	5	June	
240	E.M.I. (Australia) Limited	Sydney	Manufacturer and Distributor of Records, Radio and Television Receivers	11	June	*
241	Ensign Holdings Limited	Melbourne	Industrial Laundry Services	5	June	*
242	Equitable Building Society	Sydney	Land and Building Society	2	June	C
243	Equity Trustees Executors and Agency Company Limited, The	Brisbane	Trustees and Executors	1	June	C
244	Eureka Terra Cotta & Tile Company of Australia Limited, The	Melbourne	Manufacturer of Roof, Floor and Quarry Tiles	10	April	
245	Evans Deakin Industries Limited	Brisbane	Engineers, Shipbuilders and Manufacturers of Diesel Engines, Air Compressors and Transformers	9	June	
246	Examiner - Northern TV Limited	Hobart	Television Station Proprietor and Radio Station Operator	5	June	

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247	Executor Trustee and Agency Company of South Australia Limited	Adelaide	Trustees and Executors	1	September	C
248	F & T. Industries Limited	Melbourne	Manufacturer of Floor Coverings, Non Wovens & Felts, Plastics & Rubber Products, Builders' Suppliers	7	June	*
249	Fairfax (John) Limited	Sydney	Publishing, Television and Radio Interests	5	June	*
250	Falkiner Holdings Limited	Melbourne	Manufacturer of Chains	9	July	
251	Farley & Lewers Limited	Sydney	Quarrymaster and Ready-mixed Concrete Producer	10	June	*
252	Faulding (F.H.) & Co. Limited	Adelaide	Manufacturing Chemists	8	June	*
253	Fibre Containers Limited	Sydney	Manufacturers of Cardboard Carton and Containers	8	October	A
254	Field (T.A.) Holdings Limited	Sydney	Meat Wholesaler and Retailer	6	June	*
255	Fielders Limited	Sydney	Flour Millers, Starch and Glucose Manufacturers	6	June	A
256	Fielding (J) & Co. Limited	Sydney	Cardboard Box, Corrugated Carton and Solid Fibre Shipping Container Manufacturers	8	June	A

	Firm Name	Home Exchange	Main Activities	AASE Code	Balance Date	Category
257	Finance & Guarantee Company Limited	Sydney	Housing and General Finance	2	June	D
258	Fire Fighting Enterprises Limited	Sydney	Manufacturers of Fire Fighting Equipment	9	June	
259	Fitwear Limited	Melbourne	Manufacturers of Men's and Ladies Knitwear	7	June	A
260	Fitzgerald (G.P.) & Co. Limited	Hobart	Retail Department Store Operator	5	August	
261	Flexdrive Industries Limited	Melbourne	Manufacturer of Automotive Equipment, Industrial Tools and Instruments	12	June	*
262	Flower Davies & Johnson Limited	Perth	Engineers and Machinery Merchants	9	October	
263	Formfit of Australia Limited	Sydney	Manufacturers of Foundation Garments	7	June	
264	Foster Brewing Company Limited	Melbourne	Investor	2	January	D
265	Freeman Motors Limited	Adelaide	Motor Vehicle Distributor	12	March	
266	Freighter Industries Limited	Melbourne	Transport, Constructional Refrigeration and Air-conditioning Engineers	9	June	

	Firm Name	Home Exchange	Main Activities	AASE Code	Balance Date	Category
267	Fremantle Gas and Coke Company Limited	Perth	Gas Supplier	14	May	A
268	Frigrite Limited	Melbourne	Air-conditioning and Refrigeration Engineers, Manufacturers of Agricultural Equipment	9	June	
269	Gadsden (J.) Australia Limited	Melbourne	Manufacturers of Plain and Printed Cans, Calico and Hessian Bags, Paper Sacks and Cigarette Boxes	9	June	*
270	Gair Evans Limited	Melbourne	Manufacturers, Distributors of Canvas Goods, Carpets, Sporting Goods, Blinds and Manchester	7	June	
271	Garratt's Limited	Sydney	Investor	2	January	D
272	Genders (Holdings) Limited	Hobart	Wholesale Hardware and General Merchants	5	October	
273	General Investment Company Limited	Perth	Hire Purchase and General Finance	2	June	D
274	General Investments (Australia) Limited	Sydney	Investor and Motel Owner	2	June	D
275	Gerrard Company of Australasia Limited	Melbourne	Manufacturers and Distributors of Machinery, Steel and Wire Products	9	May	A

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276	Gibson Chemical Industries Limited	Melbourne	Manufacturer and Distributor of Chemical Products and Water Engineering Equipment	8	June	*
277	Gibson's Limited	Hobart	Flour and Oatmeal Millers, Grain Merchants	6	October	
278	Gilbert (John A.) Consolidated Limited	Sydney	Motor Vehicle Distributor	12	March	
279	Gillespie Bros. Holdings Limited	Sydney	Flour Millers, Bakers, Stock Feeds and Cake Mixes	6	April	*
280	Glen Iris Brick Consolidated Limited	Melbourne	Brick Manufacturer	10	June	A
281	Goliath Cement Holdings Limited	Hobart	Manufacturer of Portland Cement and Asbestos Cement Products	10	June	*
282	Gollin Holdings Limited	Melbourne	Distributor of Building and Industrial Raw Materials, Importers of Printing Machinery, Paper and Chemicals	5	August	
283	Goodwin (J.C.) & Co. Limited	Sydney	Glass Merchant	10	June	

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284	Gordon and Gotch (Australasia) Limited	Melbourne	Wholesale Newsagents, Booksellers and Stationers, Advertising and Subscription Agents	5	March	*
285	Gow (R.M.) & Co. Limited	Brisbane	Food Manufacturers and Wholesale Grocery Merchants	6	June	
286	Gowing Bros. Limited	Sydney	Retail Traders and Real Estate Proprietors	5	July	*
287	Grace Bros. Holdings Limited	Sydney	Department Store Retailer, Removal and Storage Specialists	5	July	*
288	Gray (Geoff K.) (Holdings) Limited	Sydney	Auctioneer and Retailer	5	June	
289	Greenwood Limited	Sydney	Importers, Manufacturers and Retailers of Ladies Handbags and Apparel	5	June	
290	Gregory (H.P.) & Co. Limited	Sydney	Engineers and Machinery Merchants	9	June	*
291	Griffiths Brothers Limited	Sydney	Retailers and Specialised Carrier	5	June	
292	Grosvenor Hotel Limited	Adelaide	Hotel Proprietor	5	May	

	Firm Name	Home Exchange	Main Activities	AASE Code	Balance Date	Category
293	Group Engineering Limited	Sydney	Industrial Engineer, Car Park Owner and Operator	10	June	
294	Group Holdings Limited	Melbourne	Financier - Short Term Money Market, Portfolio Management and Trusts	2	June	D
295	G.U.D. Holdings Limited	Melbourne	Automotive Spare Parts Manufacturers	12	June	*
296	Hains Hunkin Limited	Adelaide	Furniture Retailer	5	June	
297	Haliburton Investments (Australia) Limited	Melbourne	Investor	2	November	D
298	Halls (H.H.) Limited	Sydney	General Merchants, Manufacturers' Agents and Merchants	5	June	
299	Halmac Services Limited	Melbourne	Manufacturer of Electrical Equipment, Contractor and Maintenance Engineer	11	June	A
300	Hanimex Corporation Limited	Sydney	Importer and Manufacturer of Photographic Equipment	5	June	*
301	Hardie (James) Asbestos Limited	Sydney	Manufacturers of Asbestos Cement Building Materials	10	March	*
302	Hardie Trading Limited	Melbourne	Manufacturers, Importers and Distributors	5	June	*

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303	Harris (Keith) & Co. Limited	Sydney	Manufacturers of Flavours, Perfumes and Edible Colour Powders	6	June	*
304	Haughton Sugar Company Limited, The	Brisbane	Sugar Grower and Distributor	6	May	
305	Haughton (Wm.) & Co. Limited	Melbourne	Wool, Skin, Hide and General Merchant	3	June	
306	Hawke (Aust.) Limited	Melbourne	Wholesale Manufacturer and Importer of Jewellery	5	June	
307	Haymarket Theatres Limited	Sydney	Picture Theatre Operator	5	June	
308	Hecla Rowe Limited	Melbourne	Manufacturers and Distributors of Electrical Equipment and Appliances	11	June	
309	Hecron Limited	Melbourne	Manufacturer of Electrical Appliances	11	June	A
310	Heller (Walter E.) Australia Limited	Sydney	Financier and Discounter	2	June	D
311	Henderson's Industries Limited	Melbourne	Manufacturers of Automotive Springs, Seating and Trim	9	June	*
312	Herald and Weekly Times Limited, The	Melbourne	Newspaper Proprietors and Publishers	5	September	*

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313	Hills Industries Limited	Adelaide	Manufacturer of Rotary Clothes Hoists and Automotive Components	9	June	*
314	Hobart Gas Company, The	Hobart	Town Gas Producer	14	June	C
315	Hodge (A.H.) and Son Limited	Brisbane	Building Contractor, Joinery Works and Hardware Retailer	10	June	
316	Holland (C.V.) (Holdings) Limited	Sydney	Motor Vehicle Distributor	12	June	
317	Hooker Corporation Limited	Sydney	Real Estate Developer, Home Unit and Commercial Builder, Industrial Sands	5	June	
318	Hopkins Odlum Limited	Melbourne	Manufacturers of Rubber Transmissions, Conveyor and Vee Belting	9	December	
319	Hornibrook Highway Limited	Brisbane	Toll Bridge Operators	5	June	
320	Horsburgh (G.) & Co. Limited	Brisbane	Wholesale and Retail Hardware Merchants	5	June	
321	Horton (G.H.) and Company Limited	Sydney	Manufacturers of Pencils, Carbon Paper and Type-writer Ribbons	5	June	

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322	Horwood Bagshaw Limited	Adelaide	Agricultural Implement Manufacturers and Distributors	9	June	
323	Humes Limited	Melbourne	Manufacturers of Concrete Pipes, Precast Concrete Products and Structural Components	10	June	*
324	Hunt (Reg) - Rhodes Limited	Melbourne	Motor Vehicle Distributor	12	June	
325	Hunter Douglas Limited	Sydney	Manufacturer and Distributor of Venetian Blinds, Drapery Track, Insect Screens and Fittings	10	June	*
326	Huttons Limited	Melbourne	Meat Packers, Ham and Bacon Curers, Smallgoods Manufacturers	6	September	A
327	Hydro (Medlow) Bath Limited, The	Sydney	Hotel Proprietor	5	June	*
328	I.A.C. (Holdings) Limited	Melbourne	Financiers	2	December	D
329	ICI Australia Limited	Melbourne	Manufacturers and Distributors of Chemicals, Explosives, Dyes and Pigments	8	September	*
330	Industrial & Pastoral Holdings Limited	Melbourne	Investor	2	June	D

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331	Industrial Engineering Limited	Melbourne	Manufacturers of Machinery and Construction Equipment	9	June	*
332	Industrial Sales and Service (Q'land) Limited	Brisbane	Distributors of Industrial Tractors and Earthmoving Equipment	9	June	
333	Instrol Limited	Sydney	Manufacturers and Distributors of Electronic Equipment	11	June	
334	International Combustion Australia Limited	Sydney	Designers and Manufacturers of Boiler Plants	9	September	*
335	International Optical Corporation Limited	Sydney	Wholesale and Manufacturing Opticians	5	June	B
336	International Products Limited	Sydney	Manufacturers of Plastics, Electrical Equipment and Electrical Ranges	8	June	
337	Investment and Merchant Finance Corporation Limited	Adelaide	Merchant and Investment Financiers	2	June	D
338	IRH Industries Limited	Sydney	Manufacturers of Electrical and Electronic Equipment	11	June	*
339	Isas (N.S.W.) Limited	Sydney	Distributors of Machinery and Equipment	9	March	

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340	Italiano Cheese Industries Limited	Melbourne	Manufacturers and Distributors of Continental Type Cheese	6	June	
341	Jaques Bros. Limited	Melbourne	Manufacturers of Road Making Machinery, Excavators and Cranes	9	June	
342	Jason Investment Company (Australia) Limited	Melbourne	Investor	2	September	D
343	Jennings (A.V.) Industries (Australia) Limited	Melbourne	Commercial, Industrial and Home Builders, Real Estate Developers and Contractors	10	June	*
344	John (M.B.) & Hattersley Limited	Melbourne	Manufacturer of Valves for Pipe Lines and Pressure Vessels	9	June	*
345	Johns Hydraulics Limited	Melbourne	Manufacturers of Hydraulic Machinery for Plastic Moulding and Diecasting	9	June	
346	Jonathan Investments Limited	Melbourne	Investor	2	February	D
347	Jones (David) Limited	Sydney	Department Store Proprietors	5	July	*

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348	Jones (Henry) (IXL) Limited	Melbourne	Jam Manufacturer and Fruit Canner	6	October	A
349	Kallin Investments Limited	Adelaide	Hire Purchase Financiers	2	June	D
350	Katies Limited	Sydney	Wholesaler and Retailer of Women's Clothing	5	June	
351	Kelvinator Australia Limited	Adelaide	Manufacturers and Distributors of Refrigerators and Allied Products	11	March	*
352	Kennard Bros. (Holding) Limited	Sydney	Wholesale Hardware Merchant	10	June	
353	Kerema Rubber Limited	Sydney	Rubber Plantation Owner	8	December	
354	Kern Bros. Limited	Brisbane	Home Builders, Quarry-masters and Ready-Mixed Concrete Suppliers	10	June	
355	Kilndried Timber Industries Limited	Hobart	Timber Merchants and Processors	10	June	
356	Kinnears Ropes (Aust.) Limited	Melbourne	Manufacturers of Ropes, Cordage and Twins	7	June	A
357	Koitaki Limited	Sydney	Coffee and Rubber Plantation Owner	8	June	
358	Kolotex Holdings Limited	Sydney	Manufacturers of Hosiery, Handbags and Knitwear	7	June	*

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359	Kornblums Furnishings Limited	Melbourne	Wholesale Distributors of Soft Furnishings and Floor Coverings	5	January	
360	Lamson Industries Australia	Melbourne	Manufacturers of Office and Systems Machinery	5	December	*
361	Lanes Motors (Holdings) Limited	Melbourne	Motor Vehicle Distributor	12	June	*
362	Land Planning and Development Limited	Sydney	Land Developer	10	June	B
363	Lanray Industries Limited	Sydney	Property Developer, Builders' Hardware and Supplier	10	June	
364	Larke Consolidated Industries Limited	Sydney	Manufacturers and Distributors of Metal Products, Chain, Motor Vehicles and Parts	12	June	*
365	Launceston Gas Company	Hobart	Town Gas Producer and Supplier	14	June	A
366	Lawrence (Alfred) Holdings Limited	Melbourne	Manufacturers of Flavours and Pharmaceutical Products	8	June	*
367	Lawrenson Alumasc Holdings Limited	Sydney	Die Casting Engineers and Electroplaters	9	June	

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368	Leighton Holdings Limited	Melbourne	Civil Engineering and Building Contractor	10	June	*
369	Lemprier (O.T.) & Company Limited	Melbourne	Metal Merchants	9	June	*
370	Lend Lease Corporation Limited	Sydney	Real Estate and Property Developer, Civil Engineers and Manufacturers of Building Materials	10	June	*
371	Lensworth Finance Limited	Adelaide	Financiers	2	June	A
372	Leroy Manufacturing Co. Limited	Melbourne	Manufacturers of Ladies' Frocks, Coats, Suits	7	December	A
373	Lewis (George) Limited	Sydney	Printers and Cardboard Box Makers	5	October	
374	Life Savers (Australasia) Limited	Sydney	Manufacturers of Chocolate and Confectionery	6	July	*
375	Lightburn & Co. Limited	Adelaide	Manufacturers of Washing Machines and Concrete Mixers	9	June	
376	Lightburn Finance Limited	Adelaide	Investor	2	June	A
377	Lightweight Structural Development Limited	Melbourne	Manufacturer of Concrete Blocks	10	June	

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378	Linden & Conway Limited	Brisbane	Manufacturers of Ties and Dressing Gowns	7	June	
379	Lion Brewing and Malting Company Limited	Adelaide	Hotel Proprietor	6	July	
380	LNC Industries Limited	Sydney	Motor Vehicle Distributor	12	June	*
381	Lodge (Gilbert) (Holdings) Limited	Sydney	Machinery Merchants and Distributors	9	June	*
382	Lohn-Corden Limited	Melbourne	Manufacturer of Bakers', Pastrycooks and Butchers Requisites	6	March	
383	Lolorua Rubber Estates Limited	Sydney	Rubber Plantation Owners	8	April	
384	Lowes Limited	Sydney	Retailer of Men's and Boy's Wear	5	February	A
385	Ludowici (J.C.) and Son Limited	Sydney	Manufacturers of Hydraulic and Pneumatic Packings and Seals	8	December	
386	Luke (K.G.) Group Industries Limited	Melbourne	Manufacturers of Hospital, Hotel and Food Equipment	9	June	*
387	Lustre Jewellery Limited	Melbourne	Manufacturing Jewellers	5	June	

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388	Lynn (David) Limited	Sydney	Wine and Spirit Merchants	5	June	
389	Macquarie Worsteds Limited	Sydney	Worsted Piece Goods Manufacturers	7	September	*
390	Makurapua Estates Limited	Sydney	Copra and Cocoa Plantation Owner	6	June	
391	Malco Industries Limited	Sydney	Manufacturers of Pipe Fittings and Conveyor Equipment	9	June	
392	Mallee Hotels Limited	Melbourne	Hotel Proprietor	5	December	
393	Malleys Limited	Sydney	Appliance Manufacturers and Sheet Metal Engineers	11.	June	*
394	Mangrovite Industries Limited	Sydney	Manufacturer of Industrial Power Transmission Equipment	8	December	A
395	Manufacturing Investments Limited	Sydney	Manufacturing and General Engineers	9	June	A
396	Marco Productions Limited	Sydney	Manufacturers and Distributors of Men's Outerwear	7	June	
397	Mariboi Rubber Limited	Sydney	Rubber Plantation Owners	8	June	
398	Marlow (Julius) Holdings Limited	Melbourne	Manufacturer of Shoes	8	June	*

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399	Marra Developments Limited	Sydney	Pastoralists	3	June	
400	Marrickville Holdings Limited	Sydney	Manufacturers and Distributors of Food Products	6	June	*
401	Martin Bright Steels Limited	Sydney	Manufacturers and Distributors of Steel Bars	9	June	*
402	Martin (John) & Co. Limited	Adelaide	Retail Store Proprietors	5	July	*
403	Maryborough Knitting Mills (Cuttle) Limited	Melbourne	Manufacturers of Knitted Goods	7	September	A
404	Maryborough Sugar Factory Limited	Brisbane	Sugar Growers and Millers	6	June	
405	Mascot Industries Limited	Sydney	Manufacturer and Exporter of Tallow and Meat Meal	6	June	*
406	Mascot Mills Limited	Melbourne	Manufacturers of Knitted Underwear, Sportswear and Hosiery	7	June	
407	Mathers Enterprises Limited	Brisbane	Footwear Retailers	5	June	
408	Mauri Brothers & Thomson Limited	Sydney	Manufacturer, Importer and Marketer of Supplies and Equipment for the Food and Chemical Industries	6	May	A

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409	Mayne Nickless Limited	Melbourne	General Carriers, Shipping and Customs Agents	4	June	*
410	McDonnell & East Limited	Brisbane	Drapers and Importers	5	January	
411	McEwans Limited	Melbourne	Hardware and Timber Merchants	10	June	*
412	McIlwraith (John) Industries Limited	Melbourne	Manufacturers and Distributors of Builders' and Plumbers' Requisites	10	June	*
413	McIlwraith McEacharn Limited	Melbourne	Ship Owner, Agent and Bunkering Contractor	4	June	*
414	McKay (Ralph) Limited	Melbourne	Manufacturer of Agricultural Implements, Geared Motors and Variable Speed Drives	9	June	*
415	McLean Bros. & Rigg Limited	Perth	Hardware, Electrical and Machinery Merchants	5	November	A
416	McLeod (M.S.) Limited	Adelaide	Retailer handling Tyres, Electrical Appliances, General Hardware and Farm Equipment	5	June	
417	McPhersons Limited	Melbourne	Manufacturers of Machine Tools and Pumps	9	June	*

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418	Meacham & Leyland Holdings Limited	Brisbane	Hardware Merchant and Builders' Supplier	5	June	
419	Meagher (John) (Holdings) Limited	Sydney	General Storekeeper	5	July	
420	Meggitt Limited	Sydney	Manufacturers of Stock-feed, Vegetable Oils and Protein Meals	8	May	*
421	Melbourne Co-operative Brewery Co. Limited	Melbourne	Hotel Owner and Investor	6	June	A
422	Mercantile Credits Limited	Sydney	Hire Purchase Financiers	2	June	D
423	Mercantile Mutual Insurance Company Limited	Sydney	Fire, Marine, Accident and Life Assurance	1	June	C
424	Metro Industries Limited	Perth	Distributors of Farm Machinery	9	November	
425	Metropolitan Brick Holdings Limited	Perth	Brick Manufacturer	10	September	
426	Metropolitan Tenpin Bowling Limited	Melbourne	Tenpin Bowling Centre Operator	5	June	
427	Michaelis Bayley Limited	Melbourne	Manufacturers and Distributors of Leather, Plastics, Footwear and Canvas Products	8	June	*

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428	Midland Credit Limited	Sydney	General Financiers	2	June	D
429	Mildura Grand Hotel Limited	Melbourne	Hotel Proprietors	5	June	
430	Millaquin Sugar Company Limited, The	Brisbane	Sugar Mill and Plantation Owners	6	June	*
431	Millars (Australia) Limited	Sydney	Timber, Laminated Plastics and Hardware Distributors	10	December	A
432	Miller Anderson Limited	Adelaide	Retail Department Store	5	July	
433	Miller (James) Holdings Limited	Melbourne	Manufacturers of Ropes and Cordage	7	June	*
434	Milton Corporation Limited	Sydney	Investment Bankers, Financiers, Underwriters and Property Owners	2	June	D
435	Mindrill Limited	Melbourne	Diamond Drill and Equipment Manufacturers	9	June	A
436	Minerva Centre Limited	Sydney	Investor	5	June	D
437	Mintaro Slate and Flagstone Company Limited	Adelaide	Slate and Flagstone Quarrymaster	10	December	
438	M.L.C. Limited, The	Sydney	Fire, Marine, Accident and Life Assurance	1	April	C

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439	Moore (Charles) (Australia) Limited	Melbourne	Department Store Proprietors	5	August	*
440	Moore (Malcolm) Industries Limited	Melbourne	Manufacturer and Distributor of Earthmoving Equipment and Overhead Travelling Cranes	9	June	
441	Moreton Central Sugar Mill Company Limited, The	Brisbane	Sugar Mill and Plantation Owners	6	December	
442	Morris (Keith) Construction Limited	Brisbane	Builders and Civil Engineering Contractors, Land and Project Developers	10	June	
443	Morris (Philip) (Australia) Limited	Melbourne	Manufacturers and Distributors of Cigarettes and Tobacco Products	6	June	*
444	Mortlock Bros. Limited	Perth	Motor Vehicle Distributor	9	May	
445	Motor Discounts Limited	Sydney	Investor	2	August	A
446	Motor Funerals Limited	Sydney	Funeral Directors	5	June	
447	Murray, Maguire & Co. Limited	Sydney	Investment Bankers	2	June	D
448	Musgrove's Limited	Perth	Retailer of Electrical Goods	11	June	
449	Music Houses of Australia Limited	Sydney	Wholesalers and Retailers of Musical Instruments	5	June	*

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450	Muswellbrook Industries Limited	Sydney	Coal Miner, Electricity Generation and Brick Manufacturer	14	June	*
451	Mutual Acceptance Limited	Sydney	Hire Purchase, Property Mortgages and General Financiers	2	June	D
452	Myer Emporium Limited, The	Melbourne	Retail Department Store Proprietor	5	July	*
453	Mytton's Limited	Melbourne	Manufacturers of Stainless Steel Products for Commercial and Domestic Use	9	June	*
454	Nally Limited	Sydney	Plastic Moulders	8	June	
455	Napier Bros. Limited	Brisbane	Manufacturers of Agricultural Machinery	9	June	
456	National Bank of Australasia Limited, The	Melbourne	Banking Services	1	September	C
457	National Consolidated Limited	Melbourne	Manufacturer of Radiator Cores, Refrigeration and Air-Conditioning Systems	12	June	*
458	National Properties Limited	Sydney	Investor and Property Owner	2	June	D

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459	National Reliance Investment Company Limited	Melbourne	Investor	5	March	D
460	National Trustees Executors and Agency Company of Australasia Limited	Melbourne	Trustee and Executor	1	October	C
461	Network Finance Limited	Sydney	Real Estate Financier	2	June	D
462	New Redhead Estate & Coal Company Limited, The	Sydney	Coal Estate and Railway Proprietors	14	June	A
463	Newbold General Refractories Limited	Sydney	Manufacturer of Refractories, Building Bricks and Pottery Products	9	June	*
464	Newcastle Broadcasting and Television Corporation Limited	Sydney	Television Station Proprietor	5	June	
465	Newcastle Gas Company Limited	Sydney	Manufacturers and Distributors of Town Gas	14	June	C
466	Newcastle Lime and Cement Company Limited	Sydney	Manufacturer of Lime and Concrete Products	10	June	A
467	News Limited	Adelaide	Newspaper Publisher and Television Station Proprietor	5	June	*
468	Newstead South Holdings Limited	Sydney	Pastoralists	3	December	

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469	Nile Textiles Limited	Sydney	Manufacturer and Distributor of Underwear, Handkerchiefs Manchester and Lingerie	7	June	
470	Nilsen (Oliver J.) (Australia) Limited	Melbourne	Electrical Contractors, Sales and Repairs	11	June	*
471	N.K.S. (Holdings) Limited	Melbourne	Manufacturers of Builders' Hardware, Die-Casters and Engineering Merchants	9	June	*
472	Nock & Kirby Limited	Sydney	Hardware Store Proprietor	5	August	*
473	North Australian Cement Limited	Brisbane	Manufacturers and Distributors of Cement and Lime	10	June	
474	North Australian Rubber Mills Limited	Brisbane	Manufacturers of Rubber Footwear, Garden and Industrial Hose	5	June	
475	North Shore Gas Company Limited, The	Sydney	Manufacturers and Distributors of Town Gas	14	December	C
476	Northstate Tenpin Bowling Limited	Brisbane	Tenpin Bowling Centre Operator	5	June	
477	Noske Industries Limited	Melbourne	Flour Millers and Distributors of Agricultural Machinery	6	June	*

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478	Nylex Corporation Limited	Melbourne	Manufacturers of Plastic Goods and Compounds	8	December	*
479	O'Brien (Frank G.) Limited	Sydney	Glass Merchant, Silverer, Beveller and Shop-fitter	10	June	
480	Oldfield (H.) & Son Holdings Limited	Sydney	Manufacturer of Paint Brushes	10	June	
481	Oliver-Davey Glass Industries Limited	Melbourne	Glass and Paint Merchant	8	March	
482	Olympic Consolidated Industries Limited	Melbourne	Manufacturers of Motor Vehicle Tyres, Electric and Telecommunication Cables	8	June	*
483	Onkaparinga Textiles Limited	Adelaide	Manufacturers of Rugs Blankets and Clothing	7	June	
484	OPSM Industries Limited	Sydney	Manufacturing and Dispensing Opticians	5	June	*
485	Ormonoid Roofing and Asphalts Limited	Sydney	Manufacturers of Bituminous Roffing and Flooring Materials	10	June	*
486	Overseas Corporation (Australia) Limited	Melbourne	Manufacturers of Steel and Aluminium Furniture and Cookware	10	June	*

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487	Ozapaper Limited	Melbourne	Manufacturer of Sensitized Paper and Distributors of Drawing Office Supplies	5	June	*
488	P. & H. Holdings Limited	Sydney	Manufacturer of and Dealer in Plastic Materials	8	June	A
489	Parbury Henty Holdings Limited	Melbourne	Importer and Trader	5	June	*
490	Passiona Bottling Co (Perth) Limited	Perth	Manufacturers and Distributors of Aerated Waters	6	June	
491	Patience and Nicholson Limited	Melbourne	Manufacturers of Twist Drills and Screwcutting Tools and Hacksaw Blades	9	June	*
492	Patterson (Bill) Cheney Limited	Melbourne	Motor Vehicle Distributor	12	June	
493	Paynter & Dixon Industries Limited	Sydney	Building Design and Construction	10	June	*
494	Penfold (W.C.) Holdings Limited	Sydney	Printers and Stationers	5	June	*
495	Penfolds Wines Australia Limited	Sydney	Wine, Spirits and Brandy Producers	6	June	*

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496	Permaglass Limited	Sydney	Glass Merchants and Manufacturers	10	June	
497	Permanent Finance Corporation Limited	Brisbane	Financier	2	June	D
498	Permanent Trustee Company Limited	Sydney	Trustee and Executor	1	September	C
499	Permewan Wright Limited	Melbourne	Retail Self-Service Grocery Chain, Produce Merchants and Station Supplies	5	March	
500	Perpetual Executors, Trustees and Agency Company (W.A.) Limited	Perth	Trustee and Executor	1	June	C
501	Perpetual Insurance & Securities Limited	Hobart	Investor	2	April	A
502	Perpetual Trustees and National Executors of Tasmania Limited	Hobart	Trustee and Executor	1	June	C
503	Perth Arcade Company Limited	Perth	Real Estate Developers	2	June	
504	Peters Ice Cream (W.A.) Limited	Perth	Ice Cream, Dairy and Food Products Group	6	June	

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505	Petersville Australia Limited	Melbourne	Ice Cream, General Foods, Meat and Smallgoods, Speciality Food Group	6	June	*
506	Petrochemical Holdings Limited	Sydney	Manufacturer of Rust Preventatives, Plastics and Synthetic Rubber	8	June	A
507	Pioneer Concrete Services Limited	Sydney	Quarrymaster and Ready-mix Concrete Distributor	10	June	*
508	Pioneer Holdings Limited	Perth	Heating Engineers and Distributors, Property Investors and Motel Proprietors	5	June	
509	Pioneer Sugar Mills Limited	Brisbane	Raw Sugar Manufacturer, Paint and Chemical Manufacturer	6	December	A
510	Piper (Tom) Limited	Melbourne	Manufacturers and Distributors of Processed Foods	6	June	*
511	Pizzey Limited	Melbourne	Manufacturers, Merchants and Importers of Diary and Agricultural Machinery, Tanners and Leather Merchants	8	June	*

	Firm Name	Home Exchange	Main Activities	AASE Code	Balance Date	Category
512	Plaimar Limited	Perth	Distillers and Manufacturers of Essential Oils, Fruit Essences, Fruit Juices and Flavourings	6	June	
513	Plaistowe & Co. Limited	Perth	Manufacturers of Confectionery	6	December	
514	Plane Creek Central Mill Co. Limited	Brisbane	Manufacturer of Raw Sugar	6	December	
515	Plantation Holdings Limited	Sydney	Copra and Cocoa Plantations Owner	6	June	
516	Plastyne Products (Holdings) Limited	Sydney	Manufacturer of Plastic Coated Fabrics	8	June	
517	Plumrose (Australia) Limited	Melbourne	Food Canners	6	June	A
518	Prasby Industries Limited	Sydney	Manufacturers and Marketers of Sewing Threads and Yarns	7	June	B
519	Preston Motors (Holdings) Limited	Melbourne	Motor Vehicle Distributor	12	December	A
520	Prests' Limited	Adelaide	General Storekeepers, Agents and Importers	5	June	
521	Project Development Corporation Limited	Sydney	Builder and Civil Engineer	10	December	A

	Firm Name	Home Exchange	Main Activities	AASE Code	Balance Date	Category
522	Protector Safety Industries Limited	Sydney	Manufacturer of Industrial Safety Equipment	5	June	*
523	Provincial Traders Holding Limited	Brisbane	Manufacturer of Margarines and Stock Foods	6	June	*
524	Publishers Holdings Limited	Sydney	Magazine Publishers and Motel Proprietors	5	June	*
525	Pye Industries Limited	Sydney	Manufacturers, Importers and Distributors of Electrical Equipment	11	December	A
526	Pyrox Limited	Melbourne	Manufacturers and Distributors of Gas Appliances	9	September	A
527	Quarry Industries Limited	Adelaide	Quarrymaster and Contractor	10	June	
528	Queensland Cement and Lime Company Limited	Brisbane	Manufacturers and Distributors of Cement and Lime	10	July	*
529	Queensland Insurance Company Limited	Sydney	Fire, Marine and Accident Underwriters	1	September	C
530	Queensland Press Limited	Brisbane	Newspaper Publisher and Radio Station Proprietor	5	September	*
531	Queensland Television Limited	Brisbane	Television Station Proprietor	5	June	

	Firm Name	Home Exchange	Main Activities	AASE Code	Balance Date	Category
532	Queensland Trading and Holding Company Limited	Brisbane	Investor	2	November	D
533	Q.U.F. Industries Limited	Brisbane	Processors and Manufacturers of Milk Products, Frozen Foods, Wines and Spirits	6	June	*
534	Ramsay Surgical Limited	Melbourne	Surgical, Scientific and Educational Suppliers	5	June	A
535	Raynors Holdings Limited	Sydney	General Engravers, Die-Casters and Metal Pressers	9	June	
536	Reece (H.J.) (Holdings) Limited	Melbourne	Builders' Hardware and Plumbers' Supplies	5	June	
537	Reed Consolidated Industries Limited	Sydney	Manufacturer and Distributor of Solid and Fibre Containers, Printing and Office Machinery	8	December	A
538	Reid Bros. Holdings Limited	Adelaide	Timber Millers	10	April	
539	Reid (Malcolm) & Co. Limited	Adelaide	Furnishers and Importers	5	August	
540	Reid (Walter) and Company Limited	Brisbane	General Merchants	5	June	

	Firm Name	Home Exchange	Main Activities	AASE Code	Balance Date	Category
541	Reinvestment (Australia) Limited	Sydney	Investor and Financier	2	June	D
542	Repco Limited	Melbourne	Manufacturers and Distributors of Automotive Components, Machine Tools and Equipment	12	June	*
543	Richardson's Meat Industries Limited	Hobart	Retail and Wholesale Butchers, Fertilizer and Tallow Manufacturers	6	June	
544	Rigby Limited	Adelaide	Booksellers	5	June	
545	Robb & Brown Limited	Brisbane	Sawmiller and Timber Merchant, Aluminium Fabricator and Door Manufacturer	10	June	
546	Roberts, Stewart & Company Limited	Hobart	Wool, Grain and Produce Brokers, Stock Agents and Auctioneers	5	August	
547	Rocke Tompsitt & Company Limited	Melbourne	Wholesale Chemists and Druggists	5	June	
548	Rockhampton Television Limited	Brisbane	Television Station Proprietor	5	June	
549	Rocklea Spinning Milles Limited	Sydney	Cotton Spinners	7	June	

	Firm Name	Home Exchange	Main Activities	AASE Code	Balance Date	Category
550	Rocla Industries Limited	Melbourne	Manufacturer of Reinforced Concrete Products, Stoneware Pipes and Fittings	10	June	*
551	Rothmans of Pall Mall (Australia) Limited	Sydney	Manufacturers and Distributors of Tobacco Products	6	June	*
552	Rothwells Outfitting Limited	Brisbane	Tactors and Outfitters	5	July	
553	Rubberlands Limited	Sydney	Rubber Estate Owner	8	December	
554	Rundles Holdings Limited	Sydney	Tailors, Mercers and Clothing Manufacturers	5	August	A
555	R.V.B. Engineering Products Limited	Melbourne	Consulting, Designing and Production Engineers	12	June	
556	S.A. Brewing Holdings Limited	Adelaide	Brewer and Hotel Proprietor	6	February	*
557	S.A. Brush Company Limited	Adelaide	Manufacturer of Brooms and Brushes	5	June	
558	S.A. Plywood Holdings Limited	Adelaide	Manufacturer of Plywoods	10	June	
559	Sachs (E.) & Co. Limited	Brisbane	Manufacturer of Electric Hot Water Systems	5	June	

	Firm Name	Home Exchange	Main Activities	AASE Code	Balance Date	Category
560	Sackville (John) and Sons Limited	Melbourne	Manufacturers of Clothing	7	June	*
561	Sandhurst and Northern District Trustees, Executors and Agency Company Limited	Melbourne	Trustees, Executors and Agents	1	December	C
562	Sands (John) Holdings Limited	Sydney	Printers and Stationers	5	June	A
563	Scotts Provisions (Holdings) Limited	Sydney	Smallgoods Manufacturers and Caterers	6	June	
564	Sebel Limited	Sydney	Manufacturers of Contract Furniture	10	December	*
565	Security and General Insurance Company Limited, The	Sydney	Insurance Underwriter	1	June	C
566	Selby (H.B.) Australia Limited	Melbourne	Manufacturers of Scientific Instruments, Laboratory Equipment and Chemicals	8	June	*
567	Shannons Limited	Sydney	Manufacturers of Building Materials, Paper Bags, Rubber and Electric Cables	10	June	
568	Sherbourne Investments Limited	Sydney	Investor	2	May	D

	Firm Name	Home Exchange	Main Activities	AASE Code	Balance Date	Category
569	Siddons Industries Limited	Melbourne	Manufacturers of Hand Tools and Rolled Steel Products	9	June	*
570	Simmons Holdings Limited	Sydney	Printers, Publishers and Bookbinders	5	June	
571	Sims Consolidated Limited	Sydney	Scrap Metal Merchants, Manufacturers of Specialised Agricultural Equipment	9	July	A
572	Sleigh (H.C.) Limited	Melbourne	Distributors of Oil and Petroleum Products, Ship Owners and Agents	14	June	*
573	Smith and Lane Holdings Limited	Sydney	Printers and Stationers	5	June	
574	Smith (Henry B.) Limited	Melbourne	Wool Merchants and Scourers	5	June	
575	Smith (Howard) Limited	Sydney	Ship Owners and Coal Miners	4	December	*
576	Smith Mitchell & Company Limited	Melbourne	Malsters	6	June	*
577	Softwood Holdings Limited	Adelaide	Timber Millers and Processors, Retailers of Hardware and Building Supplies	10	June	*

	Firm Name	Home Exchange	Main Activities	AASE Code	Balance Date	Category
578	Sogeri Rubber Plantations Limited	Sydney	Rubber Estate Owners	8	June	
579	Soul Pattinson (Washington H.) & Company Limited	Sydney	Dispensing Chemists	5	July	*
580	South Australian Cold Stores Limited	Adelaide	Cold Storage Proprietor	5	June	
581	South Australian Gas Company	Adelaide	Town Gas Producer	14	June	C
582	Southern Cross Properties Limited	Melbourne	Hotel and Property Owner	5	June	
583	Southern Motors Holdings Limited	Melbourne	Motor Vehicle Distributors	12	April	
584	Southern Pacific Insurance Co. Limited	Sydney	Fire and Accident Insurance	1	June	A
585	Southgate Investments Limited	Sydney	Hotel Proprietors	5	June	
586	Speciality Press Limited (The)	Melbourne	Printers and Publishers	5	June	
587	Speedo Holdings Limited	Sydney	Manufacturers of Underwear, Sportswear and Swimwear	7	June	*
588	Spotless Limited	Melbourne	Dry Cleaners and Launderers	5	June	

	Firm Name	Home Exchange	Main Activities	AASE Code	Balance Date	Category
589	Squatting Investment Company Limited, The	Melbourne	Stock and Station Owner	3	December	
590	Stack and Company Limited	Sydney	Motor Vehicle Distributor	12	June	
591	Stafford-Ellinson Consolidated Limited	Melbourne	Manufacturers of Men's and Boy's Clothing	7	June	
592	Stanger and Company Limited	Melbourne	Manufacturing Electrical Engineers	11	June	
593	Statham Limited	Sydney	Manufacturers and Erectors of Pre-Fabricated Steel Buildings	10	June	
594	Steamship Trading Company Limited	Sydney	General Merchants, Planters, Sawmillers, Hotel and Cold Store Proprietors	5	June	*
595	Steggles Holdings Limited	Sydney	Poultry Processors, Hatcherymen and Stock Feed Manufacturers	6	June	*
596	Stocks and Holdings Limited	Sydney	Real Estate Developer and Building Contractor	10	June	
597	Stoddarts Holdings Limited	Sydney	Property Investment and Underwriting	5	June	D

	Firm Name	Home Exchange	Main Activities	AASE Code	Balance Date	Category
598	Stokes (Australasia) Limited	Melbourne	Manufacturers of Metal Stampings and Pressings	9	June	
599	Strachan & Company Limited	Melbourne	Wool Brokers, Stock and Station Agents	3	June	
600	Stramit Limited	Melbourne	Building Board Manufacturers and Steel Formers	10	June	*
601	Sun Electric Consolidated Limited	Melbourne	Manufacturers of Electrical Appliances and Equipment	11	June	*
602	Sunshine Aust. Limited	Melbourne	Manufacturer of Biscuits and Pet Foods	6	June	
603	Supermarket Limited	Brisbane	Property Owner and Investor	2	June	D
604	Supertex Industries Limited	Sydney	Manufacturer of Carpets, Cotton Spinner, Yarn and Piecegoods Dyer	7	June	
605	Swan Brewery Company Limited, The	Perth	Brewers and Hotel Owners	6	March	*
606	Swan Brushware Limited	Perth	Manufacturers of Brushware	5	June	

	Firm Name	Home Exchange	Main Activities	AASE Code	Balance Date	Category
607	Swan Portland Cement Limited	Perth	Manufacturer of Hydrated Lime and Cement	10	June	
608	Swift & Company Limited	Sydney	Manufacturer and Importer of Chemicals, Machinery, Perfumes and Toiletries	8	June	*
609	Sydney Atkinson Motors Limited	Perth	Motor Vehicle Distributor	12	June	
610	Syme (David) & Company Limited	Melbourne	Newspaper Publisher and Radio Station Proprietor	5	June	*
611	Tancred Brothers Industries Limited	Sydney	Wholesale Butcher and Meat Exporter	6	June	
612	Tasman U.E.B. Holdings Limited	Melbourne	Manufacturer of Fibre Containers and Textiles	8	February	A
613	Tasmanian Board Mills Limited	Hobart	Timber Producers and Merchants	10	June	
614	Tasmanian ISAS Holdings Limited	Hobart	Distributor of Heavy Equipment	9	June	
615	Tasmanian Permanent Executors & Trustees Association Limited, The	Hobart	Trustee and Executor	1	September	C
616	Tasmanian Television Limited	Hobart	Television Station Proprietor	5	June	

	Firm Name	Home Exchange	Main Activities	AASE Code	Balance Date	Category
617	Taubmans Industries Limited	Sydney	Manufacturer of Paints and Lacquers	8	September	A
618	Taylor (J.N.) Holdings Limited	Adelaide	Automotive, Motor Cycle and Marine Merchants	5	June	A
619	Telecasters North Queensland Limited	Brisbane	Television Station Proprietor	5	June	
620	Television Broadcasters Limited	Adelaide	Television Station Proprietor	5	June	
621	Television Corporation Limited	Sydney	Television Stations Proprietor and Publisher	5	June	B
622	Television Wollongong Transmissions Limited	Sydney	Television Station Proprietor	5	June	
623	Thiess Holdings Limited	Brisbane	Civil Engineering Constractor, Coal Producer and Motor Vehicle Distributor	10	June	
624	Thomas Nationwide Transport Limited	Sydney	Local, Interstate and International Transport, Customs, Shipping and Air Freight	4	June	*
625	Thompsons (Castlemains) Limited	Melbourne	Engineer and Steel Founder	9	June	*

	Firm Name	Home Exchange	Main Activities	AASE Code	Balance Date	Category
626	Timber Holdings Limited	Melbourne	Timber Millers	10	June	
627	Timber Holdings (Tasmania)	Hobart	Timber Millers and Manufacturers of Plywoods and Veneers	10	June	
628	Tinsley (Eliza) Limited	Melbourne	Merchants Specialising in Abrasives, Engineers' and Motor Body Supplies	5	June	*
629	Toledo Berkel (Australia) Limited	Melbourne	Importers and Manufacturers of Scales and Other Patent Machinery	9	June	A
630	Tomlinson Steel Limited	Perth	Engineers Specialising in Boilers and Railway Equipment	9	June	
631	Tooheys Limited	Sydney	Brewers and Hotel Owners	6	July	*
632	Tooth and Co. Limited	Sydney	Brewers and Hotel Owners	6	March	*
633	Tour Finance Limited	Melbourne	Financier	2	June	D
634	Townson & Mercer Holdings (Australia) Limited	Sydney	Distributors of Chemicals, Laboratory Equipment and Scientific Instruments	5	June	
635	Trade Credits Limited	Sydney	Real Estate and General Financiers	2	June	D

	Firm Name	Home Exchange	Main Activities	AASE Code	Balance Date	Category
636	Trans Otway Limited	Melbourne	Operator of Passenger and Freight Services, Cartage Contractors and Forwarding Agents	4	June	
637	Travelodge Australia Limited	Sydney	Motel Operator	5	June	*
638	Tricontinental Corporation Limited	Melbourne	Financier	2	June	D
639	Trustees Executors and Agency Co. Limited	Melbourne	Trustees, Executors and Agents	1	June	C
640	Tutt Bryant Limited	Sydney	Merchants and Manufacturers of Construction, Automotive and Engineering Equipment	9	June	
641	TVW Limited	Perth	Television Station Proprietor	5	June	
642	Tyree Industries Limited	Sydney	Maker of Electrical Transformers	11	November	A
643	Union Carbide Australia and New Zealand Limited	Sydney	Manufacturers and Merchandisers of Industrial and Fine Chemicals	8	December	A
644	Union-Fidelity Trustee Company of Australia Limited, The	Melbourne	Trustees, Administrators and Executors	1	February	C

	Firm Name	Home Exchange	Main Activities	AASE Code	Balance Date	Category
645	Uniroyal Holdings Limited	Adelaide	Motor Tyres, Rubber Goods, Footwear Products and Plastics Manufacturers	8	December	A
646	United Australian Industries Limited	Sydney	Manufacturer and Distributor of Chemicals and Pharmaceuticals	9	June	
647	United Motels Limited	Sydney	Motel Owner	5	June	
648	United Motors (Holdings) Limited	Adelaide	Motor Vehicle Distributor	12	June	
649	United Packages Limited	Brisbane	Manufacturers of Canisters, Cartons, Cardboard Boxes and Crown Seals	9	June	*
650	Unity Mortgage Corporation Limited	Sydney	Real Estate Financiers and Investors	2	June	D
651	Vale Corporation Limited	Sydney	Real Estate Developer	10	June	
652	Valley Worsted Mills Limited	Melbourne	Spinners and Weavers	7	June	*
653	Vanguard Insurance Company Limited	Sydney	Insurance Underwriters	1	June	C
654	Vealls Securities & Finance Limited	Melbourne	Financier and Investor	2	June	D

	Firm Name	Home Exchange	Main Activities	AASE Code	Balance Date	Category
655	V.I.A. Limited	Melbourne	Manufacturing Contractors and Sawmillers	9	September	
656	Victoria Holdings Limited, The	Melbourne	Hotel and Restaurant Proprietors	5	June	*
657	Victoria Broadcasting Network Limited	Melbourne	Radio and Television Station Proprietor	5	June	*
658	Vidor Limited	Sydney	Engineer and Manufacturer of Steel and Alloy Equipment	9	June	
659	Viscount Holdings Limited	Sydney	Hotel-Motel Operator and Linen Hire	5	June	
660	Vox Adeon Howard Holdings Limited	Perth	Retailer of Electrical Appliances and Furniture	5	June	
661	Vulcan Industries Limited	Melbourne	Manufacturer of Electrical Heating Appliances, Electrical and Gas Cooking Appliances	11	June	*
662	Wakefield Investments (Australia) Limited	Adelaide	Investor	2	December	D
663	Walker (F.J.) Limited	Sydney	Wholesale and Retail Butcher, Exporter and Agent in Frozen Meats	8	June	*

	Firm Name	Home Exchange	Main Activities	AASE Code	Balance Date	Category
664	Walkers Limited	Brisbane	General and Constructional Engineer and Shipbuilder	9	June	
665	Wallace (James) (Holdings)	Sydney	Master Builders, Developers and Property Owners	10	June	
666	Waltons Limited	Sydney	Retail Department Store Proprietors	5	July	*
667	Wangaratta Woollen Mills Limited	Melbourne	Spinners of Worsted, Woollen and Synthetic Yars	7	May	*
668	Warburton O'Donnell Limited	Sydney	Manufacturers of Electronic and Electrical Appliances	11	June	*
669	Wardrop (George) Limited	Melbourne	Menswear Manufacturers and Retailers	7	July	A
670	Water Wheel Holdings Limited	Melbourne	Flour Manufacturers and Merchants	6	December	
671	Waters Holdings Limited	Sydney	Merchants and Importers of Food, Floor Coverings and Furnishings	6	February	A
672	Watkins Consolidated Limited	Brisbane	Builder, Civil Engineer, Land and Property Developer	10	June	
673	Watson Victor Holdings Limited	Sydney	Manufacturer and Distributors of Scientific, Medical and X-Ray Equipment	11	June	

	Firm Name	Home Exchange	Main Activities	AASE Code	Balance Date	Category
674	Wattyl Limited	Sydney	Manufacturer of Wood Finishing Materials	8	June	*
675	Waugh & Josephson Holdings Limited	Sydney	Earthmoving Equipment and Agricultural Machinery Distributors	9	June	
676	Webb (H.H.) & Co. Limited	Melbourne	Manufacturer and Distributor of Funeral Directors Requisites	5	June	
677	Webster (A.G.) and Woolgrowers Limited	Hobart	Wool Brokers, Livestock and Property Agents, Produce and Agricultural Merchandise	3	June	
678	Weedmans Limited	Brisbane	Retail Department Store Proprietor	5	July	
679	Westate Industries Limited	Perth	Electrical Engineers and Manufacturers of Electrical Appliances	11	June	
680	West Australian Trustee, Executor and Agency Co. Limited	Perth	Trustees and Executors	1	April	C
681	West Australian Worsted & Woollen Mills Limited	Perth	Worsted and Woollen Manufacturer	7	June	B

	Firm Name	Home Exchange	Main Activities	AASE Code	Balance Date	Category
682	Westfield Limited	Sydney	Real Estate Developer	10	June	*
683	Wheelock Marden Investments (Australia) Limited	Sydney	Real Estate Investor	2	March	A
684	White (Joe) Malting Limited	Melbourne	Malsters	6	June	*
685	Whitefield Limited	Sydney	Investor	2	March	D
686	Wigmores Limited	Perth	General Merchants, Shipping, Customs, Cartage and Insurance Agents	5	June	
687	Wilcox Mofflin Limited	Sydney	Wool, Hide and Skin Exporters, Fellmongers and General Merchants	3	June	
688	Wilke & Company Limited	Melbourne	Stationers, Printers and Bookbinders	5	June	
689	Willis & Sons Limited	Melbourne	Wholesale Jewellers and General Importers	5	June	
690	Wills (G. & R.) (Holdings) Limited	Adelaide	Warehousemen, General and Shipping Agents	5	June	
691	Wimble (F.T.) & Company Limited	Sydney	Manufacturers and Distributors of Printing Ink, Varnish, Chemicals and Painters' Supplies	5	June	

	Firm Name	Home Exchange	Main Activities	AASE Code	Balance Date	Category
692	Winchcombe Carson Limited	Sydney	Wool Brokers, Stock, Station and Real Estate Agents	3	June	
693	Windsor Hotel Limited	Melbourne	Hotel Owner	5	June	
694	Winns Limited	Sydney	Department Store Proprietor	5	July	*
695	Winterbottom Holdings Limited	Perth	Motor Vehicle Distributor	12	June	
696	W.J. Manufacturing Company Limited	Sydney	Manufacturers and Chemical Engineers	8	June	*
697	Woodmasons Limited	Melbourne	Cold Storage and Quick Freezing	5	June	*
698	Woolcord Fabrics Limited	Melbourne	Manufacturers of Upholstery Cloths and Furnishing Velvets	7	June	
699	Woolworths Limited	Sydney	Chain Store Proprietors	5	January	*
700	Wormald International Limited	Sydney	Manufacturer and Distributor of Fire Protection and Detection Equipment	10	June	*
701	Wridgways Holdings Limited	Melbourne	Furniture Removalist and Storer	5	June	

	Firm Name	Home Exchange	Main Activities	AASE Code	Balance Date	Category
702	Wright, Heaton & Co. Limited	Sydney	Produce and Wholesale General Merchants, Customs Agents and Carrier	5	July	
703	Wright (Walter) Industries Limited	Melbourne	Crane Hirers, Steel Erectors and Heavy Haulers	4	June	
704	Wrights Limited	Perth	Machinery and Produce Merchants	9	June	
705	Wynyard Holdings Limited	Sydney	Hotel and Property Owners	5	June	
706	Yates Seeds Limited	Sydney	Seed Merchants and Growers	5	November	A
707	Yellow Cab Fleet Limited	Adelaide	Taxi Cap Proprietor	5	June	
708	Yencken Glass Industries Limited	Melbourne	Glass Merchants and Shopfitters	8	June	
709	York Motors (Holdings) Limited	Sydney	Motor Vehicle Distributors	12	November	*
710	Young (J.B.) Holdings Limited	Sydney	Retailer	12	August	A

APPENDIX 3

STANDARD CODES

Code	Description
	Balance Sheet
	Capitalization
001	Issued Ordinary Capital - Main Issue
002	Asset Revaluation
003	Ordinary Capital - Number of Shares
004	Ordinary Capital - Secondary Issues
005	Preferred Shares
006	Advance Payments on New Issues
007	Deferred Shares
008	Convertible Notes
009	Par Value - Ordinary Capital
	Reserves and Provisions
010	Unappropriated Profits/Losses
011	Contingency Provisions
012	Other Revenue Reserves
013	Share Premium Reserves
014	Asset Revaluation Reserves
015	Tax Free Reserves
016	Capital Reserves
017	Minority Interest
018	Provision For Future Tax
019	Premium On Consolidation
	Deferred Liabilities and Provisions
020	Debentures And Secured Notes
021	Unsecured Notes
022	Deposits

Code	Description
023	Mortgages
024	Term Bank Loans
025	Other Secured Borrowing
026	Other Unsecured Borrowing
027	Provisions For Deferred Liabilities
028	Sundry Deferred Liabilities
029	Debenture Sinking Fund
	<u>Current Liabilities</u>
030	Debentures and Secured Notes Due 12 Months
031	Unsecured Notes Due 12 Months
032	Deposits Due 12 Months
033	Mortgages Due 12 Months
034	Bank Overdraft
035	Other Secured Borrowing Due 12 Months
036	Other Unsecured Borrowing Due 12 Months
037	Trade Creditors And Bills Payable
038	Other Or Unspecified Creditors
039	Provisions For Income Tax
040	Dividend Provisions
041	Intercompany Balances
042	Provisions For Current Commitments
043	Other Current Liabilities
044	Provision For Doubtful Debts
045	Provision For Unearned Income
046	Provision For Unexpired Risks
047	Provision For Unadjusted Losses
048	Total Liabilities

Code	Description
	Fixed Assets
049	Property-Gross
050	Property-Net
051	Capital Work In Progress
052	Plant And Machinery - Gross
053	Plant And Machinery - Net
	Investments
060	Governments At Book
061	(Governments At Market)
062	Listed Firm Securities At Book
063	(Listed Firm Securities At Market)
064	Listed Securities At Book)used where government)and firm securities
065	(Listed Securities At Market)are aggregated
066	Unlisted Firm Investments
067	Investments And Advances To Associated Firms
068	Life Assurance Fund
069	Joint Ventures
070	Deposits
071	Loans On Mortgage
072	Developmental Projects
073	Other Investments
074	Investments - Global item: where investments are not split up
	Financial and Deferred Assets
075	Amounts Due Under Hire Purchase Agreements
076	Other Advances And Loans
077	Real Estate Debtors

Code	Description
078	Equipment On Lease - Gross
079	Equipment On Lease - Net
080	Other And Unspecified Deferred Assets
	<u>Current Assets</u>
082	Contracts
083	Cash And Equivalent
084	Trade Debtors
085	Other Debtors
086	Inventory
087	Prepayments
088	Inter-firm Balances
089	Other Current Assets
	<u>Intangibles</u>
091	Intangibles - undistinguished
092	Goodwill On Consolidation
093	Capitalized Expenses
094	Business Goodwill Arising From Business Patents
095	Research And Development Expenses Capitalized
099	Total Assets
	<u>Income Statement</u>(1)
	<u>Operating</u>
01	Revenue
05	Labour

(1)Items are prefixed '1' for non-add items, '2' for items in check sequence and '3' for rates on dividends, etc.

Code	Description
06	Materials Used
07	Services Used
08	Rental Expenses
09	Expenses Of Production - Global Item
10	Profit Before Charges
11	General Expenses of Marketing And Administration - Global Item
12	Marketing And Distribution
13	Directors Fees
14	Auditors Fees
15	Pensions
16	Depreciation
17	Depreciation On Leased Assets
18	Interest Paid
19	Interest Paid On Convertible Notes
20	Borrowing Expenses
21	Provisions To Be Charged Against Profit
22	Administrative Expenses
23	Research And Development
25	Other Operating Expenses
26	Royalties Paid
28	Net Operating Profit After Charges And Tax
29	Net Operating Profit After Charges Before Tax
	<u>Non-Operating (Normal)</u>
30	Dividends Received
31	Interest Received
32	Other Investment Income
33	Investment Income

Code	Description
34	Government Subsidies Received
35	Non-Government Royalties Received
36	Management Fees Received
37	Other 'Normal' Income
39	Pre-Acquisition Profits/Losses
45	'Normal' Non-Operating Expenses
49	Net Profit Before Tax
50	Provision For Income Tax In Current Year
51	Provision For Tax In Other Years
53	Net Profit After Tax
55	Less Minority Interest (Loss/Profit)
57	Minority Dividends
59	Net Profit After Tax And Minority Interest
	Non-Operating (Non-Normal)
60	Non-Operating Non-Normal Surplusses/Losses
62	Balance P/L Bought Forward From Previous Year
63	Sundry Adjustments
65	Tax Overprovided/Underprovided Previous Years
	Appropriations
71	First Interim Ordinary Dividend
371	First Interim Dividend Rate
72	Second Interim Ordinary Dividend
372	Second Interim Dividend Rate
73	Third Interim Ordinary Dividend
373	Third Interim Dividend Rate
74	Provision For Final Ordinary Dividend
374	Rate For Final Ordinary Dividend

Code	Description
75	Paid Preference Dividends
76	Provision For Final Preference Dividend
77	Interim Dividends On Other Shares
78	Provisions For Final Dividends Other Shares
79	Payments Of Arrears On Preference Dividends
80	Transfers To Appropriation Provisions
81	Appropriations To Capital Reserves
82	Appropriations To Revenue Reserves
84	Write Off Of Capitalized Expenses
85	To Tax Exempt Reserve
88	Balance Carried Forward For Outside Shareholders
289	Balance Carried Forward

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C     PROGRAM TO EXTRACT DATA FOR UNSW FILE  P052
C
C     PHASE 03  -  CALCULATIONS
C
      SUBROUTINE P05203
      COMMON KOYNO,ICLSS1,IV,KOY,PKOY,IERR,N,IYR(10,4),TAX(10),IK
      COMMON ICAP(25),IA(10),PAIDUP,PAR,PARCAP,IDIL
      COMMON IX(10,325),ICH(10,8),NCCY,KOYS(300),UNSW(10,160)
      COMMON HIP(12,12),LOP(12,12),ENP(12,12),VOL(12,12),AENP(12,12)
C
      INTEGER PKOY
      REAL    LOP,COLONG(11),COSHRT(3)
      EQUIVALENCE (COLONG(1),UNSW(2,1)),(COSHRT(1),UNSW(3,2))
C
      DIMENSION A(10)
      T(I)= 1.0E-3*I
      UNSW(1,1) = KOYNO
      UNSW(6,2) = ICLSS1
C
C
      DO 100 I=1,N
C
      UNSW(I, 3)=T(IX(I, 1)                            )
      UNSW(I, 4)=T(IX(I, 3)                            )
      UNSW(I, 5)=T(IX(I, 4)+IX(I, 7)                   )
      UNSW(I, 6)=T(IX(I, 5)                            )
      UNSW(I, 7)=T(IX(I, 8)                            )
      UNSW(I, 8)=T(IX(I,10)-IX(I,98)                   )
      UNSW(I, 9)=T(IX(I,11)+IX(I,12)+IX(I,18)          )
      UNSW(I,10)=T(IX(I,13)+IX(I,15)+IX(I,16)+IX(I,19))
      UNSW(I,11)=T(IX(I,17)-IX(I,97)                   )
      UNSW(I,12)=T(IX(I,14)                            )
      UNSW(I,13)=T(IX(I, 2)                            )
      UNSW(I,16)=T(IX(I,20)+IX(I,23)+IX(I,24)+IX(I,25))
      UNSW(I,17)=T(IX(I,21)+IX(I,22)+IX(I,26)          )
      UNSW(I,18)=T(IX(I,27)+IX(I,28)+IX(I,29)          )
      UNSW(I,19)=T(IX(I,34)                            )
      UNSW(I,20)=T(IX(I,37)+IX(I,46)+IX(I,47)          )
      UNSW(I,21)=T(IX(I,39)                            )
      UNSW(I,22)=T(IX(I,40))
      UNSW(I,23)=T(IX(I,45)+IX(I,30)+IX(I,31)+IX(I,32)+IX(I,33)+IX(I,36)
     +              +IX(I,38)+IX(I,41)+IX(I,42)+IX(I,43)+IX(I,44)+IX(I,6)
     +              +IX(I,35))
      UNSW(I,26)=T(IX(I,30)+IX(I,33)+IX(I,35))
      UNSW(I,27)=T(IX(I,31)+IX(I,32)+IX(I,36))
      UNSW(I,31)=T(IX(I,49)+IX(I,56)+IX(I,58))
      UNSW(I,32)=T(IX(I,50)+IX(I,57)+IX(I,59))
      UNSW(I,33)=T(IX(I,51)+IX(I,52))
      UNSW(I,34)=T(IX(I,51)+IX(I,53))
      UNSW(I,36)=T(IX(I,60)+IX(I,62)+IX(I,64))
      UNSW(I,37)=T(IX(I,66)+IX(I,67)+IX(I,68)+IX(I,69)+IX(I,70)+IX(I,71)
     +              +IX(I,72)+IX(I,73)+IX(I,74))
      UNSW(I,38)=T(IX(I,61)+IX(I,63)+IX(I,65))
      UNSW(I,39)=T(IX(I,75)+IX(I,76)+IX(I,77)+IX(I,79)+IX(I,80))
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      UNSW(I,40)=T(IX(I,83))
      UNSW(I,41)=T(IX(I,84)+IX(I,82))
      UNSW(I,42)=T(IX(I,86))
      UNSW(I,43)=T(IX(I,85)+IX(I,87)+IX(I,88)+IX(I,89))
      UNSW(I,48)=T(IX(I,91)+IX(I,92)+IX(I,93)+IX(I,95)+IX(I,96))
      UNSW(I,55)=T(IX(I,201)+IX(I,210)+IX(I,228)+IX(I,229)+IX(I,249)
     1           +IX(I,253)+IX(I,259)+IX(I,202)+IX(I,203)+IX(I,204)
     2           +IX(I,205)+IX(I,206)+IX(I,207)+IX(I,208)+IX(I,209)
     3           +IX(I,211)+IX(I,212)+IX(I,213)+IX(I,214)+IX(I,215)
     4           +IX(I,220)+IX(I,221)+IX(I,222)+IX(I,223)+IX(I,224)
     5           +IX(I,225)+IX(I,226)+IX(I,227)-IX(I,116)-IX(I,117)
     6           -IX(I,118)-IX(I,119)-IX(I,130)-IX(I,131)-IX(I,132)
     7           -IX(I,133)-IX(I,134)-IX(I,135)-IX(I,136)-IX(I,137)
     8           -IX(I,145)-IX(I,150)-IX(I,151)-IX(I,155)-IX(I,156)
     9           -IX(I,160)-IX(I,161)-IX(I,165)-IX(I,166)-IX(I,167))
      UNSW(I,55)= UNSW(I,55)      +T(IX(I,190)+IX(I,191)+IX(I,238)
     1           +IX(I,239)+IX(I,247)+IX(I,248)+IX(I,148)+IX(I,147)
     2           +IX(I,138)+IX(I,139)-IX(I,180)-IX(I,181)-IX(I,182)
     3           -IX(I,183)-IX(I,184)-IX(I,185)-IX(I,186)-IX(I,187))
      UNSW(I,56)=-T(IX(I,116)+IX(I,216)+IX(I,117)+IX(I,217))
      UNSW(I,58)=T(IX(I,130)+IX(I,131)+IX(I,132)+IX(I,133)+IX(I,146)
     1          + IX(I,230)+IX(I,231)+IX(I,232)+IX(I,233)+IX(I,246))
      UNSW(I,59)=T(IX(I,130)+IX(I,230))
      UNSW(I,60)=T(IX(I,134)+IX(I,135)+IX(I,136)+IX(I,137)+IX(I,140)
     1           +IX(I,144)+IX(I,145)+IX(I,234)+IX(I,235)+IX(I,236)
     2           +IX(I,237)+IX(I,240)+IX(I,244)+IX(I,245))
      UNSW(I,62)=-T(IX(I,118)+IX(I,218)+IX(I,119)+IX(I,219))
      UNSW(I,64)=-T(IX(I,150)+IX(I,250)+IX(I,151)+IX(I,251))
      UNSW(I,66)=-T(IX(I,155)+IX(I,255)+IX(I,156)+IX(I,256))
      UNSW(I,68)=-T(IX(I,175)+IX(I,176)+IX(I,177)+IX(I,178)+IX(I,179)
     1            +IX(I,275)+IX(I,276)+IX(I,277)+IX(I,278)+IX(I,279))
      UNSW(I,72)=-T(IX(I,171)+IX(I,172)+IX(I,173)+IX(I,174)
     1            +IX(I,271)+IX(I,272)+IX(I,273)+IX(I,274))
      UNSW(I,74)= T(IX(I,160)+IX(I,161)+IX(I,260)+IX(I,261))
      UNSW(I,86)= IX(I,301)*1.0E-4
      UNSW(I,87)= IX(I,302)*1.0E-4
      UNSW(I,88)= IX(I,303)*1.0E-4
      UNSW(I,89)= IX(I,304)*1.0E-4
C
C
      UNSW(I,53)= T(ICH(I,2))*T(ICH(I,8))*.1/PARCAP
      UNSW(I,70)=T(ICH(I,3)+ICH(I,4))
      UNSW(I,81)=  ICH(I,7)*1.0E-4
      UNSW(I,82)=  ICH(I,6)*1.0E-4
      UNSW(I,83)=  ICH(I,8)*1.0E-4
C
C
      UNSW(I,14)=UNSW(I, 3)+UNSW(I, 5)+UNSW(I, 7)+UNSW(I, 8)+UNSW(I, 9)
     +          +UNSW(I,10)+UNSW(I,12)-UNSW(I,48)
      UNSW(I,15)=UNSW(I,16)+UNSW(I,17)
      UNSW(I,24)=UNSW(I,19)+UNSW(I,20)+UNSW(I,21)+UNSW(I,22)+UNSW(I,23)
      UNSW(I,25)=UNSW(I,26)+UNSW(I,27)
      UNSW(I,28)=UNSW(I,15)+UNSW(I,19)+UNSW(I,25)
      UNSW(I,35)=UNSW(I,32)+UNSW(I,34)+T(IX(I,94))
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                    UNSW(I,44)=UNSW(I,36)+UNSW(I,40)+UNSW(I,41)+UNSW(I,42)+UNSW(I,43)
                    UNSW(I,45)=UNSW(I,44)-UNSW(I,24)
                    UNSW(I,46)=UNSW(I,45)+UNSW(I,35)+UNSW(I,37)+UNSW(I,39)
                    UNSW(I,47)=UNSW(I,46)+UNSW(I,24)
                    UNSW(I,49)=UNSW(I,47)+UNSW(I,48)
              C
                    UNSW(I,57)=UNSW(I,55)-UNSW(I,56)
                    UNSW(I,61)=UNSW(I,57)+UNSW(I,58)+UNSW(I,60)
                    UNSW(I,63)=UNSW(I,61)-UNSW(I,62)
                    UNSW(I,65)=UNSW(I,63)-UNSW(I,64)
                    UNSW(I,67)=UNSW(I,65)-UNSW(I,66)
                    UNSW(I,69)=UNSW(I,67)-UNSW(I,68)
                    UNSW(I,71)=UNSW(I,69)+UNSW(I,70)-(1.-TAX(I))*T(IX(I,119)+IX(I,219)
                   +)
                    UNSW(I,73)=UNSW(I,69)-UNSW(I,72)
                    UNSW(I,75)=UNSW(I,73)+UNSW(I,74)
                    UNSW(I,76)=UNSW(I,65)+UNSW(I,56)
                    UNSW(I,77)=UNSW(I,72)+UNSW(I,68)+T(IX(I,157)+IX(I,257))
                    UNSW(I,78)=UNSW(I,76)-UNSW(I,77)
                    UNSW(I,90)=UNSW(I,86)+UNSW(I,87)+UNSW(I,88)+UNSW(I,89)
                    UNSW(I,91)=UNSW(I,90)*UNSW(I,81)*PARCAP/UNSW(,83)
                                                                  $
   01) SYNTAX
                    UNSW(I,93)=100.*UNSW(I,71)/UNSW(I,53)
              C
                100 CONTINUE
              C
              C
              C   ASSET REVALUATION ADJ.
              C
                    A(1)=1.
                    DO 150 I=2,N
                    B=UNSW(I-1,12)-UNSW(I,12)
                    IF(B) 120,130,130
                120 B=0.
                130 B=B+UNSW(I-1,13)
                    A(I)=A(I-1)*(1.+B/(UNSW(I-1,46)-B))/1.025
                    IF(A(I)-1.) 140,140,150
                140 A(I)=1.
                150 CONTINUE
                    DO 160 I=1,N
                160 UNSW(I,50)=UNSW(I,46)*(A(I)-1.)
              C
              C   DILUTION FACTORS
                    UNSW(1,84)=IDIL*1.E-4
                    DO 180 I=1,N
                         B =  UNSW(I , 84)*ICH(I,5)*1.E-4
                         C =  IX(I,320)*1.E-4
                    UNSW(I,85)=C*B+(1.-C)*UNSW(I,84)
                    IF(N-I) 180,180,170
                170 UNSW(I+1,84)=B
                180 CONTINUE
              C
              C   365 DAY  YEAR LENGTH ADJ. FACTOR
```

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      C
            DO 190 I=1,N
            CALL JDATE(IYR(I,1),IYR(I,2),IYR(I,3),J)
        190 A(I)=J
            DO 240 I=1,N
            IF(IX(I,322)) 200,200,230
        200 IF(I-N) 210,220,220
        210 B=A(I)-A(I+1)
            GO TO 240
        220 B=365.
            GO TO 240
        230 B=IX(I,322)
        240 A(I)= 365./B
      C
            DO 250 I=2,N
        250 A(I-1)=A(I)*(A(I-1)-1.)/A(I-1)
            A(N)=0.
      C
      C  ADJUSTED DPS AND EPS
      C
            UNSW(1,92)= UNSW(1,91)*UNSW(1,85)
            UNSW(1,94)= UNSW(1,93)*UNSW(1,84)
            DO 260 I=2,N
            UNSW(I,92)= UNSW(I,91)*UNSW(I,85)
            UNSW(I,94)= UNSW(I,93)*UNSW(I,84)
            UNSW(I-1,92)=UNSW(I-1,92)+A(I-1)*UNSW(I,92)
        260 UNSW(I-1,94)=UNSW(I-1,94)+A(I-1)*UNSW(I,94)
      C
      C
      C   PRICE DATA
      C
            DO 320 I=1,N
            J=74-IYR(I,3)
            K=IYR(I,2)
            UNSW(I,51)=AENP(K,J)*UNSW(I,53)
            UNSW(I,52)=UNSW(I,6)+UNSW(I,11)+UNSW(I,28)+UNSW(I,51)
            NAV=0
            B=0.
            DO 280 L=1,3
            M=(K+L)/13
            JJ=J-M
            KK=K+L-12*M
            IF(LOP(KK,JJ)) 280,280,270
        270 NAV=NAV+1
            B=B+ .25*(HIP(KK,JJ)+LOP(KK,JJ)+2.*ENP(KK,JJ))
        280 CONTINUE
            UNSW(I,95)=0.
            IF(NAV) 300,300,290
        290 UNSW(I,95)=B/FLOAT(NAV)
      C
        300 DO 310 K=1,12
            UNSW(I,K+95) = HIP(K,J)
            UNSW(I,K+107)= LOP(K,J)
            UNSW(I,K+119)= ENP(K,J)
```

```
  310 UNSW(I,K+131)= VOL(K,J)
C
  320 CONTINUE
C
      RETURN
C
      END
```

RESEARCH FILE ARRAYS

Array	Description	Units
1,2	Header, Firm Number, Industry Classification	na
3	Ordinary Capital - Balance Sheet	$000's
4	Number of Fully Paid Shares - Balance Sheet	$000's
5	Ordinary Capital - Other	$000's
6	Preference Capital	$000's
7	Convertible Notes	$000's
8	Unappropriated Profits	$000's
9	Revenue Reserves	$000's
10	Capital Reserves	$000's
11	Minority Interests	$000's
12	Asset Revaluation Reserve	$000's
13	Asset Revaluation on Bonus Issue	$000's
14	Ordinary Equity	$000's
15	Long-Term Debt	$000's
16	Long-Term Debt -Secured	$000's
17	Long-Term Debt - Unsecured	$000's
18	Other Deferred Liabilities	$000's
19	Bank Overdraft	$000's
20	Trade Creditors	$000's
21	Tax Provisions	$000's
22	Dividend Provisions	$000's
23	Other Current Liabilities Excluding Dividend Provisions	$000's
24	Current Liabilities	$000's
25	Short-Term Debt Excluding Bank Overdraft	$000's
26	Short-Term Debt - Secured	$000's

Array	Description	Units
27	Short-Term Debt - Unsecured	$000's
28	Total (non-trading) Debt	$000's
29	Spare Array	na
30	Spare Array	na
31	Property - Gross	$000's
32	Property - Net	$000's
33	Plant And Machinery - Gross	$000's
34	Plant And Machinery - Net	$000's
35	Net Plant and Property	$000's
36	Listed Investments - Book Value	$000's
37	Non Listed Investments	$000's
38	Listed Investments - Market Value	$000's
39	Deferred Assets	$000's
40	Cash	$000's
41	Total Debtors	$000's
42	Stocks	$000's
43	Other Current Assets	$000's
44	Current Assets	$000's
45	Net Working Capital	$000's
46	Total Invested Capital And Total Funds Employed	$000's
47	Total Tangible Assets	$000's
48	Intangibles	$000's
49	Total Assets	$000's
50	Asset Revaluation	$000's
51	Market Value of Ordinary Shares	$000's
52	Aggregate Market Value	$000's

Array	Description	Units
53	Number of Equivalent Fully Paid Shares	$000's
54	Spare Array	na
55	First Operating Income	$000's
56	Depreciation Provided	$000's
57	Second Operating Income	$000's
58	Investment Income - Including Dividends Received	$000's
59	Dividends Received	$000's
60	Other Normal Income	$000's
61	Earnings Before Interest And Tax	$000's
62	Interest Paid	$000's
63	Pre-Tax Group Profit	$000's
64	Tax Provided	$000's
65	Group Net Profit	$000's
66	Minority Interest Paid	$000's
67	Net Profit Available	$000's
68	Preference Dividends	$000's
69	Earned For Ordinary	$000's
70	Notional Interest Adjustment	$000's
71	Earned For Ordinary - Adjusted	$000's
72	Ordinary Dividends Paid	$000's
73	Retained Earnings From Normal Operations	$000's
74	Non-Normal Surplus Or Loss	$000's
75	Total Retained Earnings	$000's
76	Gross Cash Flow	$000's
77	Total (All) Dividends	$000's
78	Retained Cash Flow	$000's
79	Spare Array	na

Array	Description	Units
80	Spare Array	na
81	Par Value	$
82	Paid-Up Value	$
83	Par Plus Capital Repaid	$
84	Earnings Dilution Factor - Cumulative	Fraction
85	Dividend Dilution Factor - Cumulative	Fraction
86	Ordinary Dividend Rate Paid - 1st Quarter	%
87	Ordinary Dividend Rate Paid - 2nd Quarter	%
88	Ordinary Dividend Rate Paid - 3rd Quarter	%
89	Ordinary Dividend Rate Paid - 4th Quarter	%
90	Total Ordinary Dividend Rate For Year	%
91	Dividends Per Share - Historical	cents
92	Dividends Per Share - Adjusted	cents
93	Earnings Per Share - Historical	cents
94	Earnings Per Share - Adjusted	cents
95	Post-Balance Date Adjusted Price	$
96/ 107	Monthly Adjusted High Price (96=January,96= February, etc.)	$
108/ 119	Monthly Adjusted Low Price (108=January, 109=February, etc.)	$
120/ 131	Monthly Adjusted End Price (120=January, 121=February, etc.)	$
132/ 143	Monthly Adjusted Trading Volume (132=January, 133=February, etc.)	000's

APPENDIX 4

```
              I = 0
              X = XLO
              Y1 = F(X)
      8           CONTINUE
                  X0 = X
                  X  =  X + AMIN1(MESHHI, AMAX1(MESHLO, ABS(Y1 * MESH)))
                  IF (X .EQ. SING)  X = X + MESHLO
                  Y2  = F(X)
                  IF(Y1 * Y2)  11, 12, 13
     11           CONTINUE
C                 FOUND A CHANGE IN SIGN - HENCE JUST PASSED A ROOT
C                                  (OR SINGULARITY)
                  IF ( (X0 .LT. SING) .AND. (X .GT. SING) )    GOTO 15
                  I = I + 1
                  ROOT(I) = (X0 + X) / 2.0
                  GOTO 15
     12       CONTINUE
C             EITHER  AT  OR  JUST  PASSED  A  ZERO
              IF(X  .NE. 0.0)  GOTO 15
C             HAVE  AN EXACT ZERO
              I = I + 1
              ROOT(I) = X
              GOTO 15
     13       CONTINUE
C             NO CHANGE IN SIGN
     15       CONTINUE
              Y1 = Y2
              IF(X .LT. XHI)  GOTO 8
              N = I
              RETURN
              ENTRY  FINDST(MESHHI, MESHLO, MESH, XLO, XHI)
              WRITE(3, 18) MESHHI, MESHLO, MESH, XLO, XHI
     18       FORMAT('-  FOR THIS RUN MESH SIZES ARE :-',
         1     'MESHHI = ', F12.6,  '   MESHLO = ', F12.6, '   MESH = ',F12.6,/
         A          '      SEARCH STARTS FROM (XLO)', F12.6,'  AND ENDS ',
         B          'AT (XHI)', F12.6)
              RETURN
              END
              FUNCTION  FUNINT(A, B, C, P, GS, GE, N)
              FUNINT = 1.0
              WRITE(3, 3) A, GS, B, GS, N, C, GE, N, P
      3       FORMAT('  EQUATION IS Y = ', F9.2, '/(K-', F7.4, ')  -  ',
         A            F9.2, '/((K-', F7.4, ')(1+K)**', I2, ')  +  ',
         B            F9.2, '/((K-', F7.4, ')(1+K)**', I2, ')  -  ', F8.2    )
              FN = FLOAT(N)
              RETURN
              ENTRY  F(X)
              ONEXN  =  (1.0  +  X) **N
              IF ((X .NE. GE) .AND. (X .NE. -1.0))  GOTO 4
              F = 9999999.
              RETURN
      4       CONTINUE
              IF (X .NE. GS )  GOTO 7
              IF (GS .NE. -1.0) GOTO 5
              F = C / ((X-GE) * ONEXN) - P
              RETURN
```

```
    7         CONTINUE
              F =  A/(X-GS)  -  B/((X-GS)*ONEXN)  +  C/((X-GE)*ONEXN)  -  P
              RETURN
              ENTRY  FDASH(Y)
              ONEXN1 =  (1.0 + X) **(N - 1)
              FDASH =    B * (ONEXN + FN*(X-GS)*ONEXN1)/((X-GS)*ONEXN)**2
         C          -    C * (ONEXN + FN*(X-GE)*ONEXN1)/((X-GE)*ONEXN)**2
         D          -    A/(X-GS)**2
              RETURN
              END
              SUBROUTINE  GRAPH(    LP, P)
              REAL * 8  LINE1(14)
              INTEGER POSN  7
              LOGICAL * 1  LINE2(112),BAR,STAR,LESS,MORE,NUMBER(9),BLANK
C             GRAPHS  FUNCTION  ON  THE  NEXT  50  LINES ON  DEVICE LP
              EQUIVALENCE (LINE1, LINE2)
    C
              DATA  XLO, XHI, XINC, LINESZ, MIDDLE,  FIDDLE,     LINE1
         A     /     1.0, 50.0, 1.0,   112  ,    56  ,     55.0, 14*'      ' /
              DATA  BAR, STAR, LESS, MORE, NUMBER   , BLANK
         B     /     '+',  '*',    '<' ,  '>' ,'1','2','3','4','5','6','7','8','9'
         ,' '  '                                                              /
C             LINE1  AND  LINE2  ARE  THE  SAME  THING
C             LINE1  IS USED  FOR  PRINTING
C             LINE2  IS USED  FOR  INDEXING
C             THE  Y-AXIS IS  PLOTTED  ACROSS  THE  PAGE
C             THE  X-AXIS DOWN  THE  PAGE
C             P  IS  THE  MIDDLE  OF  THE  GRAPH -  WHERE  THE  ROOTS  ARE
              X = XLO
              WRITE(LP, 6)  P
    6         FORMAT('0  GRAHP  OF  P(ACROSS PAGE) AGAINST K%(DOWN PAGE) MIDD
         ALE  OF  GRAPH = ', F10.4 )
    8               CONTINUE
                    LINE2(MIDDLE) = BAR
                    Y = F(X / 100.0) + P
                    VAL = (Y/P) * FIDDLE + 1.0
C                   ADDITION  OF  ONE(1.0)  REQUIRED AS BLOODY FORTRAN INSISTS
C                   ON  SUBSCRIPTING FROM 1  (AND WE REQUIRE 0)
                    POSN  =  IFIX(VAL)
C
C                   F    -   0.0        P          2P
C
C                   POSN -    1      MIDDLE      END-OF-LINE
C
                    IF (POSN .LT. 1)  GOTO  16
                    IF (POSN .GT. LINESZ)  GOTO 18
C
                    IF (IFIX((VAL - FLOAT(POSN)) * 3.0) - 1 )  12, 13, 14
   12               LINE2(POSN)  =  LESS
                    GOTO  45
   13               LINE2(POSN)  =  STAR
                    GOTO  45
   14               LINE2(POSN)  =  MORE
                    GOTO  45
   16               LINE2(1)  =  NUMBER(MINO(9, 1 - POSN))
                    POSN = 1
```

```
      45  CONTINUE
             WRITE(LP, 29)   X,  Y,  LINE1
      29     FORMAT( 1X, F5.1, 1X, F9.2, 1X, 14A8 )
             LINE2(POSN) = BLANK
             X = X + XINC
             IF (X  .LE.  XHI)  GOTO 8
          RETURN
          END
          REAL FUNCTION  NEWTON(X0, EPS, N)
C         NEWTON - RAPSON  TO FIND  ROOT OF F   NEAR X0, TO AN ACCURACY
C              OF  EPS, OR  UNTIL N -ITTERATIONS  HAVE OCCURRED
             DO  6  I = 1, N
             X1 = X0 - F(X0)  / FDASH(X0)
             IF (ABS(X1-X0) .LT. EPS)  GOTO  8
             X0 = X1
       6     CONTINUE
             NEWTON =   -999.999
             RETURN
       8     NEWTON =  X1
             RETURN
             END
C         MAIN   PROGRAMME
          REAL   APPROX(19), EXACT(19), NEWTON, APPROS(19)
          INTEGER NUMBER(2), NAME(3), INFO(14)
          LOGICAL * 1 ENTRY(8), COUNT1(4)
          REAL MESHHI, MESHLO, MESH, XLO, XHI
          INTEGER  COUNT2
          NAMELIST  /START/ P0, D0, GS, GE, N
          NAMELIST  /MESHX/  MESHHI, MESHLO, MESH, XLO, XHI
          EQUIVALENCE  (COUNT1, COUNT2)
          DATA  GS, GE, N  ,IMPUT ,  P0,  D0
     A     /  0.1, 0.05, 5,  1  ,  128.4,  7.84                    /
          DATA  LIMIT  ,  EPS  /  20 ,  0.00001  /
          DATA   MESHHI,  MESHLO,  MESH,  XLO,  XHI
     A     /       0.005,  0.001,  0.003, -0.1,  0.9               /
          READ(IMPUT, MESHX,END=61)
          CALL FINDST(MESHHI, MESHLO, MESH, XLO, XHI)
       4  CONTINUE
          READ(IMPUT, 42, END=49)NUMBER,NAME,INFO
      42  FORMAT(2A4, 1X, 3A4, 3X, 14A4)
          WRITE(3, 44)   NUMBER, NAME, INFO
      44  FORMAT('1   COMPANY NUMBER = ', 2A4,  '  SHORT NAME != ', 3A4,
     Z         20X,    14A4)
          GE = GE * 100.0
          GS = GS * 100.0
          READ (IMPUT,START,END=61)
          WRITE(3, 46)  P0,  D0,  GS,  GE,  N
      46  FORMAT('  P0 = ', F10.2, '  D0 = ', F10.2,  '3 GS = ', F6.3,
     Y         '%     GE = ', F6.2,  '%  N = ', I3)
          CALL  ERRSET( 207,  256,  1,  1)
          GS = GS / 100.00
          GE = GE / 100.00
          GSP1 = GS + 1.0
          GSP1N = GSP1 **N
          Y = FUNINT(D0*GSP1,  D0*GSP1*GSP1N,  D0*GSP1N*(1.0+GE), P0,
     B                        GS, GE, N)
```

```
                DO 55 I = 1, NR
                APPROS(I) = APPROX(I) * 100.0
   55           CONTINUE
           WRITE(3, 6)  (APPROS(I), I=1, NR)
    6      FORMAT('+',T54,' THESE  APPROX ROOTS  ARE :-',5F9.4/
        6       (' ',14F9.4))
                DO  8 I = 1, NR
                EXACT(I) = NEWTON(          APPROX(I),EPS,LIMIT) * 100.0
    8           CONTINUE
           WRITE(3, 9)  (EXACT(I), I=1, NR)
    9      FORMAT(' EXACT (NEWTONS METHOD) ROOTS ARE :-' , 5F9.4 ,
        6       (' ',14F9.4))
   15      CALL GRAPH(  3,P0)
           CALL  ERRSAV( 207,  ENTRY)
           COUNT2 = 0
           COUNT1(4) = ENTRY(3)
           IF (COUNT2 .GT. 0)  WRITE(3, 21) COUNT2
   21      FORMAT(' ',  I4,  ' ERRORS OCCURRED')
           GOTO 4
   49      WRITE(3, 51)
   51      FORMAT('1  END  OF  RUN')
           STOP
   61      WRITE(3,65)
   65      FORMAT('- ***ERROR*** NOT ENOUGH DATA CHECK &MESHX -- &END AND
        D  &START -- &END')
           STOP
           END
//LKED.SYSLMOD DD DSN=UNSW.PROCLIB(JAKI),UNIT=SYSDA,VOL=SER=222222,
//              DISP=(OLD,KEEP)
//GO.SYSIN DD *
 &MESHX      MESHHI=0.005,  MESHLO = 0.001, MESH = 0.003                  &END
12345678 MICKEY          GARBAGE
 &START P0=145.00, D0=2.36, GS=10.00, GE=4.00, N=5    &END
12345678 MICKEY          GARBAGE
 &START   P0= 84.00,D0= 4.99,GS=  -4.50,GE= 4.50,N= 5              &END
12345678 MICKEY          GARBAGE
 &START
P0= 164.00,D0= 9.97,GS=  1.20,GE= 4.50,N= 5
                      &END
 &START
P0= 435.00,D0= 8.32,GS= 10.90,GE= 4.50,N= 5
                      &END
12345678 MICKEY          GARBAGE
 &START
P0= 63.90,D0= 1.92,GS=  10.00,GE= 4.00,N=10
                      &END
//
**** LIST END ****
```

APPENDIX 5

TABLE (SA-1) $DVM^x_e = a_o + a_1 \frac{V_D}{V_S} + a_2 \left[\frac{V_D}{V_S}\right]^2 + a_3 R_N + a_4 R_N^2 + a_5 S + a_{6 \cdots 15} ID + a_{16} BR$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}	a_{16}
1967	0.540	10.540	1.701	1.461	1.804	1.153	-0.698	-0.314	-1.094	-0.649	-0.979	2.518	-0.145	0.094	-0.279	-0.471	-0.059	0.753
		(63.878)^a	(1.970)^b	(0.800)	(1.955)^c	(0.913)	(4.744)^a	(0.187)	(0.825)	(0.619)	(0.926)	(1.891)^c	(0.133)	(0.088)	(0.259)	(0.388)	(0.047)	(2.874)^a
1968	0.629	9.706	1.231	0.761	1.582	0.978	-0.606	0.446	0.157	0.776	0.685	2.288	1.535	1.782	0.960	1.573	2.034	0.654
		(82.254)^a	(1.650)^c	(1.300)^d	(1.682)^c	(1.440)^d	(5.787)^a	(0.369)	(0.161)	(1.026)	(0.904)	(2.775)^a	(1.970)^b	(2.345)^b	(1.245)	(1.806)^c	(2.293)^b	(2.286)^b
1969	0.626	9.459	1.185	0.846	1.199	0.751	-0.597	0.463	0.656	0.856	0.672	1.972	1.153	1.465	0.662	0.539	2.403	0.644
		(82.973)^a	(1.426)^d	(0.805)	(2.000)^b	(0.939)	(5.628)^a	(0.387)	(0.710)	(1.188)	(0.924)	(2.365)^b	(1.527)^d	(2.001)^b	(0.894)	(0.647)	(2.818)^a	(2.192)^b
1970	0.515	11.228	1.483	1.319	1.464	0.924	-0.547	-0.111	0.516	0.671	0.581	1.954	1.146	1.630	0.774	2.173	2.699	0.745
		(76.380)^a	(1.542)^d	(0.659)	(1.762)^c	(0.693)	(3.979)^a	(0.069)	(0.437)	(0.724	(0.621)	(1.822)^c	(1.188)	(1.753)^c	(0.815)	(2.024)^b	(2.455)^b	(2.815)^a
1971	0.566	11.814	1.599	1.129	1.581	0.995	-0.594	-0.945	0.729	0.651	0.577	1.695	0.816	1.025	0.969	1.608	2.070	0.873
		(74.772)^a	(1.752)^c	(0.973)	(1.850)^c	(0.701)	(4.030)^a	(0.512)	(0.570)	(0.652)	(0.572)	(1.568)^d	(0.790)	(1.012)	(0.949)	(1.389)^d	(1.750)^c	(3.449)^a
1972	0.458	9.882	1.537	1.133	1.396	0.883	-0.612	-1.311	0.337	-0.236	-0.197	0.675	0.232	0.425	-0.347	0.337	0.109	0.647
		(78.428)^a	(1.562)^d	(1.000)	(1.687)^c	(0.593)	(5.144)^a	(0.966)	(0.335)	(0.297)	(0.245)	(0.734)	(0.280)	(0.524)	(0.427)	(0.365)	(0.115)	(2.062)^b

t = test values are shown in brackets

a = Significant at the 0.01 level; b = Significant at the 0.05 level

c = Significant at the 0.10 level; d = Significant at the 0.20 level

TABLE (SA-2) $DVM X_e = a_o + a_1 \frac{V_D}{V_S} + a_2 \left[\frac{V_D}{V_S}\right]^2 + a_3 R_N + a_4 R_N^2 + a_5 S + a_{6 \cdots 15} ID + a_{16} BR$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}	a_{16}
1967	0.590	10.548	1.965	1.579	1.910	1.202	-0.736	0.136	-0.451	-0.154	-0.774	2.805	0.470	0.544	0.208	-0.176	-0.148	0.866
		$(48.608)^a$	$(1.570)^c$	(0.998)	$(2.554)^b$	$(1.397)^d$	$(3.802)^a$	(0.061)	(0.258)	(0.111)	(0.556)	$(1.998)^b$	(0.328)	(0.387)	(0.146)	(0.110)	(0.090)	$(2.730)^a$
1968	0.616	9.229	1.284	1.000	1.282	0.819	-0.655	0.622	0.974	1.172	0.733	2.282	2.086	2.296	1.424	1.772	2.258	0.870
		$(56.969)^a$	$(1.350)^d$	(0.904)	$(1.925)^c$	(0.913)	$(4.557)^a$	(0.375)	(0.728)	(1.130)	(0.704)	$(2.582)^a$	$(1.981)^b$	$(2.202)^b$	$(1.346)^d$	$(1.483)^d$	$(1.984)^b$	$(2.844)^a$
1969	0.585	9.285	0.973	0.652	1.157	0.723	-0.676	0.979	1.742	1.371	0.874	2.810	1.838	2.075	1.264	0.858	2.476	0.880
		$(56.272)^a$	$(1.435)^d$	(1.273)	$(2.517)^b$	(1.004)	$(4.416)^a$	(0.568)	$(1.305)^d$	$(1.317)^d$	(0.831)	$(2.333)^b$	$(1.685)^c$	$(1.961)^b$	(1.183)	(0.713)	$(2.821)^a$	$(3.032)^a$
1970	0.600	10.468	1.100	0.779	1.359	0.866	-0.597	-0.342	1.591	1.508	1.176	1.967	2.042	2.378	1.745	2.841	2.100	0.988
		$(50.815)^a$	$(1.774)^c$	$(1.353)^d$	$(1.859)^c$	(0.923)	$(3.095)^a$	(0.154)	(0.962)	(1.360)	(0.895)	$(1.972)^b$	$(1.509)^d$	$(1.803)^b$	$(1.310)^d$	$(1.886)^c$	$(2.658)^a$	$(3.908)^a$
1971	0.531	10.845	1.206	1.015	1.389	0.872	-0.484	-2.041	2.007	1.999	1.153	2.268	1.895	1.806	2.348	2.623	2.590	0.991
		$(49.520)^a$	$(2.046)^b$	(1.297)	$(2.530)^b$	(0.839)	$(3.374)^a$	(0.799)	(1.136)	$(1.448)^d$	(1.098)	$(1.672)^c$	$(1.326)^d$	$(1.289)^d$	$(1.663)^c$	$(1.637)^d$	$(2.194)^a$	$(4.022)^a$
1972	0.461	9.463	1.115	0.787	1.137	0.728	-0.484	-1.906	1.480	0.620	0.513	1.454	1.062	0.014	0.516	1.121	0.920	0.866
		$(50.335)^a$	$(2.469)^b$	$(1.354)^d$	$(2.478)^b$	(0.903)	$(2.742)^a$	(0.942)	(0.987)	(0.567)	(0.428)	(1.061)	(0.859)	(0.012)	(0.427)	(0.816)	(0.656)	$(2.801)^a$

t = test values are shown in brackets. a = Significant at the 0.01 level b = Significant at the 0.05 level
c = Significant at the 0.10 level d = Significant at the 0.20 level

TABLE (SA-3) $RIM^K_e = a_o + a_1 \frac{V_D}{V_S} + a_2 \left[\frac{V_D}{V_S}\right]^2 + a_3 R_N + a_4 R_N^2 + a_5 S + a_{6 \cdots 15} ID + a_{16} BR$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}	a_{16}
1967	0.453	10.401	1.824	1.148	1.443	0.906	-0.667	-0.091	-1.340	-0.674	-1.024	2.417	-0.124	0.064	-0.273	-0.528	-0.169	0.751
		(63.809)^a	(2.454)^a	(1.282)^d	(1.924)^c	(0.983)	(4.660)^a	(0.055)	(1.019)	(0.650)	(0.977)	(1.832)^c	(0.116)	(0.061)	(0.256)	(0.439)	(0.138)	(2.804)^a
1968	0.540	9.081	1.246	0.572	0.981	0.617	-0.597	0.318	0.360	0.712	0.535	2.124	1.339	1.605	0.890	1.480	1.953	0.848
		(77.615)^a	(1.972)^a	(0.851)	(2.149)^d	(0.793)	(5.825)^a	(0.266)	(0.318)	(0.951)	(0.708)	(1.613)^c	(1.728)^c	(2.123)^b	(1.165)	(1.715)^c	(2.222)^b	(3.658)^a
1969	0.530	9.850	1.082	0.548	1.120	0.716	-0.572	0.250	0.628	0.845	0.604	1.889	1.067	1.343	0.651	0.485	2.352	0.842
		(87.168)^a	(1.961)^a	(0.612)	(1.442)^d	(1.139)	(5.538)^a	(0.210)	(0.686)	(1.178)	(0.831)	(2.270)^b	(1.415)^d	(1.832)^c	(0.883)	(0.584)	(1.768)^c	(3.087)^a
1970	0.614	11.699	1.524	0.856	1.314	0.827	-0.520	-0.339	0.530	0.751	0.591	2.024	1.170	1.652	0.852	2.195	2.693	0.742
		(79.585)^a	(1.640)^d	(0.830)	(2.445)^b	(0.937)	(3.839)^a	(0.213)	(0.451)	(0.810)	(0.630)	(1.888)^c	(1.214)	(1.757)^c	(0.898)	(2.043)^b	(2.447)^b	(2.961)^a
1971	0.567	12.382	1.786	1.113	1.666	1.067	-0.540	-0.724	0.866	0.783	0.655	2.018	0.883	1.063	1.105	1.701	2.135	0.969
		(87.367)^a	(1.958)^c	(0.926)	(2.486)^b	(1.039)	(3.740)^a	(0.373)	(0.683)	(0.785)	(0.650)	(1.617)^d	(0.856)	(1.051)	(1.085)	(1.471)^d	(1.806)^c	(4.164)^a
1972	0.456	10.388	1.598	1.016	1.219	0.777	-0.569	-1.149	0.437	-0.158	-0.148	0.722	0.302	-0.360	-0.261	0.408	0.162	0.946
		(82.444)^a	(2.056)^b	(0.784)	(2.244)^b	(0.932)	(5.001)^a	(0.853)	(0.435)	(0.200)	(0.185)	(0.787)	(0.367)	(0.447)	(0.322)	(0.445)	(0.172)	(3.983)^a

t = test values are shown in brackets a = Significant at the 0.01 level b = Significant at the 0.05 level
c = Significant at the 0.10 level d = Significant at the 0.20 level

TABLE (5A-4) $CPM^{K}_{e} = a_o + a_1 \frac{V_D}{V_S} + a_2 \left[\frac{V_D}{V_S}\right]^2 + a_3 R_N + a_4 R_K^{\,2} + a_5 S + a_{6 \cdots 15} ID + a_{16} BR$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}	a_{16}
1967	0.496	9.629	1.460	0.765	1.410	0.894	-0.706	0.367	-0.764	-0.194	-0.831	2.835	0.522	0.554	0.222	-0.229	-0.253	0.768
		(44.373)^a	(2.500)^b	(0.774)	(1.843)^b	(0.934)	(3.720)^a	(0.167)	(0.438)	(0.141)	(0.598)	(2.022)^b	(0.367)	(0.396)	(0.158)	(0.144)	(0.155)	(2.796)^a
1969	0.513	9.868	1.435	0.929	1.288	0.819	-0.652	0.593	1.133	1.149	0.668	2.207	1.997	2.228	1.390	1.745	2.229	0.866
		(60.539)^a	(2.157)^b	(0.863)	(1.464)^d	(0.933)	(4.585)^a	(0.357)	(0.848)	(1.105)	(0.639)	(2.504)^b	(1.856)^c	(2.122)^b	(1.311)^d	(1.457)^b	(1.827)^c	(3.640)^a
1969	0.584	9.139	1.178	0.580	1.132	0.712	-0.654	0.916	1.736	1.384	0.857	2.780	1.819	2.035	1.284	0.838	2.456	0.748
		(55.387)^a	(1.963)^b	(0.705)	(1.524)^d	(0.739)	(4.362)^a	(0.530)	(1.307)^d	(1.329)^d	(0.813)	(2.301)^b	(1.662)^c	(1.913)^c	(1.201)	(0.695)	(1.801)^c	(2.656)^b
1970	0.598	11.506	1.195	0.528	1.637	1.033	-0.563	-0.452	1.604	1.558	1.172	2.040	2.089	2.433	1.788	2.876	2.117	0.890
		(55.854)^a	(2.149)^b	(1.282)^d	(1.960)^b	(1.396)^d	(2.958)^a	(0.203)	(0.971)	(1.198)	(0.891)	(2.020)^b	(1.543)^d	(1.843)^c	(1.342)^d	(1.908)^c	(1.666)^c	(3.908)^a
1971	0.528	12.045	1.492	0.767	1.463	0.937	-0.627	-1.803	2.129	2.059	1.568	2.316	1.934	1.860	2.426	2.677	2.622	0.891
		(54.750)^a	(1.644)^d	(1.468)^d	(1.690)^c	(1.039)	(3.135)^a	(0.669)	(1.205)	(1.489)^d	(1.121)	(2.698)^a	(1.351)^d	(1.326)^d	(1.717)^c	(1.669)^c	(2.209)^b	(3.952)^a
1972	0.462	10.055	1.234	0.789	1.142	0.726	-0.681	-1.676	1.444	0.619	0.469	1.460	1.036	0.023	0.480	1.088	0.892	0.867
		(53.484)^a	(1.754)^c	(1.319)^d	(1.792)^c	(0.932)	(3.951)^a	(0.834)	(0.964)	(0.525)	(0.392)	(1.069)	(0.843)	(0.019)	(0.397)	(0.795)	(0.637)	(3.847)^a

t = test values are shown in brackets a = Significant at the 0.01 level b = Significant at the 0.05 level
c = Significant at the 0.10 level d = Significant at the 0.20 level

$$\text{TABLE (5A-5)}\quad DVMX_o = a_o + a_1\frac{V_D}{V_T} + a_2\left[\frac{V_D}{V_T}\right]^2 + a_3R_X + a_4R_X^2 + a_5S + a_{6}\cdots{}_{15}ID + a_{16}BR$$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}	a_{16}
1967	0.527	9.810	-3.624	6.227	0.936	0.595	-0.629	0.324	-1.248	-0.894	-1.015	2.286	-0.367	-0.244	-0.505	-0.648	-0.369	0.845
		(72.666)^a	(1.965)^b	(1.769)^c	(1.419)^d	(0.933)	(5.171)^a	(0.235)	(1.157)	(1.040)	(1.170)	(2.287)^b	(0.413)	(0.279)	(0.572)	(0.651)	(0.363)	(3.028)^a
1968	0.609	9.181	-3.070	4.752	1.134	0.712	-0.541	0.693	0.320	0.643	0.609	2.529	1.233	1.385	0.887	1.324	1.702	1.052
		(91.810)^a	(2.579)^a	(2.223)^b	(1.983)^b	(1.398)^d	(5.981)^a	(0.675)	(0.397)	(1.011)	(0.948)	(2.414)^b	(1.862)^c	(2.147)^b	(1.356)^d	(1.794)^c	(2.261)^b	(4.602)^a
1969	0.538	9.885	-3.395	5.371	1.235	0.785	-0.526	0.623	0.572	0.752	0.549	1.574	0.945	1.187	0.622	0.368	1.977	1.050
		(106.290)^a	(2.592)^a	(2.126)^b	(1.535)^d	(1.393)^d	(5.949)^a	(0.636)	(0.763)	(1.272)	(0.919)	(2.292)^b	(1.537)^d	(1.974)^b	(1.024)	(0.538)	(2.285)^b	(4.700)^a
1970	0.566	10.773	-3.484	5.426	1.004	0.640	-0.458	-0.044	0.580	0.578	0.425	1.539	0.892	1.194	0.664	1.727	2.122	0.841
		(93.678)^a	(2.221)^b	(1.773)^c	(1.450)^d	(1.293)^d	(4.222)^a	(0.036)	(0.634)	(0.798	(0.580)	(1.828)^c	(1.182)	(1.624)^d	(0.895)	(2.059)^b	(2.471)^b	(3.313)^a
1971	0.509	12.173	-4.603	7.671	1.591	0.986	-0.540	-0.582	0.847	0.689	0.617	2.357	0.738	0.876	1.022	1.461	1.734	1.058
		(102.294)^a	(1.951)^c	(2.020)^b	(2.403)^b	(1.034)	(4.810)^a	(0.442)	(0.889)	(0.914)	(0.809)	(2.690)^a	(0.942)	(1.145)	(1.327)^d	(1.669)^c	(1.941)^b	(4.672)^a
1972	0.505	10.129	-3.470	5.179	1.400	0.886	-0.480	-0.596	0.169	-0.135	-0.109	0.650	0.319	-0.307	-0.136	0.321	0.135	1.042
		(98.339)^a	(1.873)^c	(2.352)^b	(1.565)^d	(0.935)	(4.900)^a	(0.542)	(0.205)	(0.207)	(0.165)	(0.854)	(0.465)	(0.459)	(0.203)	(0.423)	(0.174)	(4.446)^a

t = test values are shown in brackets a = Significant at the 0.01 level b = Significant at the 0.05 level
c = Significant at the 0.10 level c = Significant at the 0.20 level

TABLE (5A-6) $_{DVM}K_o = a_o + a_1 \frac{V_D}{V_T} + a_2 \left[\frac{V_D}{V_T}\right]^2 + a_3 R_N + a_4 P_N^2 + a_5 S + a_{6 \cdots 15} ID + a_{16} BR$

Year	R^2	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}	a_{16}
1967	0.601	9.840	-4.046	6.527	1.182	0.753	-0.661	0.662	-0.773	-0.576	0.882	2.242	0.300	0.063	0.137	-0.434	-0.435	0.757
		(55.593)^a	(2.210)^b	(2.290)^b	(1.392)^d	(1.239)	(4.140)^a	(0.366)	(0.546)	(0.510)	(0.775)	(2.472)^b	(0.362)	(0.054)	(0.118)	(0.332)	(0.326)	(2.909)^a
1968	0.538	9.705	-3.443	5.347	0.993	0.630	-0.588	0.703	1.031	0.946	0.631	2.358	1.721	1.789	1.240	1.516	1.882	0.972
		(71.360)^a	(2.743)^a	(2.222)^b	(1.493)^d	(1.245)	(4.786)^a	(0.504)	(0.944)	(1.087)	(0.724)	(2.338)^b	(1.914)^c	(2.024)^b	(1.397)^d	(1.513)^d	(1.842)^c	(4.698)^a
1969	0.523	9.752	-3.496	6.071	1.114	0.699	-0.632	0.917	1.476	1.134	0.696	2.177	1.491	1.783	1.076	0.599	2.832	0.868
		(71.182)^a	(1.881)^c	(1.732)^a	(1.839)^c	(0.938)	(4.892)^a	(0.641)	(1.348)^d	(1.313)^d	(0.798)	(2.170)^b	(1.646)^c	(2.029)^b	(1.214)	(0.600)	(2.770)^a	(3.010)^a
1970	0.566	11.574	-3.654	6.322	1.194	0.750	-0.512	-0.125	1.585	1.244	0.914	2.329	1.615	1.735	1.421	2.299	3.179	0.860
		(72.337)^a	(2.745)^a	(1.754)^c	(1.983)^b	(0.983)	(3.395)^a	(0.074)	(1.244)	(1.234)	(0.896)	(1.987)^b	(1.538)^d	(1.696)^c	(1.376)^d	(1.969)^b	(2.659)^a	(3.426)^a
1971	0.607	11.165	-3.741	6.278	1.474	0.930	-0.446	-1.167	1.995	1.746^c	1.429	2.411	1.619	1.506	2.094	2.333	2.900	0.974
		(68.496)^a	(2.198)^b	(3.198)^a	(1.396)^d	(1.396)^d	(2.902)^a	(0.649)	(1.535)^d	(1.698)	(1.374)^d	(1.852)^c	(1.514)^d	(1.441)^c	(1.992)^b	(1.953)^c	(2.379)^b	(4.379)^a
1972	0.514	9.694	-3.760	5.857	1.101	0.696	-0.537	-0.690	1.132	0.624	0.546	1.346	1.096	0.109	0.646	0.990	0.853	0.960
		(62.948)^a	(1.766)^c	(1.784)^c	(1.960)^b	(0.953)	(3.675)^a	(0.420)	(0.918)	(0.638)	(0.552)	(1.184)	(1.070)	(0.109)	(0.649)	(0.872)	(0.735)	(4.197)^a

t = test values are shown in brackets a = Significant at the 0.01 level b = Significant at the 0.05 level
c = Significant at the 0.10 level d = Significant at the 0.20 level

<u>TABLE (SA-7)</u> $_{RIM}X_o = a_o + a_1 \frac{V_D}{V_T} + a_2 \left[\frac{V_D}{V_T}\right]^2 + a_3 R_N + a_4 R_N^2 + a_5 S + a_{6 \cdots 15} ID + a_{16} BR$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}	a_{16}
1967	0.612	9.545	-3.911	5.343	1.228	0.783	-0.544	0.321	-1.198	-0.928	-1.107	2.061	-0.486	-0.378	-0.545	-0.861	-0.482	0.742
		(73.992)^{a}	(3.266)^{a}	(2.266)^{b}	(1.995)^{b}	(0.932)	(4.804)^{a}	(0.245)	(1.166)	(1.134)	(1.338)^{d}	(2.162)^{b}	(0.574)	(0.454)	(0.650)	(0.907)	(0.496)	(2.936)^{a}
1968	0.525	9.019	-2.972	3.660	0.991	0.622	-0.521	0.663	0.327	0.530	0.480	2.234	0.992	1.130	0.838	1.036	1.515	0.942
		(98.032)^{a}	(2.735)^{a}	(2.603)^{a}	(1.735)^{c}	(1.199)	(6.415)^{a}	(0.706)	(0.444)	(0.902)	(0.813)	(2.288)^{b}	(1.631)^{d}	(1.903)^{c}	(1.399)^{d}	(1.532)^{d}	(2.198)^{b}	(4.106)^{a}
1969	0.543	9.294	-3.167	3.900	1.053	0.666	-0.490	0.421	0.563	0.706	0.472	1.419	0.835	1.049	0.604	0.248	1.790	0.836
		(113.341)^{a}	(2.306)^{b}	(2.478)^{b}	(2.274)^{b}	(0.953)	(6.104)^{a}	(0.465)	(0.808)	(1.284)^{c}	(0.849)	(2.218)^{b}	(1.445)^{d}	(1.868)^{c}	(1.071)	(0.391)	(2.747)^{a}	(3.300)^{a}
1970	0.555	10.246	-2.923	4.311	0.896	0.565	-0.441	-0.155	0.443	0.399	0.220	1.306	0.623	0.949	0.493	1.327	1.682	0.952
		(93.703)^{a}	(2.837)^{a}	(2.239)^{b}	(1.452)^{d}	(1.176)	(4.474)^{a}	(0.141)	(0.525)	(0.597)	(0.327)	(1.680)^{c}	(0.896)	(1.399)^{d}	(0.722)	(1.715)^{c}	(2.121)^{b}	(4.444)^{a}
1971	0.528	10.585	-3.248	4.030	1.232	0.785	-0.476	-0.430	0.659	0.437	0.461	1.755	0.391	0.603	0.828	1.131	1.317	0.840
		(99.858)^{a}	(3.303)^{a}	(2.275)^{b}	(1.548)^{d}	(0.932)	(5.664)^{a}	(0.380)	(0.781)	(0.652)	(0.682)	(2.250)^{b}	(0.562)	(0.887)	(1.213)	(1.456)^{d}	(1.661)^{c}	(3.623)^{a}
1972	0.612	9.594	-3.433	4.281	1.049	0.672	-0.467	-0.315	0.209	-0.086	0.016	0.594	0.299	-0.238	-0.031	0.368	0.115	0.960
		(99.937)^{a}	(3.301)^{a}	(2.475)^{b}	(1.684)^{c}	(0.930)	(5.328)^{a}	(0.316)	(0.273)	(0.143)	(0.026)	(0.845)	(0.473)	(0.386)	(0.050)	(0.523)	(0.160)	(4.028)^{a}

t = test values are shown in brackets a = Significant at the 0.01 level b = Significant at the 0.05 level
c = Significant at the 0.10 level d = Significant at the 0.20 level

TABLE (5A-8) $CPM^{K}_{o} = a_o + a_1 \frac{V_D}{V_T} + a_2 \left[\frac{V_D}{V_T}\right]^2 + a_3 R_N + a_4 R_N^2 + a_5 S + a_6 \cdots a_{15} ID + a_{16} BR$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}	a_{16}
1967	0.497	10.778	-4.739	5.909	1.328	0.851	-0.578	0.624	-0.713	-0.616	-0.975	2.084	-0.010	-0.053	-0.205	-0.641	-0.522	0.858
		(62.662)^a	(1.739)^c	(2.761)^a	(1.502)^d	(1.390)^d	(3.824)^a	(0.357)	(0.520)	(0.564)	(0.883)	(2.423)^b	(0.009)	(0.048)	(0.183)	(0.506)	(0.403)	(3.045)^a
1968	0.546	9.999	-3.847	4.798	1.388	0.876	-0.573	0.751	1.046	0.860	0.593	2.127	1.540	1.609	1.219	1.250	1.750	0.848
		(78.117)^a	(2.727)^a	(1.743)^c	(1.695)^c	(1.396)^d	(5.063)^a	(0.574)	(1.023)	(1.052)	(0.723)	(2.307)^b	(1.820)^c	(1.948)^c	(1.463)^d	(1.327)^d	(1.824)^c	(3.338)^a
1969	0.536	9.831	-3.507	4.912	1.151	0.722	-0.566	0.888	1.465	1.131	0.690	2.080	1.437	1.593	1.119	0.500	2.654	0.850
		(78.648)^a	(2.257)^b	(2.744)^a	(1.398)^d	(0.972)	(4.898)^a	(0.681)	(1.459)^d	(1.428)^d	(0.860)	(2.257)^b	(1.726)^c	(1.969)^b	(1.377)^d	(0.546)	(2.828)^a	(3.275)^a
1970	0.572	10.547	-3.304	4.640	0.909	0.573	-0.487	0.056	1.388	1.009	0.696	2.044	1.308	1.500	1.197	1.844	2.673	0.854
		(71.748)^a	(2.730)^a	(2.738)^a	(1.963)^b	(0.873)	(3.556)^a	(0.037)	(1.184)	(1.087)	(0.742)	(1.890)^c	(1.353)^d	(1.589)^d	(1.261)	(1.714)^c	(2.424)^b	(3.316)^a
1971	0.515	10.898	-3.690	4.555	1.071	0.683	-0.474	-0.588	1.682	1.356	1.213	2.673	1.134	1.213	1.793	1.892	2.357	0.855
		(74.136)^a	(2.305)^b	(2.731)^a	(2.048)^b	(0.932)	(3.520)^a	(0.375)	(1.440)^d	(1.461)^d	(1.296)^d	(2.474)^b	(1.177)	(1.290)^d	(1.895)^c	(1.759)^c	(2.146)^b	(3.569)^a
1972	0.620	9.594	-3.705	5.432	0.929	0.593	-0.552	-0.188	1.013	0.531	0.570	1.218	0.910	0.128	0.629	0.924	0.718	0.851
		(66.625)^a	(2.771)^a	(1.684)^c	(1.791)^c	(0.814)	(4.197)^a	(0.126)	(0.886)	(0.586)	(0.622)	(1.160)	(0.963)	(0.140)	(0.681)	(0.881)	(0.669)	(3.873)^a

t = test values are shown in brackets a = Significant at the 0.01 level b = Significant at the 0.05 level
c = Significant at the 0.10 level d = Significant at the 0.20 level

TABLE (5A-9) $DVX_e = a_o + a_1 \frac{V_D}{V_S} + a_2 \left[\frac{V_D}{V_S}\right]^2 + a_3 \frac{V_P}{V_S} + a_4 \left[\frac{V_P}{V_S}\right]^2 + a_5 R_N + a_6 R_N^2 + a_7 S + a_{8 \cdots 17} ID + a_{18} BR$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}	a_{16}	a_{17}	a_{18}
1967	0.554	9.976	1.497	0.659	1.318	0.023	1.253	0.828	-0.743	0.079	-1.250	-0.566	-0.748	2.754	0.073	0.301	-0.184	-0.374	0.020	0.754
		(60.460)[a]	(1.840)[c]	(0.973)	(0.405)	(0.028)	(1.645)[c]	(1.039)	(4.998)[a]	(0.048)	(0.941)	(0.542)	(0.708)	(2.083)[b]	(0.068)	(0.284)	(0.173)	(0.313)	(0.001)	(2.957)[a]
1968	0.532	9.175	0.996	0.605	1.210	0.014	1.398	0.882	-0.608	0.457	0.210	0.817	0.737	0.358	1.524	1.811	0.991	1.589	2.091	0.954
		(77.100)[a]	(2.146)[b]	(1.397)[d]	(0.414)	(0.018)	(1.584)[d]	(0.963)	(5.715)[a]	(0.378)	(0.215)	(1.078)	(0.969)	(1.825)[c]	(1.953)[c]	(2.377)[b]	(1.281)	(1.822)[c]	(2.348)[b]	(4.086)[a]
1969	0.539	9.803	1.305	0.768	1.537	0.038	1.150	0.722	-0.640	0.429	0.655	0.870	0.729	2.089	1.122	1.511	0.680	0.525	2.415	0.850
		(85.991)[a]	(1.520)[c]	(0.943)	(0.521)	(0.031)	(1.458)[d]	(0.983)	(5.960)[a]	(0.362)	(0.709)	(1.214)	(1.004)	(2.518)[b]	(1.495)[d]	(2.073)[b]	(0.923)	(0.633)	(2.841)[a]	(3.705)[a]
1970	0.633	10.181	1.130	0.721	1.443	0.011	1.055	0.669	-0.597	-0.234	0.341	0.622	0.505	1.968	1.097	1.568	0.727	2.041	2.554	0.748
		(69.732)[a]	(1.724)[c]	(1.303)[d]	(0.434)	(0.007)	(1.489)[d]	(0.943)	(4.292)[a]	(0.148)	(0.290)	(0.674)	(0.540)	(1.850)[c]	(1.146)	(1.679)[c]	(0.768)	(1.912)[c]	(2.331)[b]	(3.013)[a]
1971	0.569	10.139	0.927	0.669	1.339	0.043	1.197	0.767	-0.612	-0.617	0.785	0.678	0.634	2.994	0.828	1.071	1.009	1.638	2.120	0.972
		(63.368)[a]	(1.412)[d]	(1.254)	(0.404)	(0.039)	(1.532)[d]	(1.390)[d]	(4.090)[a]	(0.325)	(0.608)	(0.676)	(0.622)	(2.583)[b]	(0.799)	(1.050)	(0.983)	(1.406)[d]	(1.778)[c]	(4.339)[a]
1972	0.565	9.681	1.364	0.763	1.526	0.049	1.272	0.815	-0.656	-1.205	0.251	-0.315	-0.288	0.629	0.155	-0.468	-0.394	0.202	-0.016	0.989
		(76.833)[a]	(1.745)[c]	(1.279)	(0.535)	(0.030)	(1.961)[b]	(0.930)	(5.552)[a]	(0.881)	(0.249)	(0.396)	(0.355)	(0.684)	(0.187)	(0.570)	(0.484)	(0.218)	(0.017)	(4.138)[a]

t = test values are shown in brackets a = Significant at the 0.01 level b = Significant at the 0.05 level
c = Significant at the 0.10 level d = Significant at the 0.20 level

TABLE (SA-10) $DVM^{K}_{e} = a_o + a_1 \frac{V_D}{V_S} + a_2 \left[\frac{V_D}{V_S}\right]^2 + a_3 \frac{V_P}{V_S} + a_4 \left[\frac{V_P}{V_S}\right]^2 + a_5 R_N + a_6 R_N^2 + a_7 S + a_8 \ldots_{17} ID + a_{18} BR$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}	a_{16}	a_{17}	a_{18}
1967	0.605	10.463	1.760	1.111	1.832	0.036	1.679	1.076	-0.800	0.485	-0.662	-0.068	-0.530	2.160	0.643	0.764	0.318	-0.112	-0.075	0.768
		$(48.216)^a$	$(1.518)^d$	(0.973)	(0.663)	(0.030)	$(1.913)^c$	$(1.390)^d$	$(4.080)^a$	(0.221)	(0.378)	(0.050)	(0.380)	$(2.216)^b$	(0.453)	(0.547)	(0.226)	(0.070)	(0.046)	$(2.821)^a$
1968	0.520	9.435	1.466	1.347	1.423	0.043	1.144	0.725	-0.673	0.606	1.013	1.212	0.784	2.423	2.065	2.327	1.434	1.783	2.304	0.870
		$(57.883)^a$	$(2.272)^b$	$(1.386)^d$	(0.462)	(0.036)	$(2.154)^b$	$(1.394)^d$	$(4.609)^a$	(0.364)	(0.756)	(1.164)	(0.751)	$(1.673)^c$	$(1.927)^c$	$(2.226)^b$	$(1.352)^d$	$(1.490)^d$	$(1.885)^c$	$(3.860)^a$
1969	0.603	9.835	1.475	1.258	1.339	0.031	1.293	0.814	-0.749	0.914	1.701	1.371	0.946	2.981	1.781	2.127	1.276	0.817	2.470	0.760
		$(59.969)^a$	$(2.293)^b$	(0.934)	(0.437)	(0.035)	$(1.512)^d$	(1.125)	$(4.835)^a$	(0.534)	(1.279)	$(1.326)^d$	(0.903)	$(2.492)^b$	$(1.645)^c$	$(2.022)^b$	(1.202)	(0.684)	$(1.831)^c$	$(3.160)^a$
1970	0.525	11.957	1.254	0.976	1.628	0.025	1.303	0.818	-0.678	-0.538	1.280	1.419	1.051	2.974	1.964	2.281	1.659	2.614	2.858	0.773
		$(57.839)^a$	$(1.565)^d$	(1.030)	(0.523)	(0.023)	$(1.429)^d$	$(1.294)^d$	$(3.488)^a$	(0.243)	(0.778)	(1.101)	(0.803)	$(1.999)^b$	$(1.467)^d$	$(1.745)^c$	(1.253)	$(1.751)^c$	$(2.518)^b$	$(3.244)^a$
1971	0.532	10.960	1.075	0.923	1.702	0.011	1.464	0.933	-0.518	-1.750	2.007	1.999	1.551	2.289	1.888	1.837	2.359	2.615	2.594	0.891
		$(49.592)^a$	$(1.486)^d$	(0.864)	(0.559)	(0.011)	$(1.645)^c$	(0.932)	$(2.862)^a$	(0.665)	(1.123)	$(1.439)^d$	(1.100)	$(1.671)^c$	$(1.314)^d$	$(1.300)^d$	$(1.659)^c$	$(1.621)^d$	$(2.176)^b$	$(3.957)^a$
1972	0.466	10.249	1.232	0.781	1.973	0.015	1.174	0.741	-0.570	-1.669	1.366	0.550	0.381	1.375	0.945	0.044	0.442	0.921	0.737	0.868
		$(54.227)^a$	$(2.391)^b$	$(1.394)^d$	(0.655)	(0.017)	$(1.693)^a$	$(1.396)^d$	$(3.176)^a$	(0.815)	(0.905)	(0.462)	(0.313)	(1.000)	(0.761)	(0.036)	(0.362)	(0.663)	(0.520)	$(3.858)^a$

t = test values are shown in brackets a = Significant at the 0.01 level b = Significant at the 0.05 level
c = Significant at the 0.10 level d = Significant at the 0.20 level

TABLE (5A-11) $RIM^K_e = a_o + a_1 \frac{V_D}{V_S} + a_2 \left[\frac{V_D}{V_S}\right]^2 + a_3 \frac{V_P}{V_S} + a_4 \left[\frac{V_C}{V_S}\right]^2 + a_5 R_N + a_6 R_N^2 + a_7 S + a_{8 \cdots 17} ID + a_{18} BR$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}	a_{16}	a_{17}	a_{18}
1967	0.559	9.456	1.218	0.641	1.283	0.002	1.567	0.984	-0.701	0.057	-1.278	-0.599	-0.908	2.605	-0.103	0.155	-0.266	-0.506	-0.112	0.750
		$(57.658)^a$	$(2.432)^b$	(0.906)	(0.420)	(0.000)	$(1.556)^d$	(1.069)	$(4.820)^a$	(0.034)	(0.969)	(0.575)	(0.861)	$(1.963)^b$	(0.096)	(0.146)	(0.212)	(0.421)	(0.091)	$(2.770)^a$
1968	0.544	9.096	0.963	0.582	1.165	0.011	1.027	0.653	-0.606	0.308	0.344	0.750	0.580	2.216	1.327	1.633	0.909	1.493	2.001	0.848
		$(77.084)^a$	$(1.410)^d$	$(1.393)^d$	(0.496)	(0.007)	$(1.645)^c$	(0.933)	$(5.840)^a$	(0.257)	(0.357)	(0.999)	(0.768)	$(1.692)^c$	$(1.709)^c$	$(2.154)^b$	(1.187)	$(1.726)^c$	$(2.267)^b$	$(3.682)^a$
1969	0.543	9.742	1.224	0.786	1.572	0.027	1.348	0.859	-0.610	0.149	0.589	0.856	0.653	2.007	1.038	1.378	0.674	0.468	2.361	0.845
		$(86.212)^a$	$(1.722)^c$	(0.762)	(0.500)	(0.031)	$(1.722)^c$	(0.932)	$(5.849)^a$	(0.125)	(0.644)	(1.198)	(0.901)	$(2.423)^b$	$(1.383)^d$	$(1.885)^c$	(0.918)	(0.566)	$(2.785)^a$	$(3.375)^a$
1970	0.629	10.238	0.975	0.950	1.901	0.032	1.078	0.684	-0.550	-0.606	0.347	0.728	0.505	2.067	1.135	1.606	0.823	2.073	2.548	0.744
		$(69.646)^a$	$(1.446)^d$	(0.722)	(0.666)	(0.025)	$(2.168)^b$	(1.168)	$(4.024)^a$	(0.380)	(0.295)	(0.788)	(0.538)	$(1.939)^c$	(1.183)	$(1.715)^c$	(0.867)	$(1.938)^c$	$(2.319)^b$	$(2.709)^a$
1971	0.469	12.258	1.789	1.563	1.127	0.011	1.496	0.951	-0.550	-0.437	0.916	0.811	0.717	2.039	0.897	1.103	1.143	1.738	2.193	0.968
		$(76.612)^a$	$(1.804)^c$	$(1.393)^d$	(0.395)	(0.014)	$(2.048)^b$	(0.933)	$(3.768)^a$	(0.220)	(0.716)	(0.809)	(0.705)	$(1.622)^d$	(0.865)	(1.082)	(1.116)	$(1.495)^d$	$(1.841)^c$	$(4.063)^a$
1972	0.562	10.236	1.476	0.961	1.922	0.017	1.121	0.707	-0.614	-1.013	0.407	-0.187	-0.194	0.708	0.274	-0.356	-0.263	0.333	0.084	0.947
		$(81.238)^a$	$(1.825)^c$	(0.825)	(0.661)	(0.017)	$(1.401)^d$	(1.014)	$(5.250)^a$	(0.743)	(0.404)	(0.235)	(0.240)	(0.771)	(0.332)	(0.436)	(0.323)	(0.360)	(0.089)	$(4.015)^a$

t = test values are shown in brackets a = Significant at the 0.01 level b = Significant at the 0.05 level
c = Significant at the 0.10 level d = Significant at the 0.20 level

TABLE (SA-12) $CPM^{K}_{e} = a_o + a_1 \frac{V_D}{V_S} + a_2 \left[\frac{V_D}{V_S}\right]^2 + a_3 \frac{V_P}{V_S} + a_4 \left[\frac{V_P}{V_S}\right]^2 + a_5 R_N + a_6 R_N^2 + a_7 S + a_{8 \cdots 17} ID + a_{18} BR$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}	a_{16}	a_{17}	a_{18}
1967	0.603	10.410	1.819	1.016	1.032	0.005	1.580	0.997	-0.758	0.437	-0.645	-0.078	-0.635	2.118	0.557	0.702	0.300	-0.192	-0.147	0.766
		(47.752)[a]	(1.860)[c]	(0.964)	(0.363)	(0.001)	(1.396)[d]	(0.554)	(3.934)[a]	(0.199)	(0.369)	(0.057)	(0.455)	(2.176)[b]	(0.391)	(0.501)	(0.212)	(0.120)	(0.090)	(2.743)[a]
1968	0.518	9.882	1.380	0.846	1.693	0.027	1.327	0.850	-0.672	0.557	1.163	1.188	0.712	2.359	1.968	2.254	1.396	1.751	2.271	0.868
		(60.256)[a]	(1.496)[d]	(1.062)	(0.562)	(0.031)	(1.477)[d]	(0.496)	(4.671)[a]	(0.334)	(0.869)	(1.140)	(0.679)	(1.606)[d]	(1.826)[c]	(2.141)[b]	(1.313)[d]	(1.459)[d]	(1.854)[c]	(3.656)[a]
1969	0.500	9.957	1.432	0.667	1.335	0.023	1.463	0.930	-0.713	0.757	1.661	1.387	0.918	2.942	1.766	2.073	1.308	0.801	2.454	0.756
		(60.713)[a]	(1.937)[c]	(0.937)	(0.487)	(0.017)	(1.655)[c]	(0.565)	(4.708)[a]	(0.439)	(1.252)	(1.339)[d]	(0.872)	(2.449)[d]	(1.623)[d]	(1.955)[c]	(1.229)	(0.668)	(1.810)[c]	(2.912)[a]
1970	0.519	11.761	1.272	1.032	1.065	0.013	1.687	1.067	-0.611	-0.869	1.303	1.529	1.046	2.104	2.043	2.372	1.748	2.681	2.895	0.773
		(57.092)[a]	(1.691)[c]	(0.987)	(0.423)	(0.019)	(2.395)[b]	(0.691)	(3.195)[a]	(0.390)	(0.791)	(1.183)	(0.796)	(2.079)[b]	(1.521)[d]	(1.809)[c]	(1.317)[d]	(1.790)[c]	(2.533)[b]	(3.195)[a]
1971	0.529	10.576	1.332	1.098	1.197	0.002	1.242	0.768	-0.526	-1.593	2.133	2.077	1.610	2.339	1.942	1.903	2.453	2.695	2.658	0.890
		(47.639)[a]	(1.537)[d]	(0.726)	(0.481)	(0.000)	(1.501)[d]	(0.416)	(3.148)[a]	(0.578)	(1.202)	(1.493)[d]	(1.140)	(1.696)[d]	(1.350)[d]	(1.344)[d]	(1.725)[c]	(1.669)[c]	(2.211)[b]	(3.886)[a]
1972	0.465	9.316	1.080	0.690	1.380	0.020	1.175	0.743	-0.504	-1.414	1.419	0.581	0.408	1.433	0.997	0.039	0.477	0.984	0.791	0.868
		(49.291)[a]	(1.805)[c]	(0.973)	(0.455)	(0.014)	(1.674)[c]	(0.508)	(2.890)[a]	(0.695)	(0.942)	(0.490)	(0.338)	(1.045)	(0.807)	(0.032)	(0.392)	(0.713)	(0.560)	(3.858)[a]

t = test values are shown in brackets   a = Significant at the 0.01 level   b = Significant at the 0.05 level
c = Significant at the 0.10 level   d = Significant at the 0.20 level

TABLE (SA-13) $DVM^K_o = a_o + a_1 \frac{V_D}{V_T} + a_2 \left[\frac{V_D}{V_T}\right]^2 + a_3 \frac{V_P}{V_T} + a_4 \left[\frac{V_P}{V_T}\right]^2 + a_5 R_N + a_6 R_N^2 + a_7 S + a_{8 \cdots 17} ID + a_{18} BR$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8
1967	0.539	9.828	-3.895	7.240	-1.581	0.011	1.038	0.661	-0.649	0.343
		(72.800)^a	(2.169)^b	(2.773)^a	(0.535)	(0.016)	(1.463)^d	(0.738)	(5.280)^a	(0.251)
1968	0.611	9.063	-3.063	5.088	-1.052	0.016	1.107	0.697	-0.549	0.655
		(89.732)^a	(2.580)^a	(1.772)^c	(0.390)	(0.009)	(2.201)^b	(0.603)	(5.966)^a	(0.636)
1969	0.545	9.384	-3.054	5.024	-1.177	0.030	1.156	0.733	-0.548	0.493
		(99.829)^a	(2.753)^a	(1.900)^c	(0.303)	(0.033)	(1.720)^c	(0.558)	(6.141)^a	(0.503)
1970	0.489	10.375	-3.245	5.338	-1.678	0.032	1.140	0.719	-0.597	-0.234
		(91.814)^a	(3.044)^a	(2.746)^a	(0.544)	(0.031)	(1.558)^d	(0.758)	(4.292)^a	(0.178)
1971	0.615	12.109	-4.199	7.142	-2.442	0.024	1.557	0.368	-0.590	-0.628
		(100.908)^a	(1.774)^c	(2.194)^b	(0.872)	(0.019)	(2.402)^b	(0.524)	(5.134)^a	(0.478)
1972	0.531	9.302	-2.955	5.131	-1.125	0.017	0.915	0.580	-0.554	-0.522
		(91.196)^a	(2.392)^b	(3.086)^a	(0.486)	(0.017)	(1.439)^d	(0.673)	(5.694)^a	(0.539)

Year	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}	a_{16}	a_{17}	a_{18}
1967	-1.233	-0.787	-0.921	2.721	-0.267	-0.077	-0.461	-0.617	-0.322	0.748
	(1.143)	(0.917)	(1.062)	(2.693)^b	(0.302)	(0.088)	(0.525)	(0.623)	(0.317)	(3.199)^a
1968	0.303	0.673	0.627	2.651	1.245	1.426	0.897	1.330	1.725	0.952
	(0.374)	(1.046)	(0.970)	(2.534)^b	(1.875)^c	(2.199)^b	(1.366)^d	(1.796)^c	(2.278)^b	(4.622)^a
1969	0.509	0.755	0.534	1.728	0.938	1.221	0.623	0.347	1.957	0.844
	(0.676)	(1.278)	(0.892)	(2.509)^b	(1.514)^d	(2.027)^b	(1.026)	(0.508)	(2.791)^a	(3.988)^a
1970	0.341	0.622	0.505	1.968	1.097	1.568	0.727	2.041	2.554	0.848
	(0.290)	(0.674)	(0.540)	(1.850)^c	(1.146)	(1.679)^c	(0.768)	(1.912)^c	(2.331)^b	(3.013)^a
1971	0.828	0.690	0.614	2.498	0.741	0.938	1.034	1.449	1.711	0.958
	(0.564)	(0.914)	(0.801)	(2.836)^a	(0.946)	(1.219)	(1.338)^d	(1.653)^c	(1.907)^c	(4.644)^a
1972	-0.004	-0.244	-0.231	0.634	0.217	-0.335	-0.241	0.148	-0.056	0.945
	(0.005)	(0.377)	(0.351)	(0.844)	(0.320)	(0.502)	(0.323)	(0.197)	(0.072)	(4.722)^a

t = test values are shown in brackets a = Significant at the 0.01 level b = Significant at the 0.05 level
c = Significant at the 0.10 level d = Significant at the 0.20 level

TABLE (SA-14) $DVN^{X}_{o} = a_o + a_1 \frac{V_D}{V_T} + a_2 \left[\frac{V_D}{V_T}\right]^2 + a_3 \frac{V_P}{V_T} + a_4 \left[\frac{V_P}{V_T}\right]^2 + a_5 R_N + a_6 R_N^2 + a_7 S + a_{8 \cdots 17} ID + a_{18} BR$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}	a_{16}	a_{17}	a_{18}
1967	0.624	10.353	-4.183	6.496	-1.996	0.031	1.324	0.844	-0.698	0.629	-0.751	-0.439	-0.765	1.913	0.101	0.291	-0.060	-0.410	-0.363	0.761
		(58.823)^a	(2.466)^b	(1.733)^c	(0.666)	(0.028)	(2.392)^b	(1.301)^d	(4.361)^a	(0.354)	(0.534)	(0.393)	(0.675)	(1.974)^b	(0.088)	(0.257)	(0.052)	(0.318)	(0.274)	(3.106)^a
1968	0.544	9.632	-3.633	5.730	-1.524	0.019	1.063	0.662	-0.612	0.665	1.007	0.981	0.662	2.555	1.723	1.843	1.249	1.524	1.910	0.748
		(70.306)^a	(2.165)^b	(2.753)^a	(0.503)	(0.016)	(1.491)^d	(1.301)^d	(4.910)^a	(0.476)	(0.919)	(1.125)	(0.757)	(2.501)^b	(1.917)^c	(2.099)^b	(1.404)^d	(1.520)^d	(1.863)^c	(3.006)^a
1969	0.533	9.163	-3.173	5.942	-1.074	0.002	1.097	0.689	-0.664	0.803	1.438	1.160	0.712	2.407	1.478	1.859	1.105	0.593	2.840	0.742
		(66.883)^a	(1.744)^c	(1.960)^b	(0.401)	(0.000)	(1.558)^d	(0.967)	(5.096)^a	(0.561)	(1.308)^d	(1.343)^d	(0.815)	(2.395)^b	(1.635)^d	(2.113)^b	(1.246)	(0.595)	(2.774)^a	(2.596)^a
1970	0.499	11.792	-4.177	6.426	-2.353	0.031	1.206	0.761	-0.572	-0.512	1.326	1.218	0.808	2.546	1.587	1.706	1.391	2.161	2.007	0.746
		(74.632)^a	(2.717)^a	(2.761)^a	(0.822)	(0.029)	(1.730)^c	(1.444)^d	(3.826)^a	(0.307)	(1.053)	(1.225)	(0.801)	(2.198)^b	(1.536)^d	(1.692)^c	(1.363)^d	(1.880)^c	(1.545)^d	(2.668)^a
1971	0.616	12.401	-4.972	8.399	-2.611	0.030	1.409	0.891	-0.516	-1.105	1.965	1.737	1.429	2.583	1.599	1.588	2.109	2.295	2.862	0.974
		(75.615)^a	(2.111)^b	(1.772)^c	(0.875)	(0.025)	(2.395)^b	(1.111)	(3.348)^a	(0.617)	(1.505)^d	(1.689)^c	(1.369)^d	(1.985)^b	(1.498)^d	(1.516)^d	(2.003)^b	(1.921)^c	(2.339)^b	(4.349)^a
1972	0.538	10.432	-4.147	7.101	-1.769	0.019	1.067	0.683	-0.464	-0.622	0.902	0.475	0.387	1.319	0.953	0.083	0.547	0.753	0.595	0.963
		(68.183)^a	(2.622)^a	(2.192)^b	(0.604)	(0.016)	(1.407)^d	(1.192)	(3.190)^a	(0.383)	(0.733)	(0.489)	(0.392)	(1.171)	(0.937)	(0.083)	(0.551)	(0.666)	(0.514)	(4.418)^a

t = test values are shown in brackets   a = Significant at the 0.01 level   b = Significant at the 0.05 level
c = Significant at the 0.10 level   d = Significant at the 0.20 level

TABLE (5A-15) $RIM^K_o = a_o + a_1 \frac{V_D}{V_T} + a_2 \left[\frac{V_D}{V_T}\right]^2 + a_3 \frac{V_P}{V_T} + a_4 \left[\frac{V_P}{V_T}\right]^2 + a_5 R_N + a_6 R_N^{2} + a_7 S + a_8 \ldots {}_{17} ID + a_{18} BR$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}	a_{16}	a_{17}	a_{18}
1967	0.527	10.282	-4.350	5.664	-1.814	0.016	1.232	0.773	-0.590	0.383	-1.169	-0.824	-0.993	2.433	-0.464	-0.268	-0.487	-0.845	-0.421	0.742
		(79.705)^a	(1.748)^c	(3.436)^a	(0.623)	(0.019)	(2.000)^b	(1.398)^d	(5.146)^a	(0.294)	(1.139)	(1.009)	(1.202)	(2.517)^b	(0.551)	(0.323)	(0.583)	(0.895)	(0.435)	(2.932)^a
1968	0.524	9.131	-3.332	5.018	-1.158	0.029	1.014	0.650	-0.527	0.612	0.292	0.546	0.476	2.347	0.999	1.150	0.833	1.039	1.513	0.842
		(98.182)^a	(2.939)^a	(2.232)^b	(0.350)	(0.025)	(1.775)^c	(0.767)	(5.381)^a	(0.647)	(0.394)	(0.921)	(0.799)	(2.689)^a	(1.633)^d	(1.920)^c	(1.381)^d	(1.526)^d	(2.173)^b	(4.098)^a
1969	0.543	9.154	-3.137	4.043	-1.270	0.016	1.001	0.631	-0.495	0.286	0.510	0.703	0.440	2.549	0.834	1.050	0.605	0.231	1.766	1.068
		(104.022)^a	(2.963)^a	(2.751)^a	(0.434)	(0.015)	(1.510)^d	(1.396)^d	(5.072)^a	(0.312)	(0.724)	(1.269)	(0.782)	(2.380)^b	(1.433)^d	(1.852)^c	(1.062)	(0.360)	(2.684)^a	(5.013)^a
1970	0.570	11.415	-3.385	5.181	-1.159	0.040	1.337	0.848	-0.454	-0.432	0.289	0.368	0.111	1.414	0.590	0.905	0.447	1.239	1.554	0.956
		(108.714)^a	(2.754)^a	(1.727)^c	(0.357)	(0.035)	(1.950)^c	(1.275)	(4.590)^a	(0.392)	(0.343)	(0.553)	(0.165)	(1.813)^c	(0.852)	(1.339)^d	(0.655)	(1.608)^d	(1.962)^b	(4.852)^a
1971	0.629	12.140	-4.698	6.264	-1.567	0.024	1.206	0.767	-0.556	-0.539	0.614	0.427	0.418	1.799	0.387	0.577	0.802	1.118	1.267	0.841
		(113.457)^a	(2.290)^b	(1.747)^c	(0.551)	(0.020)	(1.404)^d	(0.987)	(5.644)^a	(0.474)	(0.721)	(0.624)	(0.612)	(2.268)^b	(0.553)	(0.842)	(1.165)	(1.430)^d	(1.582)^d	(3.629)^a
1972	0.539	9.323	-3.146	4.161	-1.287	0.029	1.127	0.716	-0.534	-0.318	0.960	-0.139	-0.083	0.652	0.267	-0.232	-0.058	0.261	-0.017	0.857
		(98.136)^a	(2.757)^a	(2.278)^b	(0.469)	(0.030)	(1.713)^c	(1.393)^d	(5.074)^a	(0.324)	(0.126)	(0.232)	(0.137)	(0.938)	(0.428)	(0.378)	(0.094)	(0.376)	(0.023)	(4.231)^a

t = test values are shown in brackets a = Significant at the 0.01 level b = Significant at the 0.05 level
c = Significant at the 0.10 level d = Significant at the 0.20 level

TABLE (5A-16) $CPM^{K} = a_o + a_1 \frac{V_D}{V_T} + a_2 \left[\frac{V_D}{V_T}\right]^2 + a_3 \frac{V_P}{V_T} + a_4 \left[\frac{V_P}{V_T}\right]^2 + a_5 R_N + a_6 R_N^{\ 2} + a_7 S + a_{8 \cdots 17} ID + a_{18} BR$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}	a_{16}	a_{17}	a_{18}
1967	0.618	9.575	-3.955	5.816	-1.368	0.027	1.275	0.809	-0.552	0.751	-0.634	-0.434	-0.766	2.692	0.027	0.137	-0.092	-0.608	-0.391	0.757
		(55.994)^{a}	(1.726)^{c}	(1.955)^{c}	(0.444)	(0.025)	(1.394)^{d}	(1.595)^{d}	(4.282)^{a}	(3.434)	(0.465)	(0.400)	(0.697)	(2.873)^{a}	(0.024)	(0.124)	(0.083)	(0.484)	(0.303)	(3.026)^{a}
1968	0.551	9.704	-3.843	5.913	-1.459	0.030	0.953	0.607	-0.592	0.703	1.015	0.894	0.612	2.339	1.544	1.647	1.225	1.257	1.764	0.964
		(75.812)^{a}	(1.775)^{c}	(1.884)^{c}	(0.497)	(0.029)	(1.293)^{d}	(1.434)^{d}	(5.174)^{a}	(0.537)	(0.988)	(1.090)	(2.742)	(2.481)^{b}	(1.822)^{c}	(1.986)^{b}	(1.466)^{d}	(1.332)^{d}	(1.829)^{c}	(4.430)^{a}
1969	0.541	9.095	-3.215	4.164	-1.170	0.036	0.942	0.602	-0.585	0.719	1.399	1.133	0.663	2.293	1.433	1.602	1.133	0.476	2.628	0.750
		(72.182)^{a}	(1.672)^{c}	(1.935)^{c}	(0.387)	(0.030)	(1.789)^{c}	(0.726)	(4.994)^{a}	(0.547)	(1.383)^{d}	(1.425)^{d}	(0.821)	(2.455)^{b}	(1.716)^{c}	(1.969)^{b}	(1.386)^{d}	(0.517)	(2.784)^{a}	(2.950)^{a}
1970	0.491	10.197	-3.272	4.434	-1.725	0.029	1.113	0.711	-0.513	-0.295	1.195	0.990	0.574	2.237	1.280	1.457	1.167	1.731	2.517	0.860
		(69.367)^{a}	(1.727)^{c}	(2.960)^{a}	(0.595)	(0.032)	(1.793)^{c}	(1.127)	(3.741)^{a}	(0.193)	(1.023)	(1.072)	(0.613)	(2.066)^{b}	(1.332)^{d}	(1.553)^{d}	(1.233)	(1.619)^{d}	(2.289)^{b}	(3.724)^{a}
1971	0.618	10.592	-3.082	4.269	-1.983	0.009	1.213	0.773	-0.496	-0.649	1.619	1.325	1.166	2.735	1.111	1.188	1.764	1.856	2.282	0.855
		(71.567)^{a}	(2.252)^{b}	(1.742)^{c}	(0.629)	(0.005)	(2.261)^{b}	(0.752)	(3.644)^{a}	(0.413)	(1.376)^{d}	(1.422)^{d}	(1.237)	(2.495)^{b}	(1.150)	(1.255)	(1.854)^{c}	(1.718)^{c}	(2.061)^{b}	(3.557)^{a}
1972	0.545	10.245	-3.638	5.153	-1.725	0.036	1.386	0.877	-0.458	-0.152	0.869	0.463	0.491	1.292	0.867	0.149	0.602	0.783	0.548	0.953
		(71.643)^{a}	(1.857)^{c}	(2.335)^{b}	(0.644)	(0.034)	(1.682)^{c}	(0.758)	(3.452)^{a}	(0.103)	(0.764)	(0.515)	(0.538)	(1.239)	(0.925)	(0.162)	(0.656)	(0.751)	(0.512)	(4.025)^{a}

t = test values are shown in brackets   a = Significant at the 0.01 level   b = Significant at the 0.05 level
c = Significant at the 0.10 level   d = Significant at the 0.20 level

TABLE (5A-20) $DVNX_e = a_o + a_1 \frac{V_D}{V_S} + a_2 \left[\frac{V_D}{V_S}\right]^2 + a_3 R_N + a_4 R_N^2 + a_5 S + a_6 \ldots a_{15} ID$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}
1967	0.602	9.595	1.131	0.663	1.015	0.604	-0.528	———	-1.388	-1.722	-1.433	2.138	0.240	0.046	0.171	0.414	-0.085
		(50.767)^a	(1.900)^c	(0.426)	(1.305)^d	(0.350)	(3.841)^a	———	(0.854)	(1.062)	(0.869)	(2.420)^b	(0.142)	(0.050)	(0.099)	(0.585)	(0.060)
1968	0.603	8.846	0.708	0.491	0.763	0.434	-0.598	———	0.087	0.880	0.796	2.036	1.954	1.729	0.800	1.452	2.100
		(58.973)^a	(1.384)^d	(0.360)	(1.685)^c	(0.345)	(4.132)^a	———	(0.093)	(1.103)	(0.851)	(2.524)^b	(2.176)^b	(2.258)^b	(0.954	(1.579)^d	(2.592)^b
1969	0.529	9.330	0.565	0.346	0.576	0.324	-0.530	———	0.504	0.742	0.957	1.857	1.321	1.962	0.754	0.458	2.171
		(55.207)^a	(1.694)^c	(0.408)	(1.306)^d	(0.255)	(3.996)^a	———	(0.236)	(0.408)	(1.063)	(2.261)^b	(1.421)^d	(2.091)^b	(0.932)	(0.651)	(2.190)^b
1970	0.519	10.611	0.929	0.638	0.834	0.485	-0.698	———	1.208	1.204	0.060	1.222	1.348	1.590	0.752	2.489	———
		(89.923)^a	(1.839)^c	(0.364)	(1.690)^c	(0.350)	(4.612)^a	———	(1.312)^d	(1.032)	(0.071)	(1.342)^d	(1.576)^d	(1.476)^d	(0.891)	(2.379)^b	———
1971	0.547	11.259	0.951	0.701	0.965	0.544	-0.640	———	0.068	0.065	0.065	2.425	0.624	1.250	0.699	1.491	2.163
		(90.798)^a	(1.000)	(0.339)	(1.406)^d	(0.340)	(3.196)^a	———	(0.051)	(0.070)	(0.085)	(2.576)^b	(0.842)	(1.391)^d	(0.598)	(1.034)	(2.342)^b
1972	0.542	9.415	0.650	0.412	0.614	0.359	-0.588	———	0.280	-0.666	-0.505	-0.941	-0.027	0.401	-0.859	0.585	0.105
		(49.293)^a	(1.365)^d	(0.394)	(1.701)^c	(0.360)	(3.854)^a	———	(0.246)	(0.697)	(0.470)	(0.762)	(0.028)	(0.387)	(0.844)	(0.379)	(0.951)

t = test values are shown in brackets   a = Significant at the 0.01 level   b = Significant at the 0.05 level
c = Significant at the 0.10 level   d = Significant at the 0.20 level

TABLE (SA-21) $DVX_e = a_o + a_1 \frac{V_D}{V_S} + a_2 \left[\frac{V_D}{V_S}\right]^2 + a_3 R_N + a_4 R_N^2 + a_5 S + a_{6 \cdots 15} ID$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}
1967	0.522	8.966	0.914	0.417	0.926	0.530	-0.676	——	1.174	0.742	0.383	2.890	1.301	0.441	0.558	0.139	0.315
		(60.993)^a	(1.694)^c	(0.547)	(1.365)^d	(0.437)	(3.725)^a	——	(1.493)^d	(0.763)	(0.338)	(2.116)^b	(0.945)	(0.582)	(0.575)	(0.178)	(0.365)
1968	0.495	9.273	0.808	0.530	0.832	0.475	-0.615	——	1.001	0.426	0.314	2.200	2.387	2.428	1.733	1.939	1.754
		(70.786)^a	(1.019)	(0.381)	(1.690)^c	(0.438)	(3.493)^a	——	(0.960)	(0.619)	(0.413)	(2.258)^b	(2.021)^b	(2.100)^b	(1.593)^d	(1.540)^d	(2.050)^b
1969	0.553	8.866	0.575	0.459	0.535	0.309	-0.653	——	-1.096	-0.329	-0.809	2.718	1.610	-2.240	-1.267	-0.583	2.484
		(45.005)^a	(1.701)^c	(0.313)	(0.846)	(0.432)	(3.467)^a	——	(1.030)	(0.312)	(0.992)	(2.010)^c	(1.220)	(2.087)^b	(1.447)^d	(0.396)	(2.874)^a
1970	0.584	10.418	0.844	0.401	0.832	0.470	-0.599	——	0.811	0.555	0.709	2.353	1.408	1.844	1.241	1.889	——
		(61.644)^a	(1.310)^d	(0.525)	(1.712)^c	(0.443)	(3.273)^a	——	(0.560)	(0.657)	(0.507)	(1.864)^c	(1.084)	(1.690)^c	(1.574)^d	(2.016)^c	——
1971	0.556	20.982	0.915	0.644	0.929	0.530	-0.507	——	0.819	1.063	0.728	2.034	1.191	1.194	1.543	1.772	2.719
		(84.476)^a	(1.132)	(0.355)	(1.019)	(0.438)	(2.432)^a	——	(0.927)	(0.918)	(0.827)	(2.304)	(0.911)	(0.876)	(1.706)^c	(1.673)^d	(2.107)^b
1972	0.581	9.272	0.595	0.283	0.595	0.356	-0.520	——	0.951	-0.684	-0.470	-0.922	-1.043	0.479	-0.829	0.705	-0.681
		(59.590)^a	(0.960)	(0.524)	(1.214)	(0.417)	(3.055)^a	——	(0.612)	(0.524)	(0.321)	(0.745)	(1.230)	(0.383)	(0.975)	(0.809)	(0.701)

t = test values are shown in brackets   a = Significant at the 0.01 level   b = Significant at the 0.05 level
c = Significant at the 0.10 level   d = Significant at the 0.20 level

TABLE (SA-22) $RIM^{K}_{e} = a_o + a_1 \frac{V_D}{\bar{V}_S} + a_2 \left[\frac{V_D}{\bar{V}_S}\right]^2 + a_3 R_N + a_4 R_N^2 + a_5 \bar{S} + a_6 \cdots {}_{15} ID$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}
1967	0.518	8.804	0.856	0.505	0.905	0.539	-0.616	——	0.998	0.759	0.550	2.260	0.584	0.461	1.099	0.182	0.736
		(47.589)[a]	(1.250)	(0.423)	(1.800)[c]	(0.419)	(5.672)[a]	——	(0.613)	(0.950)	(0.593)	(2.806)[a]	(0.565)	(0.361)	(0.932)	(0.246)	(0.944)
1968	0.490	9.476	0.806	0.471	0.793	0.447	-0.571	——	0.747	0.253	0.976	2.977	1.851	2.007	1.067	2.429	2.614
		(61.532)[a]	(1.255)	(0.611)	(1.656)[d]	(0.443)	(5.674)[a]	——	(0.774)	(0.354)	(1.000)	(2.765)[a]	(1.962)[c]	(2.263)[b]	(0.917)	(2.010)[c]	(2.836)[a]
1969	0.546	8.820	0.498	0.318	0.498	0.282	-0.604	——	-0.802	-0.839	-1.107	1.489	-1.376	-1.461	-0.479	-1.182	2.032
		(53.780)[a]	(1.350)[d]	(0.667)	(1.254)	(0.441)	(6.029)[a]	——	(0.834)	(0.741)	(0.915)	(1.682)[d]	(1.203)	(1.641)[d]	(0.418)	(1.089)	(1.874)[c]
1970	0.523	9.842	0.732	0.638	0.752	0.427	-0.566	——	1.060	0.839	0.708	2.067	1.050	1.588	1.001	1.626	——
		(84.119)[a]	(1.189)	(0.542)	(1.170)	(0.440)	(5.568)[a]	——	(0.960)	(0.982)	(0.851)	(2.243)[b]	(0.960)	(1.783)[c]	(1.275)	(1.843)[c]	——
1971	0.558	10.020	0.656	0.452	0.733	0.415	-0.583	——	0.312	0.781	1.068	2.244	1.020	1.783	1.368	1.683	2.257
		(82.131)[a]	(1.370)[d]	(0.721)	(1.772)[c]	(0.441)	(5.486)[a]	——	(0.372)	(0.718)	(0.962)	(1.876)[c]	(1.254)	(1.467)[d]	(1.582)[d]	(1.473)[d]	(1.986)[c]
1972	0.540	8.779	0.517	0.263	0.538	0.303	-0.577	——	0.282	-0.654	-0.537	-0.960	-1.025	0.351	-0.888	0.640	-0.124
		(45.963)[a]	(1.013)	(0.726)	(1.250)	(0.444)	(5.848)[a]	——	(0.247)	(0.682)	(0.501)	(0.773)	(1.250)	(0.336)	(0.872)	(0.441)	(0.108)

t - test values are shown in brackets   a - Significant at the 0.01 level   b - Significant at the 0.05 level
c - Significant at the 0.10 level   d - Significant at the 0.20 level

TABLE (SA-23) $CPM^{K}_{e} = a_o + a_1 \frac{V_D}{V_S} + a_2 \left[\frac{V_D}{V_S}\right]^2 + a_3 R_N + a_4 R_N^2 + a_5 S + a_{6\cdots15} ID$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}
1967	0.536	9.426	1.093	0.958	1.009	0.583	-0.708	——	0.603	0.682	0.447	2.263	0.482	0.455	0.940	0.167	0.219
		(65.916)^a	(1.390)^d	(0.722)	(1.876)^c	(0.432)	(4.477)^a	——	(0.880)	(0.748)	(0.618)	(2.363)^b	(0.700)	(0.789)	(0.775)	(0.157)	(0.335)
1968	0.483	8.631	0.628	0.328	0.649	0.384	-0.693	——	0.318	0.804	0.584	2.437	1.329	1.670	0.935	1.285	1.794
		(63.933)^a	(1.321)^d	(0.577)	(1.685)^c	(0.423)	(4.463)^a	——	(0.436)	(0.589)	(0.642)	(2.703)^b	(1.752)^c	(1.861)^c	(1.352)^d	(1.563)^d	(1.659)^d
1969	0.566	9.397	0.585	0.496	0.574	0.324	-0.606	——	-0.391	-0.430	-0.950	2.318	-2.074	-2.290	-1.346	-0.453	2.343
		(48.942)^a	(0.803)	(0.810)	(1.230)	(0.442)	(4.163)^a	——	(0.216)	(0.361)	(0.653)	(1.909)^c	(2.027)^b	(2.107)^b	(1.483)^d	(0.510)	(2.849)^a
1970	0.548	10.509	0.813	0.464	0.847	0.502	-0.579	——	0.734	0.238	0.742	2.073	1.039	2.131	1.296	1.932	——
		(59.039)	(1.096)	(0.683)	(1.879)^c	(0.422)	(3.539)^a	——	(0.483)	(0.375)	(0.462)	(2.262)^b	(1.486)^d	(1.834)^c	(1.432)^d	(1.653)^d	——
1971	0.555	11.335	0.878	0.786	0.935	0.559	-0.644	——	0.779	0.861	0.355	2.797	1.817	1.971	2.332	1.966	2.687
		(87.192)^a	(1.230)	(0.639)	(1.811)^c	(0.418)	(4.289)^a	——	(0.981)	(0.614)	(0.573)	(2.063)^b	(1.584)^d	(1.600)^d	(1.889)^c	(1.696)^c	(2.290)^b
1972	0.484	9.395	0.600	0.293	0.623	0.371	-0.612	——	0.850	-0.682	-0.477	-0.835	-1.027	0.503	-0.823	0.784	-0.628
		(58.718)^a	(1.354)^d	(0.755)	(1.265)	(0.420)	(4.038)^a	——	(0.800)	(0.817)	(0.327)	(0.944)	(1.026)	(0.543)	(0.954)	(0.849)	(0.740)

t = test values are shown in brackets   a = Significant at the 0.01 level   b = Significant at the 0.05 level
c = Significant at the 0.10 level   d = Significant at the 0.20 level

TABLE (SA-24) $DWK_e = a_o + a_1 \frac{V_D}{V_S} + a_2 \left[\frac{V_D}{V_S}\right]^2 + a_3 R_X + a_4 R_X^2 + a_5 S + a_{6 \cdots 15} ID$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}
1967	0.537	9.534	1.446	1.004	1.461	0.904	-0.689	-1.082	——	0.268	0.169	2.213	0.776	1.084	1.089	0.313	1.450
		(82.904)^a	(1.865)^c	(1.004)	(1.726)^c	(1.121)	(4.767)^a	(0.695)	——	(0.231)	(0.137)	(2.287)^b	(0.696)	(0.923)	(0.880)	(0.171)	(0.984)
1968	0.525	8.908	1.056	0.647	1.056	0.617	-0.937	1.607	1.310	-0.153	0.692	——	2.641	2.110	0.254	-1.022	——
		(68.000)^a	(1.470)^d	(1.000)	(1.846)^c	(1.428)^d	(5.815)^a	(0.819)^b	(1.941)^b	(0.127)	(0.569)	——	(2.240)^b	(2.091)^b	(0.200)	(0.645)	——
1969	0.560	9.697	1.080	0.741	1.018	0.628	-0.680	0.308	-0.357	1.870	1.640	2.556	0.780	2.431	1.241	0.773	1.566
		(79.485)^a	(1.684)^c	(1.088)	(1.759)^c	(1.415)^d	(4.131)^a	(0.172)	(0.260)	(1.721)^c	(1.485)^d	(2.891)^a	(0.670)	(2.256)^b	(1.103)	(0.450)	(2.103)^b
1970	0.560	11.139	1.423	1.049	1.357	0.833	-0.660	0.680	-0.267	1.194	0.706	1.470	0.792	1.197	1.352	4.421	2.528
		(64.761)^a	(2.069)^b	(1.339)^d	(1.510)^d	(1.405)^d	(4.070)^a	(0.236)	(0.139)	(0.712)	(0.416)	(1.949)^c	(0.439)	(0.689)	(0.831)	(2.454)^b	(1.935)^c
1971	0.540	10.602	1.209	0.767	1.134	0.665	-0.696	——	0.568	1.300	1.018	2.751	0.193	1.117	0.991	1.115	2.809
		(71.635)^a	(1.752)^c	(1.394)^d	(1.699)^c	(1.001)	(4.909)^a	——	(0.203)	(0.735)	(0.570)	(2.454)^b	(0.106)	(0.598)	(0.543)	(1.516)^d	(2.364)^b
1972	0.535	9.538	1.056	0.693	0.983	0.591	-0.700	——	0.462	1.336	0.737	1.276	0.679	0.340	1.993	1.586	0.935
		(67.169)^a	(1.685)^c	(0.984)	(1.690)^c	(0.972)	(4.972)^a	——	(0.300)	(1.098)	(0.607)	(0.950)	(0.529)	(0.269)	(1.523)^d	(1.184)	(1.074)

t = test values are shown in brackets a = Significant at the 0.01 level b = Significant at the 0.05 level
c = Significant at the 0.10 level d = Significant at the 0.20 level

TABLE (5A-25) $DVM^{K}_{e} = a_o + a_1 \frac{V_D}{\Gamma_S} + a_2 \left[\frac{V_D}{\Gamma_S}\right]^2 + a_3 R_N + a_4 R_N^2 + a_5 S + a_{6 \cdots 15} ID$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}
1967	0.608	10.244	1.714	1.369	1.765	1.068	-0.668	0.136	——	0.901	0.756	2.050	1.183	1.810	1.625	0.488	0.962
		$(66.519)^a$	$(2.000)^c$	$(1.313)^d$	$(1.515)^d$	(0.865)	$(4.903)^a$	(0.176)	——	(0.965)	(0.504)	$(2.008)^c$	(0.897)	$(1.304)^d$	(1.110)	(0.687)	(0.552)
1968	0.563	9.440	1.181	0.832	1.206	0.695	-0.665	1.090	1.017	0.317	1.031	——	2.276	2.481	1.297	1.147	——
		$(51.027)^a$	$(2.541)^b$	$(1.355)^d$	$(2.475)^b$	$(1.475)^d$	$(4.856)^a$	(0.863)	(1.561)	(0.212)	(0.866)	——	$(1.871)^c$	$(2.223)^b$	(0.828)	(1.075)	——
1969	0.513	9.462	0.991	0.599	0.991	0.592	-0.682	0.243	0.358	0.766	0.623	2.730	1.707	2.126	0.550	0.433	2.857
		$(71.142)^a$	$(1.425)^d$	(0.332)	$(1.794)^c$	$(1.425)^d$	$(4.759)^a$	(0.577)	(0.173)	(0.696)	(0.582)	$(2.103)^b$	$(2.116)^b$	$(2.234)^b$	(0.510)	(0.555)	$(2.809)^a$
1970	0.564	11.393	1.424	0.897	1.452	0.901	-0.567	0.987	0.404	1.283	0.264	2.950	1.335	1.444	1.515	2.011	2.709
		$(99.069)^a$	$(2.510)^b$	(0.688)	$(1.520)^d$	(0.620)	$(3.613)^a$	(1.248)	(0.251)	(0.984)	(3.359)	$(2.465)^b$	$(1.535)^d$	$(1.601)^d$	(1.118)	$(2.431)^b$	$(2.265)^b$
1971	0.523	10.970	1.276	0.919	1.290	0.748	-0.489	——	1.002	1.279	0.552	1.914	1.347	1.149	1.909	1.890	2.267
		$(71.699)^a$	$(1.688)^c$	(0.861)	$(2.120)^b$	$(1.480)^d$	$(3.226)^a$	——	(0.901)	(0.989)	(0.667)	$(2.182)^b$	(1.139)	$(1.473)^d$	$(1.803)^c$	$(1.453)^d$	$(1.783)^c$
1972	0.608	10.361	1.201	0.930	1.158	0.701	-0.514	——	0.387	0.979	0.543	0.977	1.039	1.862	0.854	1.179	0.724
		$(52.862)^a$	$(2.420)^b$	(0.694)	$(2.405)^b$	(0.661)	$(3.679)^a$	——	(0.581)	(0.751)	(0.787)	(0.950)	$(1.502)^d$	$(1.423)^d$	(0.825)	(1.008)	(1.068)

t = test values are shown in brackets a = Significant at the 0.01 level b = Significant at the 0.05 level
c = Significant at the 0.10 level d = Significant at the 0.20 level

TABLE (5A-26) $RIM^{K}_{e} = a_o + a_1 \frac{V_D}{V_S} + a_2 \left[\frac{V_D}{V_S}\right]^2 + a_3 R_K + a_4 R_K^2 + a_5 S + a_{6 \cdots 15} ID$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}
1967	0.624	10.301	1.735	1.265	1.719	1.008	-0.710	-0.806	——	0.281	0.356	2.280	0.624	0.954	0.151	0.413	0.263
		(53.097)[a]	(2.306)[b]	(0.751)	(2.010)[c]	(0.825)	(5.483)[a]	(0.797)	——	(0.268)	(0.309)	(1.814)[c]	(0.612)	(0.897)	(0.170)	(0.462)	(0.159)
1968	0.557	8.699	1.045	0.706	0.981	0.613	-0.607	0.895	0.450	-0.295	0.425	——	1.526	-2.190	1.235	-2.175	——
		(70.723)[a]	(2.133)[b]	(0.525)	(1.701)[c]	(0.508)	(4.670)[a]	(0.643)	(0.430)	(0.252)	(0.361)	——	(1.456)[d]	(2.261)[b]	(1.192)	(1.768)[c]	——
1969	0.503	9.528	1.017	0.691	1.029	0.611	-0.570	0.642	-0.387	0.839	0.591	2.464	1.483	2.303	1.198	0.727	2.556
		(80.067)[a]	(1.366)[d]	(0.490)	(1.695)[c]	(0.451)	(4.233)[a]	(0.664)	(0.287)	(0.707)	(0.453)	(1.821)[c]	(1.127)	(2.149)[b]	(1.075)	(0.824)	(2.801)[a]
1970	0.563	10.525	1.250	1.089	1.274	0.747	-0.528	0.346	-0.275	0.213	0.687	1.549	1.567	2.881	1.348	2.160	2.497
		(61.549)[a]	(2.338)[b]	(0.879)	(2.455)[b]	(0.605)	(3.781)[a]	(0.211)	(0.341)	(0.275)	(0.704)	(1.987)[c]	(1.310)[d]	(2.493)[b]	(1.288)	(2.277)[b]	(1.921)[c]
1971	0.560	11.675	1.406	0.963	1.376	0.807	-0.594	——	0.530	1.199	0.895	2.316	1.046	1.684	0.850	1.730	1.842
		(82.218)[a]	(2.058)[b]	(0.535)	(1.450)[d]	(0.520)	(4.397)[a]	——	(0.391)	(0.986)	(0.512)	(2.422)[b]	(1.204)	(1.465)[d]	(0.742)	(1.443)[d]	(1.737)[c]
1972	0.474	9.387	0.940	0.635	0.951	0.593	-0.530	——	-1.002	0.377	0.506	1.228	0.523	0.316	0.953	0.434	0.743
		(73.335)[a]	(1.700)[c]	(0.460)	(1.405)[d]	(0.477)	(4.168)[a]	——	(0.901)	(0.317)	(0.429)	(0.998)	(0.422)	(0.528)	(0.550)	(0.210)	(0.703)

t = test values are shown in brackets a = Significant at the 0.01 level b = Significant at the 0.05 level
c = Significant at the 0.10 level d = Significant at the 0.20 level

TABLE (5A-27) $CPM^{K}_{e} = a_o + a_1 \frac{V_D}{V_S} + a_2 \left[\frac{V_D}{V_S}\right]^2 + a_3 R_N + a_4 R_N^{2} + a_5 S + a_{6 \cdots 15} ID$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}
1967	0.480	10.142	1.703	1.132	1.687	0.976	-0.687	-0.948	——	0.925	0.934	2.180	1.062	0.695	0.716	0.632	0.793
		(73.492)[a]	(1.405)[d]	(1.034)	(2.215)[d]	(1.525)[d]	(4.878)[a]	(0.715)	——	(0.716)	(0.660)	(2.610)[b]	(0.846)	(0.692)	(1.233)	(0.793)	(0.845)
1968	0.527	8.854	1.064	0.824	1.097	0.650	-0.640	0.597	0.369	0.221	0.828	——	2.120	2.247	1.308	1.030	——
		(48.648)[a]	(2.218)[b]	(0.592)	(1.750)[c]	(1.495)[d]	(4.319)[a]	(0.653)	(0.693)	(0.149)	(0.555)	——	(1.766)[c]	(2.166)[b]	(0.844)	(1.015)	——
1969	0.516	9.763	1.008	0.714	1.095	0.652	-0.669	1.037	0.324	0.782	0.627	2.758	1.708	2.085	1.551	1.359	2.830
		(73.962)[a]	(2.490)[b]	(1.344)[d]	(2.440)[b]	(0.440)	(4.795)[a]	(1.481)	(0.519)	(0.707)	(0.586)	(2.099)[b]	(2.099)[b]	(2.215)[b]	(1.513)[d]	(1.530)[d]	(2.802)[a]
1970	0.560	10.372	1.208	0.983	1.174	0.685	-0.593	0.711	0.351	0.326	0.200	2.027	1.310	1.400	1.506	1.965	2.732
		(89.413)[a]	(2.258)[b]	(0.743)	(1.854)[c]	(0.520)	(3.502)[a]	(0.791)	(0.311)	(0.236)	(0.115)	(2.584)[b]	(1.515)[d]	(1.564)[d]	(1.108)	(1.949)[c]	(2.265)[b]
1971	0.542	10.547	1.121	0.934	1.121	0.667	-0.682	——	-1.111	1.154	0.435	2.458	1.116	0.917	1.812	1.351	2.217
		(71.263)[a]	(2.465)[b]	(0.697)	(2.455)[b]	(0.455)	(4.306)[a]	——	(1.131)	(0.946)	(0.628)	(2.993)[a]	(1.047)	(1.411)[d]	(1.769)[c]	(1.324)[d]	(1.804)[c]
1972	0.515	10.254	1.192	0.844	1.150	0.706	-0.635	——	0.419	0.620	0.465	1.016	1.012	0.948	0.837	1.164	0.660
		(56.966)[a]	(1.535)[d]	(0.302)	(1.950)[c]	(0.410)	(3.787)[a]	——	(0.271)	(0.549)	(0.476)	(0.975)	(0.940)	(0.644)	(0.829)	(0.998)	(0.540)

t = test values are shown in brackets a = Significant at the 0.01 level b = Significant at the 0.05 level
c = Significant at the 0.10 level d = Significant at the 0.20 level

TABLE (SA-28) $DVM^X_e = a_o + a_1 \frac{V_D}{V_S} + a_2 \left[\frac{V_D}{V_S}\right]^2 + a_3 R_X + a_4 R_X^2 + a_5 S + a_{6 \cdots 15} ID$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7
1967	0.534	10.222	1.532	1.439	1.614	1.037	-0.757	——	-1.545
		(85.183)^a	(1.470)^d	(1.389)^d	(1.672)^d	(0.780)	(4.552)^a	——	(1.052)
1968	0.600	9.463	1.340	0.930	1.302	0.817	-0.664	——	0.451
		(62.668)^a	(1.724)^c	(1.398)^d	(2.025)^b	(1.378)^d	(4.757)^a	——	(0.456)
1969	0.604	10.565	1.673	1.025	1.688	1.079	-0.603	——	0.229
		(71.385)^a	(1.575)^d	(1.391)^d	(2.111)^b	(1.386)^d	(3.491)^a	——	(0.419)
1970	0.605	10.181	1.035	0.711	1.014	0.658	-0.533	——	0.660
		(98.844)^a	(2.158)^b	(1.385)^d	(2.095)^b	(0.525)	(3.236)^a	——	(0.609)
1971	0.515	11.945	1.727	1.473	1.615	1.068	-0.579	1.101	-0.324
		(112.688)^a	(2.199)^b	(1.095)	(1.980)^c	(0.540)	(3.336)^a	(1.382)^d	(0.192)
1972	0.538	9.973	1.515	0.912	1.581	1.024	-0.596	-0.695	0.915
		(50.115)^a	(1.658)^d	(1.063)	(1.595)^d	(0.670)	(3.529)^a	(0.519)	(0.676)

Year	$\bar{R}^2$	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}
1967	0.534	-0.426	-1.515	-2.137	-0.203	-0.598	-0.707	-0.329	-0.892
		(0.190)	(1.148)	(2.501)^b	(0.197)	(0.715)	(0.782)	(0.287)	(0.817)
1968	0.600	0.796	0.557	2.520	1.942	2.234	1.326	2.136	2.502
		(0.899)	(0.451)	(2.026)^b	(2.418)^b	(2.574)^b	(0.996)	(1.981)^c	(2.183)^b
1969	0.604	0.352	1.324	2.365	1.769	2.338	0.913	——	2.856
		(0.752)	(0.692)	(2.178)^b	(1.432)^d	(2.476)^b	(0.524)	——	(2.422)^b
1970	0.605	0.928	1.325	1.647	1.695	2.046	0.796	2.422	1.923
		(0.849)	(1.586)^d	(1.153)	(1.266)	(1.862)^c	(0.850)	(2.216)^b	(2.337)^b
1971	0.515	-0.803	0.900	2.823	1.067	1.029	-0.516	1.637	2.207
		(0.519)	(0.570)	(2.758)^a	(1.039)	(1.143)	(0.533)	(1.257)	(1.750)^d
1972	0.538	-0.509	-0.196	-1.165	-0.375	-0.387	-0.188	0.897	-0.060
		(0.238)	(0.092)	(1.066)	(0.307)	(0.423)	(0.190)	(0.943)	(0.052)

t = test values are shown in brackets a = Significant at the 0.01 level b = Significant at the 0.05 level
c = Significant at the 0.10 level d = Significant at the 0.20 level

TABLE (SA-29) $DVM^{K}_{e} = a_0 + a_1 \frac{V_D}{V_S} + a_2 \left[\frac{V_D}{V_S}\right]^2 + a_3 R_N + a_4 R_N^2 + a_5 S + a_{6 \cdots 15} ID$

Year	$\bar{R}^2$	a_0	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}
1967	0.605	10.880	1.746	1.065	1.710	1.116	-0.616	——	-0.841	0.693	-0.324	2.079	-1.105	-1.260	-0.087	-1.018	-0.484
		(77.714)[a]	(1.639)[d]	(0.986)	(1.818)[c]	(1.383)[d]	(4.007)[a]	——	(0.532)	(0.422)	(0.440)	(2.025)[b]	(1.262)	(1.084)	(0.092)	(1.568)[d]	(0.521)
1968	0.556	9.867	1.498	1.196	1.401	0.907	-0.600.	——	0.411	0.344	0.607	2.343	2.091	2.312	0.529	1.323	2.692
		(89.318)[a]	(1.755)[c]	(0.754)	(1.505)[d]	(1.000)	(4.205)[a]	——	(0.593)	(0.381)	(0.722)	(2.173)[b]	(2.161)[b]	(1.876)[c]	(0.698)	(0.785)	(2.398)[b]
1969	0.554	10.260	1.540	1.498	1.554	0.993	-0.636	——	0.307	1.005	0.424	2.730	1.983	2.786	1.186	——	2.430
		(77.727)[a]	(2.257)[b]	(0.980)	(2.240)[b]	(0.980)	(3.931)[a]	——	(0.401)	(0.834)	(0.487)	(2.267)[b]	(1.413)[d]	(1.763)[c]	(1.509)[d]	——	(2.112)[b]
1970	0.606	10.943	1.035	0.711	1.189	0.790	-0.573	——	1.155	1.043	0.836	2.763	1.026	1.689	1.077	2.280	2.801
		(72.470)[a]	(1.751)[c]	(0.685)	(1.465)[d]	(1.021)	(3.582)[a]	——	(1.362)[d]	(0.916)	(0.553)	(2.104)[b]	(1.490)[d]	(1.763)[c]	(0.981)	(2.296)[b]	(2.171)[b]
1971	0.495	11.218	1.727	1.473	1.409	0.939	-0.541	-1.097	1.269	1.537	0.758	2.543	0.554	0.594	1.147	1.533	2.112
		(74.291)[a]	(2.288)[b]	(1.520)[d]	(2.368)[b]	(1.375)[d]	(3.776)[a]	(1.136)	(0.961)	(1.236)	(0.761)	(2.022)[b]	(0.616)	(0.677)	(1.507)[d]	(1.969)[c]	(2.540)[b]
1972	0.484	9.466	1.515	0.912	1.327	0.857	-0.519	-1.319	1.682	1.137	0.249	1.023	1.069	0.405	0.792	1.488	0.854
		(64.835)[a]	(2.391)[b]	(0.545)	(1.555)[d]	(1.387)[d]	(2.732)[a]	(1.509)[d]	(1.305)[d]	(1.358)[d]	(0.397)	(1.274)	(1.299)	(0.311)	(0.852)	(1.028)	(0.951)

t = test values are shown in brackets a = Significant at the 0.01 level b = Significant at the 0.05 level
c = Significant at the 0.10 level d = Significant at the 0.20 level

TABLE (5A-30) $RIM^K_e = a_o + a_1 \frac{V_D}{V_S} + a_2 \left[\frac{V_D}{V_S}\right]^2 + a_3 R_N + a_4 R_N^2 + a_5 S + a_{6 \cdots 15} ID$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}
1967	0.458	10.057	1.804	1.119	1.820	1.169	-0.643	——	-0.894	-0.906	0.499	-1.669	-0.603	-0.995	-0.641	-0.641	-0.070
		(89.000)[a]	(2.166)[b]	(1.000)	(1.813)[c]	(0.980)	(4.602)[a]	——	(1.212)	(1.406)[d]	(0.360)	(1.735)[c]	(0.862)	(0.096)	(0.926)	(0.436)	(0.912)
1968	0.509	9.935	1.533	1.440	1.504	0.957	-0.611	——	0.316	0.456	0.413	2.093	1.525	2.066	1.095	1.854	2.082
		(66.677)[a]	(2.065)[b]	(0.980)	(1.535)[d]	(1.015)	(4.660)[a]	——	(0.399)	(0.691)	(0.314)	(1.758)[c]	(1.516)[d]	(2.216)[b]	(0.831)	(2.069)[b]	(1.963)[c]
1969	0.514	9.588	1.366	0.949	1.175	0.768	-0.537	——	0.306	0.542	0.480	2.334	1.746	1.123	0.924	——	2.900
		(66.124)[a]	(1.570)[d]	(1.368)[d]	(1.934)[c]	(0.854)	(3.309)[a]	——	(0.468)	(0.816)	(0.417)	(2.165)[b]	(1.424)[d]	(1.645)[d]	(0.536)	——	(2.448)[b]
1970	0.427	10.004	1.218	0.755	1.228	0.775	-0.570	——	0.590	0.624	0.700	2.132	1.434	2.657	1.474	2.336	2.510
		(50.525)[a]	(1.545)[d]	(1.381)[d]	(1.862)[c]	(0.740)	(3.520)[a]	——	(0.709)	(0.671)	(0.919)	(1.741)[c]	(0.939)	(2.156)[b]	(1.168)	(1.917)[c]	(2.604)[b]
1971	0.519	12.215	1.703	1.057	1.687	1.124	-0.557	0.702	-0.318	-0.869	0.163	2.427	-1.023	1.202	-1.540	1.578	1.926
		(116.333)[a]	(1.465)[d]	(0.870)	(1.505)[d]	(1.375)[d]	(3.548)[a]	(0.676)	(0.198)	(0.553)	(0.104)	(2.591)[b]	(1.013)	(1.126)	(1.352)[d]	(1.234)	(2.066)[b]
1972	0.428	9.293	1.357	1.420	1.127	0.728	-0.549	1.270	0.972	0.034	0.132	0.522	-0.561	-0.552	0.122	0.369	0.160
		(91.107)[a]	(1.590)[d]	(1.021)	(1.727)[c]	(1.387)[d]	(3.895)[a]	(1.032)	(0.904)	(0.016)	(0.101)	(0.990)	(0.632)	(0.672)	(0.221)	(0.451)	(0.155)

t = test values are shown in brackets   a = Significant at the 0.01 level   b = Significant at the 0.05 level
c = Significant at the 0.10 level   d = Significant at the 0.20 level

TABLE (5A-31) $CTM^{I}_{e} = a_o + a_1 \frac{V_D}{V_S} + a_2 \left[\frac{V_D}{V_S}\right]^2 + a_3 R_N + a_4 R_N^2 + a_5 S + a_{6 \cdots 15} ID$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}
1967	0.603	11.018	2.119	1.365	2.064	1.361	-0.721	——	-0.965	0.585	-0.515	-2.257	-0.196	-0.398	0.154	-0.641	-0.523
		$(78.141)^a$	$(1.570)^d$	(1.010)	$(2.555)^b$	$(1.450)^d$	$(3.046)^a$	——	(1.287)	(0.861)	(0.496)	$(2.080)^b$	(0.281)	(0.271)	(0.150)	(0.606)	(0.641)
1968	0.551	9.155	1.239	0.581	1.263	0.844	-0.674	——	0.204	1.122	0.477	2.095	2.107	2.114	0.408	1.048	2.376
		$(79.608)^a$	$(1.833)^c$	(0.394)	$(1.690)^c$	$(1.374)^d$	$(4.146)^a$	——	(0.522)	(1.288)	(0.661)	$(2.058)^b$	$(2.118)^b$	$(1.782)^c$	(0.641)	(1.077)	$(1.892)^c$
1969	0.548	10.418	1.303	0.818	1.274	0.836	-0.672	——	0.279	0.991	0.382	2.620	1.020	1.836	1.187	——	2.320
		$(78.330)^a$	$(1.460)^d$	$(1.398)^d$	$(1.450)^d$	$(1.381)^d$	$(4.779)^a$	——	(0.379)	(0.824)	(0.535)	$(2.226)^b$	$(1.472)^d$	$(1.776)^c$	$(1.507)^d$	——	$(2.117)^b$
1970	0.513	11.262	1.539	0.776	1.607	1.022	-0.560	——	1.902	1.481	0.376	2.143	1.531	2.080	1.591	2.976	2.241
		$(76.094)^a$	$(1.725)^c$	(0.398)	$(1.590)^d$	$(1.450)^d$	$(3.774)^a$	——	$(1.472)^d$	(1.028)	(0.586)	$(2.208)^b$	$(1.608)^d$	$(1.872)^c$	(1.127)	$(2.428)^b$	$(2.288)^b$
1971	0.489	12.160	1.788	0.949	1.755	1.154	-0.694	0.421	1.107	0.531	0.834	2.175	1.314	0.724	2.079	2.461	2.935
		$(79.477)^a$	$(1.540)^d$	(0.496)	$(1.999)^c$	$(1.530)^d$	$(3.672)^a$	(0.309)	(0.845)	(0.322)	(0.790)	$(2.886)^a$	$(1.521)^d$	(0.724)	$(2.475)^b$	$(1.945)^c$	$(2.468)^b$
1972	0.562	9.447	1.095	0.569	1.071	0.695	-0.649	0.506	0.560	0.922	0.737	1.632	1.134	0.899	1.192	0.732	0.543
		$(61.745)^a$	$(1.719)^c$	$(1.481)^d$	$(2.450)^b$	$(1.385)^d$	(3.263)	(0.732)	(0.999)	(0.611)	(0.551)	$(1.431)^d$	$(1.318)^d$	(1.290)	(0.711)	(1.106)	(0.655)

t = test values are shown in brackets a = Significant at the 0.01 level b = Significant at the 0.50 level
c = Significant at the 0.10 level d = Significant at the 0.20 level

<u>TABLE (5A-32)</u> $DVX_e = a_o + a_1 \frac{V_D}{V_S} + a_2 \left[\frac{V_D}{V_S}\right]^2 + a_3 R_X + a_4 \; P_X^2 \; a_5 S + a_{6\cdots15} ID$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}
1967	0.553	11.473	2.945	2.778	2.905	1.921	-0.650	1.132	-0.872	-0.446	-1.204	2.103	0.780	0.723	0.620	1.026	0.159
		(63.738)^{a}	(2.700)^{b}	(1.265)	(3.265)^{a}	(1.635)^{d}	(4.631)^{a}	(1.041)	(1.188)	(0.417)	(1.063)	(2.250)^{b}	(0.542)	(0.732)	(0.912)	(1.249)	(0.204)
1968	0.485	9.699	1.797	1.444	1.837	1.312	-0.542	0.725	0.635	0.988	0.757	2.956	2.454	2.478	0.688	1.793	2.412
		(78.853)^{a}	(1.879)^{c}	(0.683)	(1.923)^{c}	(1.685)^{d}	(3.627)^{a}	(0.738)	(0.630)	(1.037)	(0.491)	(2.041)^{b}	(2.034)^{b}	(2.082)^{b}	(0.536)	(1.958)^{c}	(2.142)^{b}
1969	0.543	9.578	1.506	1.242	1.518	1.130	-0.618	0.809	0.771	1.296	1.372	2.396	1.056	2.125	0.690	0.892	2.685
		(63.853)^{a}	(2.740)^{a}	(0.670)	(2.635)^{b}	(1.635)^{d}	(3.959)^{a}	(1.034)	(0.931)	(0.975)	(1.094)	(2.689)^{b}	(1.385)^{d}	(2.455)^{b}	(0.509)	(0.685)	(2.862)^{a}
1970	0.510	11.358	1.943	2.084	2.012	1.320	-0.511	-0.998	-0.821	-1.182	-0.430	-1.965	-1.338	2.185	-0.481	-2.471	2.971
		(68.421)^{a}	(1.700)^{c}	(1.233)	(3.233)^{a}	(0.725)	(3.350)^{a}	(0.977)	(0.972)	(1.128)	(0.370)	(1.714)^{c}	(1.066)	(2.091)^{b}	(0.550)	(2.210)^{b}	(2.789)^{a}
1971	0.484	12.011	2.166	2.157	2.150	1.629	-0.589	-0.842	———	0.483	0.919	2.777	0.458	0.543	0.681	1.450	1.854
		(74.141)^{a}	(3.234)^{a}	(1.670)^{d}	(2.665)^{b}	(1.665)^{d}	(3.629)^{a}	(0.965)	———	(0.609)	(0.513)	(2.365)^{b}	(0.306)	(0.642)	(0.470)	(1.565)^{d}	(1.613)^{d}
1972	0.545	9.938	1.636	1.354	1.622	1.067	-0.628	-1.071	———	-0.307	-0.320	1.088	1.214	-0.178	-0.517	-0.362	-0.160
		(57.445)^{a}	(2.776)^{a}	(0.639)	(3.028)^{a}	(0.725)	(3.811)^{a}	(1.302)	———	(0.370)	(0.190)	(1.352)^{d}	(0.801)	(0.163)	(0.537)	(0.457)	(0.156)

t = test values are shown in brackets a = Significant at the 0.01 level b = Significant at the 0.05 level
c = Significant at the 0.10 level d = Significant at the 0.20 level

TABLE (5A-33) $DVM^K_e = a_o + a_1 \frac{V_D}{V_S} + a_2 \left[\frac{V_D}{V_S}\right]^2 + a_3 R_N + A_4 R_N^2 + a_5 S + a_{6 \cdots 15} ID$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}
1967	0.554	10.534	2.511	2.325	2.528	1.646	-0.727	0.443	0.934	0.964	1.170	2.109	0.738	1.834	1.253	0.082	0.663
		(61.964)^a	(2.000)^b	(1.620)^d	(2.645)^b	(1.384)^d	(4.413)^a	(0.317)	(1.151)	(1.239)	(1.040)	(2.322)^b	(0.649)	(1.452)^d	(1.526)^d	(0.054)	(0.569)
1968	0.525	10.245	1.998	1.899	2.028	1.317	-0.685	0.811	1.350	0.205	1.062	2.565	2.317	2.033	0.983	1.066	1.327
		(82.620)^a	(2.983)^a	(1.263)	(2.680)^b	(1.385)^d	(4.107)^a	(0.916)	(0.983)	(0.272)	(0.938)	(2.579)^b	(1.878)^c	(2.294)^b	(0.733)	(0.879)	(1.838)^c
1969	0.563	9.544	1.472	1.343	1.531	1.087	-0.662	0.825	0.246	1.111	0.830	2.018	2.329	2.041	1.706	0.952	2.092
		(73.984)^a	(1.730)^c	(1.620)^d	(2.755)^a	(1.274)	(3.670)^a	(1.311)^d	(0.479)	(1.346)^d	(0.654)	(2.709)^a	(1.700)^c	(2.407)^b	(1.395)^d	(0.813)	(1.993)^c
1970	0.553	12.157	2.316	2.372	2.380	1.734	-0.544	-1.393	-1.003	-1.443	-0.413	-2.676	-1.404	1.925	-1.573	-2.351	2.503
		(62.025)^a	(2.605)^b	(1.244)	(2.645)^b	(1.277)	(3.425)^a	(1.057)	(1.251)	(0.932)	(0.512)	(2.215)^b	(1.649)^c	(2.335)^b	(1.202)	(2.116)^b	(2.034)^b
1971	0.520	12.966	2.521	2.275	2.465	1.630	-0.479	-1.492	———	0.927	0.888	2.206	1.674	1.247	2.114	1.328	2.113
		(81.037)^a	(2.010)^c	(1.675)^d	(2.660)^b	(1.378)^d	(2.362)^a	(0.966)	———	(1.130)	(0.866)	(2.572)^b	(1.250)	(0.946)	(1.864)^c	(1.635)^c	(1.889)^c
1972	0.577	10.634	1.818	1.438	1.938	1.349	-0.453	-1.523	———	1.020	0.225	1.620	0.978	0.208	-0.700	-0.680	-0.705
		(70.893)^a	(2.100)^b	(1.725)^d	(2.745)^a	(1.724)^c	(2.608)^a	(1.100)	———	(1.241)	(0.285)	(1.575)^d	(1.222)	(0.291)	(0.861)	(0.510)	(0.531)

t = test values are shown in brackets a = Significant at the 0.01 level b = Significant at the 0.05 level
c = Significant at the 0.10 level c = Significant at the 0.20 level

TABLE (SA-34) $RIM^{X}_{e} = a_o + a_1 \frac{V_D}{V_S} + a_2 \left[\frac{V_D}{V_S}\right]^2 + a_3 R_X + a_4 R_X^2 + a_5 S + a_{6\cdots15} ID$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}
1967	0.539	10.254	2.098	1.986	2.114	1.476	-0.645	0.023	-1.121	1.110	1.110	2.125	0.641	0.583	0.581	0.241	0.350
		(54.834)^{a}	(2.640)^{b}	(1.334)^{d}	(2.704)^{a}	(1.358)^{d}	(4.284)^{a}	(0.025)	(1.189)	(1.036)	(1.034)	(2.554)^{b}	(0.520)	(0.525)	(0.500)	(0.351)	(0.268)
1968	0.490	9.482	1.705	1.527	1.679	1.272	-0.576	1.109	0.343	0.616	0.674	2.456	2.176	2.077	0.496	1.355	2.511
		(78.363)^{a}	(2.665)^{b}	(1.818)^{c}	(1.999)^{c}	(1.716)^{c}	(3.780)^{a}	(0.918)	(0.523)	(0.841)	(0.877)	(2.007)^{b}	(1.922)^{b}	(1.824)^{c}	(0.443)	(1.655)^{d}	(2.011)^{b}
1969	0.542	9.990	1.943	2.058	1.865	1.306	-0.605	0.939	0.835	1.323	1.311	2.389	1.025	1.105	0.733	0.862	2.641
		(66.600)^{a}	(2.010)^{c}	(1.405)^{d}	(2.970)^{a}	(1.745)^{c}	(4.093)^{a}	(0.994)	(0.624)	(1.005)	(1.058)	(2.691)^{b}	(1.359)^{d}	(1.443)^{d}	(0.550)	(0.659)	(2.964)^{a}
1970	0.516	12.252	2.174	2.448	2.192	1.630	-0.568	-0.418	-0.418	-0.387	-0.788	-2.162	-0.783	-1.820	-0.734	-2.469	1.697
		(74.707)^{a}	(2.020)^{c}	(1.956)^{c}	(3.182)^{a}	(1.222)	(3.585)^{a}	(0.581)	(0.350)	(0.232)	(0.864)	(2.503)^{b}	(0.786)	(2.013)^{c}	(0.660)	(2.013)^{c}	(1.756)^{c}
1971	0.570	11.219	1.902	2.058	1.902	1.244	-0.539	-1.100	——	0.717	0.927	2.184	1.356	1.222	0.805	1.130	1.478
		(66.779)^{a}	(2.279)^{b}	(1.325)^{d}	(2.715)^{a}	(1.231)	(3.447)^{a}	(0.778)	——	(0.742)	(1.391)^{d}	(2.632)^{b}	(1.250)	(1.499)^{d}	(1.313)^{d}	(1.428)^{d}	(1.854)^{c}
1972	0.537	10.542	2.143	3.004	2.956	2.295	-0.532	-0.516	——	-0.450	-0.771	0.704	0.463	-0.400	-1.311	0.791	-0.753
		(60.240)^{a}	(2.725)^{a}	(1.366)^{d}	(2.018)^{b}	(1.322)^{d}	(3.811)^{a}	(0.434)	——	(0.348)	(0.903)	(0.721)	(0.510)	(0.350)	(0.777)	(0.704)	(0.706)

t = test values are shown in brackets a = Significant at the 0.01 level b = Significant at the 0.05 level
c = Significant at the 0.10 level d = Significant at the 0.20 level

TABLE (5A-35) $CPM^{K}_{e} = a_0 + a_1 \frac{V_D}{V_S} + a_2 \left[\frac{V_D}{V_S}\right]^2 + a_3 R_N + a_4 R_N^2 + a_5 S + a_{6\cdots15} ID$

Year	$\bar{R}^2$	a_0	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}
1967	0.547	11.636	2.505	2.546	1.503	0.994	-0.745	0.447	0.477	0.443	1.237	2.916	1.329	0.527	1.373	0.314	0.650
		$(66.491)^a$	$(3.074)^a$	$(1.417)^d$	$(1.730)^c$	$(1.378)^d$	$(3.115)^a$	(0.511)	(0.239)	(0.362)	(1.055)	$(2.527)^b$	(0.800)	(0.635)	(0.808)	(0.497)	(0.813)
1968	0.516	10.361	1.980	1.949	2.071	1.546	-0.673	0.416	0.769	0.746	1.073	2.379	1.999	2.634	1.662	1.359	1.825
		$(81.582)^a$	$(2.650)^b$	$(1.417)^d$	$(3.047)^a$	$(1.335)^d$	$(4.170)^a$	(0.701)	(0.812)	(1.076)	(0.932)	$(2.499)^b$	$(1.699)^c$	$(2.067)^c$	$(1.593)^d$	$(1.467)^d$	$(1.656)^d$
1969	0.559	9.140	1.557	1.497	1.578	1.022	-0.673	0.533	1.194	1.147	1.074	1.965	1.290	1.990	1.700	1.235	2.036
		$(69.770)^a$	$(1.720)^c$	$(1.381)^d$	$(2.386)^b$	(1.120)	$(4.615)^a$	(0.615)	(0.640)	(0.657)	(0.644)	$(2.050)^b$	$(1.667)^d$	$(2.371)^b$	$(1.396)^d$	(0.877)	$(1.959)^c$
1970	0.552	10.736	1.579	1.436	1.542	1.068	-0.592	-0.301	-0.197	0.551	-0.604	-2.790	-1.605	1.778	-1.770	-1.477	2.413
		$(54.497)^a$	$(1.744)^c$	(1.275)	$(2.361)^b$	$(1.361)^d$	$(3.068)^a$	(0.608)	(0.297)	(0.964)	(0.584)	$(2.250)^b$	$(1.518)^d$	$(2.280)^b$	(1.270)	$(1.651)^d$	$(1.994)^c$
1971	0.520	11.078	1.838	1.816	1.879	1.308	-0.654	-1.041	——	0.837	1.089	2.239	1.165	1.980	1.261	1.270	2.212
		$(69.237)^a$	$(1.740)^c$	(1.253)	$(2.359)^b$	(1.228)	$(3.897)^a$	(0.897)	——	(0.806)	(0.624)	$(2.316)^b$	$(1.364)^d$	$(1.547)^d$	$(1.655)^d$	$(1.341)^d$	$(2.695)^b$
1972	0.570	9.819	1.906	1.945	1.881	1.343	-0.655	-0.635	——	-0.427	-0.816	0.899	1.126	-0.755	-0.682	-0.643	-0.564
		$(63.759)^a$	$(2.577)^b$	(1.245)	$(2.909)^a$	(1.163)	$(3.317)^a$	(0.713)	——	(1.127)	(1.183)	(1.190)	(0.739)	(1.178)	(0.611)	(0.579)	(0.620)

t = test values are shown in brackets a = Significant at the 0.01 level . b = Significant at the 0.05 level
c = Significant at the 0.10 level d = Significant at the 0.20 level

TABLE (5A-36) $DVX^{X}_{o} = a_o + a_1 \frac{V_D}{V_T} + a_2 \left[\frac{V_D}{V_T}\right]^2 + a_3 R_N + a_4 R_N^2 \; a_5 S + a_6 \cdots {}_{15} ID$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}
1967	0.535	9.041	-4.059	5.340	0.705	0.422	-0.624	——	0.551	1.040	0.920	2.524	0.658	0.644	0.246	0.396	1.153
		(55.808)^a	(3.908)^a	(2.280)^b	(0.845)	(0.370)	(5.407)^a	——	(0.396)	(0.747)	(0.652)	(2.881)^a	(0.741)	(0.840)	(0.284)	(0.290)	(0.725)
1968	0.568	8.883	-3.823	4.851	0.566	0.338	-0.529	——	1.008	0.281	0.969	2.442	1.923	1.897	0.923	1.263	2.094
		(80.754)^a	(2.828)^a	(2.294)^b	(1.690)^c	(0.310)	(4.924)^a	——	(0.960)	(0.315)	(1.027)	(2.702)^a	(1.729)^c	(2.099)^b	(1.123)	(1.654)^c	(2.261)^b
1969	0.605	8.990	-3.684	5.650	0.518	0.300	-0.478	——	-0.459	-0.670	-0.968	2.346	-1.114	-2.343	-1.160	-0.273	2.312
		(74.916)^a	(2.226)^b	(1.802)^c	(1.685)^c	(0.275)	(3.995)^a	——	(0.264)	(0.449)	(0.640)	(2.149)^b	(1.074)	(2.224)^b	(0.731)	(0.160)	(2.421)^b
1970	0.499	9.880	-3.448	4.788	0.705	0.420	-0.599	——	1.014	0.480	1.022	2.295	1.111	1.970	1.090	2.218	——
		(53.118)^a	(2.809)^a	(2.260)^b	(0.827)	(0.390)	(4.611)^a	——	(0.990)	(0.584)	(0.963)	(2.000)^c	(1.342)^d	(1.780)^c	(1.256)	(2.100)^b	——
1971	0.568	10.235	-4.117	6.126	0.707	0.409	-0.567	——	0.706	0.830	0.632	3.042	0.572	0.641	1.308	1.987	2.221
		(73.633)^a	(2.236)^b	(2.082)^b	(1.305)^d	(0.340)	(4.836)^a	——	(0.851)	(0.906)	(0.752)	(2.654)^b	(0.752)	(0.461)	(1.111)	(1.715)^c	(1.962)^c
1972	0.508	9.044	-3.749	6.086	0.579	0.345	-0.542	——	-0.366	-0.457	-0.280	-0.685	0.207	0.430	-0.456	0.198	-0.840
		(61.945)^a	(2.208)^a	(2.860)^a	(1.310)^d	(0.295)	(4.111)^a	——	(0.392)	(0.542)	(0.340)	(0.724)	(0.273)	(0.543)	(0.586)	(0.168)	(0.985)

t = test values are shown in brackets a = Significant at the 0.01 level b = Significant at the 0.05 level
c = Significant at the 0.10 level d = Significant at the 0.20 level

TABLE (SA-37) $DVMX_o = a_o + a_1 \frac{V_D}{V_T} + a_2 \left[\frac{V_D}{V_T}\right]^2 + a_3 R_N + a_4 R_N^2 + a_5 S + a_{6 \cdots 15} ID$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}
1967	0.523	9.487	-4.482	5.897	0.818	0.489	-0.621	——	0.742	0.295	0.213	2.948	0.924	0.993	0.483	0.766	1.078
		(86.245)^{a}	(2.280)^{b}	(2.098)^{b}	(1.280)	(0.390)	(4.074)^{a}	——	(0.964)	(0.271)	(0.209)	(2.410)^{b}	(0.955)	(0.740)	(0.293)	(0.540)	(1.008)
1968	0.578	9.208	-4.129	6.072	0.641	0.367	-0.634	——	0.460	0.623	0.353	2.794	2.299	1.346	1.537	0.974	2.023
		(52.022)^{a}	(2.974)^{a}	(2.240)^{b}	(1.325)^{d}	(0.437)	(3.660)^{a}	——	(0.562)	(0.813)	(0.482)	(2.963)^{a}	(2.016)^{c}	(1.695)^{c}	(1.214)	(1.096)	(2.215)^{b}
1969	0.541	9.214	-3.774	4.926	0.557	0.318	-0.615	——	-1.177	-0.409	-0.942	1.984	1.089	-1.274	-1.118	-0.659	2.320
		(74.306)^{a}	(2.992)^{a}	(1.845)^{c}	(1.280)	(0.438)	(3.545)^{a}	——	(1.069)	(0.618)	(1.095)	(2.177)^{b}	(1.458)^{d}	(1.664)^{d}	(1.384)^{d}	(0.623)	(2.683)^{a}
1970	0.563	10.073	-3.734	5.129	0.731	0.420	-0.594	——	1.403	0.841	1.144	2.078	1.222	1.223	1.285	1.641	——
		(74.614)^{a}	(2.264)^{b}	(1.901)^{c}	(2.003)^{c}	(0.385)	(3.241)^{a}	——	(1.281)	(1.000)	(0.960)	(1.875)^{c}	(1.538)^{d}	(1.694)^{c}	(1.495)^{d}	(1.864)^{c}	——
1971	0.479	10.459	-4.346	6.727	0.667	0.388	-0.619	——	1.433	1.588	1.092	2.402	1.403	1.077	2.220	1.361	2.494
		(85.032)^{a}	(2.850)^{a}	(2.223)^{b}	(1.305)^{d}	(0.189)	(3.557)^{a}	——	(1.584)^{d}	(1.413)^{d}	(0.979)	(2.632)^{b}	(1.685)^{c}	(1.214)	(1.954)^{c}	(1.613)^{d}	(2.100)^{b}
1972	0.565	8.908	-3.714	5.477	0.541	0.315	-0.602	——	0.330	-0.502	-0.214	-1.769	1.214	0.417	-0.372	0.754	-0.397
		(86.485)^{a}	(2.899)^{a}	(2.239)^{b}	(1.285)	(0.429)	(3.205)^{a}	——	(0.275)	(0.495)	(0.188)	(1.586)^{d}	(1.203)	(0.360)	(0.345)	(0.642)	(0.318)

t = test values are shown in brackets a = Significant at the 0.01 level b = Significant at the 0.05 level
c = Significant at the 0.10 level d = Significant at the 0.20 level

TABLE (5A-38) $RIM^{K}_{o} = a_o + a_1 \frac{V_D}{V_T} + a_2 \left[\frac{V_D}{V_T}\right]^2 + a_3 R_N + a_4 R_N^{\,2} + a_5 S + a_{6 \cdots 15} ID$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}
1967	0.489	8.642	-3.838	5.243	0.608	0.355	-0.525	—	0.678	1.108	0.869	2.211	0.602	0.467	0.366	0.673	1.056
		(56.855)[a]	(2.505)[b]	(2.266)[b]	(1.350)[d]	(0.428)	(5.885)[a]	—	(0.518)	(0.843)	(0.653)	(2.871)[a]	(0.850)	(0.211)	(0.589)	(0.960)	(0.700)
1968	0.484	9.204	-4.081	4.436	0.591	0.340	-0.478	—	0.736	1.006	0.825	2.320	1.551	1.630	0.825	1.060	1.618
		(47.689)[a]	(2.972)[a]	(1.837)[c]	(1.233)	(0.300)	(4.950)[a]	—	(0.600)	(0.852)	(0.636)	(2.762)[a]	(1.673)[d]	(1.754)[c]	(0.586)	(1.482)[d]	(2.281)[b]
1969	0.604	9.347	-4.058	4.373	0.534	0.317	-0.491	—	-0.609	-0.752	-1.090	1.822	-1.026	-1.361	1.191	-0.236	1.894
		(92.544)[a]	(3.055)[a]	(2.055)[b]	(1.185)	(0.260)	(5.198)[a]	—	(0.483)	(0.554)	(0.790)	(1.974)[c]	(1.362)[d]	(1.754)[c]	(1.083)	(0.151)	(2.274)[b]
1970	0.491	9.757	-3.325	4.231	0.665	0.385	-0.556	—	0.590	0.245	0.791	1.937	0.660	0.640	0.777	1.044	—
		(54.504)[a]	(2.604)[b]	(1.751)[c]	(1.687)[c]	(0.380)	(5.623)[a]	—	(0.485)	(0.362)	(0.818)	(1.680)[d]	(0.760)	(0.874)	(0.652)	(1.682)[d]	—
1971	0.574	10.085	-3.858	4.010	0.683	0.405	-0.524	—	0.878	0.114	0.976	2.065	0.774	0.857	0.630	1.234	1.429
		(84.747)[a]	(3.011)[a]	(2.011)[c]	(1.205)	(0.340)	(4.840)[a]	—	(0.602)	(0.384)	(0.752)	(2.265)[b]	(0.652)	(0.962)	(0.812)	(1.562)[d]	(1.671)[d]
1972	0.604	8.922	-3.803	4.604	0.533	0.319	-0.522	—	-0.144	-0.421	-0.294	-0.638	0.221	0.350	-0.423	0.205	-0.847
		(63.728)[a]	(2.905)[a]	(1.905)[c]	(1.685)[c]	(0.280)	(4.959)[a]	—	(0.174)	(0.600)	(0.375)	(0.699)	(0.304)	(0.459)	(0.570)	(0.182)	(1.033)

t = test values are shown in brackets a = Significant at the 0.01 level b = Significant at the 0.05 level
c = Significant at the 0.10 level d = Significant at the 0.20 level

TABLE (SA-39) $CPM^X_o = a_o + a_1 \frac{V_D}{V_T} + a_2 \left[\frac{V_D}{V_T}\right]^2 + a_3 R_N + a_4 R_N^2 + a_5 S + a_{6 \cdots 15} ID$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}
1967	0.543	9.481	-4.571	6.402	0.733	0.421	-0.620	——	0.811	0.243	1.088	2.023	0.839	0.876	0.529	0.651	0.854
		$(48.372)^a$	$(2.817)^a$	$(2.095)^b$	$(1.350)^d$	(0.435)	$(5.654)^a$	——	(1.071)	(0.320)	(1.214)	$(2.441)^b$	(0.624)	(0.501)	(0.411)	(0.431)	(0.951)
1968	0.487	8.555	-3.481	4.889	0.512	0.306	-0.570	——	1.605	0.880	0.710	2.037	1.399	1.487	0.890	1.227	1.976
		$(54.145)^a$	$(2.867)^a$	$(2.680)^b$	$(1.305)^d$	(0.256)	$(4.643)^a$	——	(1.263)	(0.973)	(0.963)	$(2.470)^b$	$(1.782)^c$	$(1.652)^d$	(1.120)	$(1.363)^d$	$(1.784)^c$
1969	0.545	8.781	-3.426	3.765	0.464	0.266	-0.613	——	1.289	-1.494	-1.055	2.389	-2.081	-1.279	-1.121	-0.582	2.431
		$(45.734)^a$	$(2.786)^a$	$(1.850)^c$	$(1.350)^d$	(0.260)	$(5.700)^a$	——	(1.125)	(1.250)	(0.926)	$(2.480)^b$	$(1.939)^c$	$(1.689)^c$	$(1.361)^d$	(0.572)	$(2.588)^b$
1970	0.564	10.449	-4.015	5.752	0.769	0.437	-0.552	——	1.066	1.517	1.119	1.816	1.868	1.150	1.128	1.665	——
		$(85.647)^a$	$(2.865)^a$	$(2.080)^b$	(1.280)	(0.370)	$(4.367)^a$	——	(0.960)	(1.367)	(0.863)	$(1.673)^d$	$(1.486)^d$	(1.250)	(1.257)	$(1.702)^c$	——
1971	0.585	11.253	-5.078	6.119	0.872	0.494	-0.566	——	1.785	0.951	1.526	2.574	1.706	1.396	1.534	1.831	1.932
		$(56.833)^a$	$(2.840)^a$	$(2.566)^b$	(1.260)	(0.340)	$(4.525)^a$	——	$(1.452)^d$	(1.162)	$(1.342)^d$	$(2.162)^b$	$(1.352)^d$	$(1.452)^d$	$(1.752)^c$	$(1.750)^c$	$(2.143)^b$
1972	0.572	9.440	-4.169	4.664	0.598	0.346	-0.583	——	1.326	-0.462	-0.217	-0.658	0.233	0.387	-0.309	0.747	-0.286
		$(48.911)^a$	$(2.138)^b$	$(1.835)^c$	(1.280)	(0.370)	$(5.184)^a$	——	(1.287)	(0.479)	(0.202)	(0.525)	(0.233)	(0.369)	(0.303)	(0.824)	(0.143)

t = test values are shown in brackets a = Significant at the 0.01 level b = Significant at the 0.05 level
c = Significant at the 0.10 level d = Significant at the 0.20 level

TABLE (5A-40) $DVMX_o = a_o + a_1 \frac{V_D}{V_T} + a_2 \left[\frac{V_D}{V_T}\right]^2 + a_3 R_N + a_4 R_N^2 + a_5 S + a_{6 \cdots 15} ID$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}
1967	0.491	9.491	-4.185	6.227	1.059	0.637	-0.635	0.881	—	0.402	0.601	2.598	0.540	0.255	1.011	0.591	0.542
		(58.950)^a	(2.780)^a	(2.099)^b	(2.025)^b	(1.416)^d	(5.779)^a	(0.713)	—	(0.465)	(0.626)	(2.242)^b	(0.648)	(0.431)	(1.092)	(0.426)	(0.387)
1968	0.535	8.952	-3.512	5.873	0.883	0.547	-0.609	0.798	1.199	-1.133	0.659	—	1.729	1.909	1.192	-1.994	—
		(87.764)^a	(2.199)^b	(1.859)^c	(1.475)^d	(1.403)^d	(5.669)^a	(1.052)	(1.232)	(1.125)	(0.618)	—	(1.702)^c	(2.093)^b	(1.173)	(1.715)^c	—
1969	0.521	9.102	-3.318	4.894	0.775	0.457	-0.554	-.608	-1.055	0.610	1.372	2.126	1.238	2.034	1.047	0.194	2.348
		(49.737)^a	(2.239)^b	(1.938)^c	(1.400)^d	(1.082)	(4.015)^a	(0.778)	(1.050)	(0.792)	(1.502)^d	(2.030)^b	(1.307)^d	(1.890)^c	(1.126)	(0.136)	(2.148)^b
1970	0.551	10.610	-3.768	5.869	1.131	0.668	-0.544	0.189	-1.123	1.205	0.559	2.251	1.496	1.959	1.176	2.484	1.706
		(54.132)^a	(2.221)^b	(2.156)^b	(1.752)^c	(1.132)	(3.980)^a	(0.253)	(1.031)	(0.503)	(0.412)	(1.897)^c	(1.343)^d	(1.695)^c	(0.909)	(2.345)^b	(1.863)^c
1971	0.495	11.363	-4.432	6.991	1.178	0.653	-0.603	—	0.472	1.3[illegible]6	0.825	2.210	1.452	1.124	1.143	1.751	1.928
		(63.127)^a	(2.217)^b	(2.618)^b	(2.236)^b	(1.431)^d	(4.304)^a	—	(0.331)	(0.961)	(0.577)	(2.449)^b	(1.295)	(0.748)	(0.778)	(1.654)^d	(1.519)^d
1972	0.536	9.952	-4.215	6.484	0.969	0.574	-0.604	—	-0.362	0.982	0.502	0.730	0.365	0.206	0.456	0.204	1.178
		(52.104)^a	(2.010)^c	(2.394)^b	(2.042)^b	(1.422)^d	(4.023)^a	—	(0.289)	(0.594)	(0.510)	(0.633)	(0.350)	(0.204)	(0.367)	(0.109)	(0.892)

t = test values are shown in brackets   a = Significant at the 0.01 level   b = Significant at the 0.05 level
c = Significant at the 0.10 level   d = Significant at the 0.20 level

TABLE (5A-41) $DVWX_o = a_o + a_1 \frac{V_D}{V_T} + a_2 \left[\frac{V_D}{V_T}\right]^2 + a_3 R_X + a_4 R_X^2 + a_5 S + a_{6 \cdots 15} ID$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}
1967	0.584	10.142	-4.540	7.644	1.199	0.740	-0.620	0.828	——	0.853	0.983	2.497	0.755	0.739	0.390	0.723	1.050
		(52.010)a	(2.376)b	(2.197)b	(1.505)d	(0.592)	(5.681)a	(0.555)	——	(0.817)	(0.848)	(1.964)c	(0.751)	(0.644)	(0.244)	(1.029)	(0.783)
1968	0.576	9.359	-3.731	5.740	0.990	0.592	-0.529	1.215	0.624	1.261	0.919	——	2.247	2.394	1.065	1.023	——
		(64.544)a	(2.042)b	(1.800)c	(1.701)c	(0.539)	(4.803)a	(1.072)	(0.541)	(1.204)	(0.713)	——	(1.993)c	(2.308)b	(0.794)	(1.013)	——
1969	0.497	9.326	-3.595	5.583	0.910	0.523	-0.534	0.590	0.631	0.421	1.266	2.102	1.343	1.661	1.252	0.647	2.504
		(54.538)a	(1.770)c	(2.045)b	(1.687)c	(0.435)	(4.622)a	(0.658)	(0.893)	(0.285)	(1.068)	(2.350)b	(1.334)d	(2.195)b	(1.396)d	(0.803)	(2.022)b
1970	0.585	12.021	-5.058	7.549	1.257	0.759	-0.595	0.681	0.484	1.233	1.074	2.878	1.885	1.211	1.252	1.808	2.471
		(87.981)a	(1.826)c	(2.235)b	(2.026)b	(0.951)	(4.819)a	(0.538)	(0.321)	(1.129)	(1.277)	(2.560)b	(1.445)d	(1.671)d	(1.268)	(1.744)c	(2.241)b
1971	0.543	11.779	-4.938	8.314	1.393	0.671	-0.535	——	0.645	1.299	1.311	2.460	1.722	1.290	2.035	1.516	2.358
		(76.082)a	(1.816)c	(2.197)b	(1.775)c	(0.929)	(4.126)a	——	(0.522)	(1.662)d	(1.113)	(2.261)b	(1.368)	(1.639)d	(2.083)b	(1.652)d	(2.031)b
1972	0.569	9.916	-4.164	6.235	1.057	0.616	-0.579	——	1.142	1.313	1.177	1.212	0.626	0.682	1.012	0.703	0.617
		(84.033)a	(2.377)b	(1.760)c	(2.022)b	(0.505)	(4.697)a	——	(1.069)	(1.430)d	(0.960)	(0.702)	(0.736)	(0.412)	(0.727)	(0.958)	(0.920)

t = test values are shown in brackets a = Significant at the 0.01 level b = Significant at the 0.05 level
c = Significant at the 0.10 level d = Significant at the 0.20 level

TABLE (5A-42) $RIH^{X}{}_{o} = a_o + a_1 \frac{V_D}{V_T} + a_2 \left[\frac{V_D}{V_T}\right]^2 + a_3 R_X + a_4 R_X^2\ a_5 S + a_{6\cdots15} ID$

Year	$\bar{R}^2$	a_0	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}
1967	0.490	9.211	-3.938	5.610	1.049	0.620	-0.560	0.306	—	0.388	0.493	2.140	0.518	0.930	1.089	0.782	0.128
		(64.866)^a	(2.251)^b	(2.530)^b	(1.980)^c	(0.661)	(5.900)^a	(0.303)	—	(0.502)	(0.582)	(1.972)^c	(0.694)	(1.195)	(1.295)	(0.617)	(0.155)
1968	0.579	9.578	-3.873	4.914	1.016	0.614	-0.479	0.844	0.521	-0.432	0.323	—	0.502	-1.925	1.100	-1.270	—
		(52.626)^a	(2.294)^b	(2.010)^c	(2.141)^b	(1.414)^d	(5.207)^a	(0.629)	(0.750)	(0.449)	(0.335)	—	(0.533)	(1.703)^c	(1.000)	(1.010)	—
1969	0.512	8.992	-3.348	4.924	0.792	0.485	-0.547	0.222	0.105	0.544	0.284	1.846	0.976	1.924	0.988	0.272	2.417
		(51.090)^a	(2.732)^a	(1.972)^c	(1.420)^d	(1.408)^d	(5.278)^a	(0.355)	(0.100)	(0.784)	(0.462)	(1.855)^c	(1.107)	(2.015)^b	(1.103)	(0.200)	(2.260)^b
1970	0.541	12.174	-5.163	7.293	1.463	0.881	-0.509	0.122	-0.137	0.150	0.501	2.269	0.374	0.644	1.168	1.430	2.607
		(68.393)^a	(2.254)^b	(2.104)^b	(2.152)^b	(1.415)^d	(4.949)^a	(0.185)	(0.095)	(0.179)	(0.394)	(2.026)^b	(0.271)	(0.479)	(0.958)	(1.796)^c	(1.898)^c
1971	0.576	11.885	-4.942	6.503	1.361	0.848	-0.453	—	0.815	0.271	0.715	1.795	0.426	0.878	1.007	1.255	1.979
		(75.700)^a	(2.280)^b	(2.035)^b	(1.475)^d	(1.401)^d	(4.244)^a	—	(0.793)	(0.379)	(0.546)	(2.266)^b	(0.302)	(0.630)	(0.743)	(1.465)^d	(1.596)^d
1972	0.556	10.429	-4.586	6.685	1.113	0.692	-0.501	—	-0.375	0.539	0.390	0.657	0.243	0.132	0.336	0.902	0.975
		(59.936)^a	(2.790)^a	(2.519)^b	(1.866)^c	(1.243)	(5.010)^a	—	(0.329)	(0.580)	(0.433)	(0.687)	(0.255)	(0.143)	(0.374)	(0.901)	(0.884)

t = test values are shown in brackets a = Significant at the 0.01 level b = Significant at the 0.05 level
c = Significant at the 0.10 level d = Significant at the 0.20 level

TABLE (5A-43) $CPM^{K}_{o} = a_o + a_1 \frac{V_D}{V_T} + a_2 \left[\frac{V_D}{V_T}\right]^2 + a_3 R_{\lambda} + a_4 R_{\lambda}^2 + a_5 S + a_{6 \cdots 15} ID$

Year	$\bar{R}^2$	a_0	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}
1967	0.552	9.436	-3.908	5.459	1.100	0.638	-0.538	0.177	———	0.853	0.857	3.157	0.774	0.369	0.501	0.996	0.716
		(55.505)^a	(2.735)^a	(2.076)^b	(2.218)^b	(0.886)	(4.742)^a	(0.147)	———	(0.920)	(0.845)	(2.824)^a	(0.867)	(0.470)	(0.491)	(1.316)^d	(0.612)
1968	0.495	9.366	-3.855	5.702	0.920	0.559	-0.604	1.026	0.651	1.014	0.664	———	2.107	1.087	0.991	-1.241	———
		(72.604)^a	(2.238)^b	(1.984)^c	(1.792)^c	(1.305)^d	(5.103)^a	(0.932)	(0.649)	(0.912)	(9.549)	———	(1.937)^c	(1.272)	(0.792)	(1.153)	———
1969	0.558	9.198	-3.359	4.564	0.803	0.494	-0.525	0.235	0.884	1.433	0.512	2.872	1.851	1.227	1.270	0.741	2.581
		(57.130)^a	(2.772)^a	(2.184)^b	(1.735)^c	(0.546)	(4.760)^a	(0.252)	(0.658)	(0.891)	(0.725)	(2.289)^b	(1.652)^d	(1.661)^d	(0.706)	(0.366)	(2.143)^b
1970	0.589	11.792	-4.817	6.306	1.480	0.866	-0.516	0.635	1.445	1.161	0.629	2.844	1.924	1.139	1.244	1.531	2.396
		(63.740)^a	(3.282)^b	(2.236)^b	(1.834)^c	(1.152)	(4.702)^a	(0.546)	(1.224)	(1.247)	(0.547)	(2.693)^b	(1.484)^d	(1.614)^d	(1.332)^d	(1.751)^c	(2.136)^b
1971	0.537	10.382	-3.679	5.476	1.065	0.649	-0.498	———	1.682	1.183	1.241	2.046	1.726	1.161	1.930	2.002	2.425
		(81.109)^a	(2.765)^a	(1.960)^c	(1.722)^c	(0.886)	(4.149)^a	———	(1.260)	(1.310)^d	(0.742)	(2.131)^b	(1.403)^d	(1.356)^d	(2.117)^b	(1.852)^c	(2.158)^b
1972	0.571	9.538	-3.836	4.956	0.923	0.537	-0.570	———	-1.021	1.303	1.250	1.262	0.669	0.714	0.959	0.547	0.537
		(93.509)^a	(2.752)^a	(1.800)^c	(1.690)^c	(0.628)	(4.712)^a	———	(0.911)	(1.477)^d	(0.802)	(0.762)	(0.406)	(0.445)	(0.758)	(0.893)	(0.949)

t = test values are shown in brackets a = Significant at the 0.01 level b = Significant at the 0.05 level
c = Significant at the 0.10 level d = Significant at the 0.20 level

TABLE (SA-44) $DVW^{X}_{o} = a_o + a_1 \frac{V_D}{V_T} + a_2 \left[\frac{V_D}{V_T}\right]^2 + a_3 R_N + a_4 R_N^2 + a_5 S + a_{6 \cdots 15} ID$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}
1967	0.518	10.941	-3.987	6.173	1.303	0.820	-0.654	——	-0.866	-1.177	-0.593	-1.719	-0.251	-1.089	-1.047	-0.769	-0.174
		(66.309)[a]	(2.251)[b]	(2.772)[a]	(1.732)[c]	(0.661)	(5.546)[a]	——	(0.942)	(1.364)	(0.434)	(1.908)[c]	(0.468)	(1.123)	(1.130)	(0.882)	(0.134)
1968	0.528	9.251	-2.720	4.893	1.076	0.676	-0.609	——	0.761	0.833	1.059	3.271	1.543	2.204	0.915	1.718	1.760
		(90.696)[a]	(2.294)[b]	(1.886)[c]	(2.141)[b]	(1.414)[d]	(5.003)[a]	——	(0.972)	(0.954)	(0.964)	(2.722)[a]	(1.836)[c]	(1.966)[c]	(0.848)	(1.861)[c]	(2.115)[b]
1969	0.522	9.629	-2.922	5.236	1.247	0.803	-0.580	——	0.374	0.980	0.845	2.137	1.463	1.916	0.632	——	2.600
		(49.891)[a]	(2.732)[a]	(2.240)[b]	(1.530)[d]	(1.408)[d]	(4.794)[a]	——	(0.432)	(0.710)	(0.750)	(2.086)[b]	(1.335)[d]	(1.673)[d]	(0.466)	——	(2.380)[b]
1970	0.516	11.374	-3.299	5.747	1.171	0.745	-0.491	——	0.794	0.368	0.612	2.248	0.823	2.099	0.527	1.489	2.456
		(86.186)[a]	(2.254)[b]	(2.152)[b]	(2.104)[b]	(1.415)[d]	(3.203)[a]	——	(0.714)	(0.460)	(0.558)	(2.072)[b]	(0.619)	(1.874)[c]	(0.417)	(1.661)[d]	(2.144)[b]
1971	0.605	12.296	-3.880	6.403	1.591	1.002	-0.575	0.591	1.026	0.483	0.164	2.493	1.236	1.201	-1.255	1.722	1.780
		(94.584)[a]	(2.280)[b]	(2.621)[b]	(1.475)[d]	(1.401)[d]	(4.119)[a]	(0.741)	(1.200)	(0.415)	(0.193)	(2.813)[a]	(1.180)	(1.168)	(1.218)	(1.843)[c]	(1.532)[d]
1972	0.567	9.567	-2.919	4.384	1.260	0.818	-0.627	0.727	0.868	-0.165	1.103	1.078	-0.328	-0.538	1.092	0.850	0.197
		(78.418)[a]	(2.790)[a]	(1.980)[c]	(1.745)[c]	(0.621)	(5.385)[a]	(1.113)	(0.648)	(0.140)	(1.056)	(1.014)	(0.481)	(0.439)	(1.059)	(0.501)	(0.110)

t = test values are shown in brackets a = Significant at the 0.01 level b = Significant at the 0.05 level
c = Significant at the 0.10 level d = Significant at the 0.20 level

TABLE (5A-45) $DVMX_o = a_o + a_1 \frac{V_D}{V_T} + a_2 \left[\frac{V_D}{V_T}\right]^2 + a_3 R_K + a_4 R_K^2 + a_5 S + a_{6 \cdots 15} ID$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}
1967	0.618	10.131	-3.348	5.151	1.066	0.711	-0.687	——	-1.065	-1.054	-1.141	2.408	-0.804	-0.496	-0.248	-1.081	-0.520
		(62.153)[a]	(2.376)[b]	(2.197)[b]	(1.505)[d]	(0.760)	(4.989)[a]	——	(0.863)	(1.012)	(0.954)	(2.157)[b]	(0.408)	(0.491)	(0.284)	(0.663)	(0.791)
1968	0.496	10.045	-3.140	5.199	1.257	0.847	-0.592	——	1.223	1.147	0.961	2.733	2.218	2.758	1.920	0.792	1.799
		(76.098)[a]	(2.042)[b]	(2.225)[b]	(1.800)[c]	(1.234)	(4.463)[a]	——	(1.444)[d]	(1.103)	(0.532)	(2.889)[a]	(1.995)[c]	(2.497)[b]	(1.519)[d]	(0.740)	(1.805)[d]
1969	0.563	9.943	-3.037	4.588	1.332	0.893	-0.586	——	1.602	1.365	0.680	2.319	1.582	2.132	1.747	——	2.180
		(62.534)[a]	(1.770)[c]	(2.222)[b]	(1.730)[c]	(1.197)	(4.356)[a]	——	(1.355)[d]	(1.276)	(0.431)	(2.149)[b]	(1.313)[d]	(2.618)[b]	(1.410)[d]	——	(2.080)[b]
1970	0.556	10.521	-2.799	4.544	1.014	0.680	-0.560	——	1.452	1.157	1.038	2.333	1.941	1.440	1.476	2.233	2.420
		(74.091)[a]	(1.792)[c]	(1.951)[c]	(2.045)[b]	(0.760)	(4.449)[a]	——	(1.587)[d]	(1.128)	(0.660)	(2.277)[b]	(1.532)[d]	(1.794)[c]	(1.117)	(2.366)[b]	(2.288)[b]
1971	0.545	10.906	-3.230	5.016	1.284	0.836	-0.563	0.585	1.014	1.638	0.466	2.872	1.302	1.220	1.204	2.017	1.661
		(87.951)[a]	(1.775)[c]	(1.929)[c]	(1.495)[d]	(0.730)	(4.150)[a]	(0.506)	(1.105)	(1.389)[d]	(0.388)	(2.112)[b]	(1.706)[c]	(0.722)	(1.732)[c]	(2.141)[b]	(1.908)[c]
1972	0.575	10.106	-3.216	5.764	1.382	0.892	-0.647	0.284	1.140	0.427	0.555	1.254	0.217	0.701	0.933	0.922	0.967
		(78.953)[a]	(2.377)[b]	(2.600)[c]	(2.026)[b]	(1.235)	(4.670)[a]	(0.374)	(1.194)	(0.610)	(0.672)	(1.456)[d]	(0.364)	(0.803)	(0.851)	(0.961)	(0.748)

t = test values are shown in brackets   a = Significant at the 0.01 level   b = Significant at the 0.05 level
c = Significant at the 0.10 level   d = Significant at the 0.20 level

TABLE (5A-46) $RIM^{K}_{o} = a_o + a_1 \frac{V_D}{V_T} + a_2 \left[\frac{V_D}{V_T}\right]^2 + a_3 R_N + a_4 R_N^{2} + a_5 S + a_{6 \cdots 15} ID$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}
1967	0.530	10.820	-3.887	5.183	1.491	1.002	-0.614	———	0.712	-0.665	-0.629	-1.824	-1.065	-0.046	-0.924	-0.845	-0.102
		(73.108)[a]	(2.780)[a]	(1.780)[c]	(2.236)[b]	(1.416)[d]	(6.646)[a]	———	(0.421)	(0.936)	(0.524)	(1.992)[c]	(0.863)	(0.134)	(1.108)	(1.399)[d]	(0.164)
1968	0.545	8.975	-2.663	3.441	0.934	0.624	-0.599	———	0.607	0.508	0.884	2.728	0.813	1.811	0.724	2.494	2.310
		(47.994)[a]	(2.099)[b]	(1.859)[c]	(1.475)[d]	(1.403)[d]	(6.095)[a]	———	(0.782)	(0.376)	(0.864)	(2.440)[b]	(0.445)	(1.738)[c]	(0.725)	(2.121)[b]	(1.933)[c]
1969	0.538	10.624	-3.412	5.155	1.210	0.760	-0.535	———	0.315	0.994	0.836	-2.290	0.469	1.752	0.655	———	2.616
		(59.351)[a]	(2.394)[b]	(2.199)[b]	(1.400)[d]	(1.687)[c]	(5.746)[a]	———	(0.411)	(0.767)	(0.650)	(2.019)[c]	(0.365)	(1.592)[d]	(0.522)	———	(2.421)[b]
1970	0.527	11.484	-3.259	4.489	1.529	0.990	-0.499	———	0.227	0.619	0.926	1.424	1.116	1.352	0.872	1.911	1.567
		(108.339)[a]	(2.618)[b]	(2.217)[b]	(1.752)[c]	(1.745)[c]	(5.401)[a]	———	(0.166)	(0.796)	(0.932)	(1.908)[c]	(1.353)[d]	(1.591)[d]	(0.606)	(2.527)[b]	(2.041)[b]
1971	0.526	10.593	-2.954	4.047	1.148	0.723	-0.464	0.677	-1.013	-0.478	0.218	2.081	0.193	0.138	-0.242	1.635	1.626
		(96.300)[a]	(2.156)[b]	(1.730)[c]	(2.082)[b]	(1.431)[d]	(5.282)[a]	(0.806)	(1.011)	(0.450)	(0.202)	(2.653)[b]	(0.164)	(0.125)	(0.228)	(1.732)[c]	(1.922)[c]
1972	0.604	10.073	-3.242	4.927	1.201	0.778	-0.530	0.873	0.852	0.268	0.502	0.265	-0.117	-0.218	0.324	1.018	0.505
		(89.937)[a]	(1.938)[c]	(2.225)[b]	(2.042)[b]	(1.422)[d]	(6.211)[a]	(0.847)	(0.514)	(0.182)	(0.339)	(0.150)	(0.070	(0.151)	(0.225)	(0.864)	(0.302)

t = test values are shown in brackets   a = Significant at the 0.01 level   b = Significant at the 0.05 level
c = Significant at the 0.10 level   d = Significant at the 0.20 level

TABLE (5A-47) $CPM^{K}_{o} = a_o + a_1 \frac{Y_D}{Y_T} + a_2 \left[\frac{Y_D}{Y_T}\right]^2 + a_3 R_N + a_4 R_N^2 + _5S + a_{6 \cdots 15} ID$

Year	R^2	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}
1967	0.553	9.872	-3.209	4.967	1.243	0.791	-0.581	——	-0.571	1.007	-0.816	-2.025	-0.222	0.035	0.261	-0.878	-0.267
		(69.034)^a	(2.735)^a	(2.198)^b	(2.076)^b	(1.411)^d	(4.216)^a	——	(0.612)	(1.002)	(0.432)	(2.100)^b	(0.167)	(0.041)	(0.109)	(1.312)^d	(0.107)
1968	0.499	10.156	-3.431	5.075	1.284	0.860	-0.576	——	0.934	0.880	0.853	3.379	1.196	2.432	1.815	0.540	1.470
		(86.067)^a	(2.045)^b	(2.152)^b	(1.792)^c	(1.268)	(4.382)^a	——	(0.832)	(1.009)	(0.914)	(2.777)^a	(1.030)	(2.374)^b	(1.481)^d	(0.679)	(1.612)^d
1969	0.531	9.395	-2.795	4.111	0.935	0.616	-0.558	——	0.322	1.215	0.729	-2.010	1.575	2.159	1.726	——	-2.026
		(63.911)^a	(2.772)^a	(2.000)^c	(1.984)^c	(1.282)	(4.350)^a	——	(0.350)	(0.776)	(0.833)	(2.005)^c	(1.324)^d	(1.662)^d	(1.419)^d	——	(2.021)^b
1970	0.568	9.813	-2.425	3.505	0.977	0.626	-0.496	——	0.361	0.950	0.975	2.124	0.781	1.316	0.624	2.144	1.997
		(89.209)^a	(1.800)^c	(1.984)^c	(1.717)^c	(1.236)	(3.452)^a	——	(0.452)	(0.802)	(0.675)	(1.902)^c	(1.183)	(1.492)^d	(0.751)	(1.872)^c	(1.882)^c
1971	0.550	10.791	-3.038	4.291	1.255	0.786	-0.529	0.945	0.819	1.569	1.433	2.346	1.077	1.147	2.125	2.131	2.180
		(104.766)^a	(2.765)^a	(2.020)^c	(1.886)^c	(0.974)	(4.067)^a	(0.647)	(0.760)	(1.384)^c	(0.920)	(1.981)^c	(0.633)	(0.720)	(1.732)^c	(1.788)^c	(1.749)^c
1972	0.605	10.297	-3.366	4.980	1.253	0.797	-0.498	0.155	0.793	0.867	0.945	1.523	0.422	0.190	1.049	0.882	1.186
		(91.123)^a	(2.752)^a	(2.178)^b	(1.722)^c	(1.000)	(4.141)^a	(0.096)	(1.141)	(0.858)	(0.891)	(1.582)^d	(0.499)	(0.477)	(0.963)	(1.243)	(0.884)

t = test values are shown in brackets a = Significant at the 0.01 level b = Significant at the 0.05 level
c = Significant at the 0.10 level d = Significant at the 0.20 level

TABLE (5A-48) $DVM^{X}_{o} = a_o + a_1 \frac{V_D}{V_T} + a_2 \left[\frac{V_D}{V_T}\right]^2 + a_3 R_X + a_4 R_X^2 + a_5 S + a_{6 \cdots 15} ID$

Year	$\bar{R}^2$	a_0	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}
1967	0.533	11.592	-3.549	6.596	2.109	1.468	-0.595	0.854	-0.271	-0.186	0.489	2.516	0.275	1.026	0.660	0.401	0.296
		$(59.142)^a$	$(2.680)^b$	$(2.042)^b$	$(2.705)^a$	(1.169)	$(5.631)^a$	(0.963)	(0.167)	(0.071)	(0.718)	$(2.129)^b$	(0.469)	(1.239)	(0.422)	(0.468)	(0.187)
1968	0.528	10.208	-2.931	5.530	1.599	1.049	-0.507	0.381	0.212	0.481	0.896	2.226	1.720	2.512	1.762	1.600	1.793
		$(57.672)^a$	$(1.645)^d$	$(2.388)^b$	$(1.929)^c$	(1.165)	$(4.750)^a$	(0.244)	(0.179)	(0.496)	$(1.320)^d$	$(1.936)^c$	$(1.674)^d$	$(2.105)^b$	$(1.344)^d$	$(1.929)^c$	$(1.512)^d$
1969	0.502	9.949	-2.592	4.628	1.451	0.962	-0.605	1.052	0.925	0.254	0.394	2.178	1.859	1.881	1.131	1.078	1.508
		$(91.275)^a$	$(1.992)^c$	$(1.929)^c$	$(1.788)^c$	$(1.705)^c$	$(5.606)^a$	(0.666)	(0.954)	(0.127)	(0.327)	$(1.796)^c$	$(1.453)^d$	$(1.659)^c$	(0.831)	(0.944)	$(1.869)^c$
1970	0.576	12.317	-3.279	6.186	2.091	1.405	-0.541	-0.417	-0.917	-0.945	-1.087	-1.146	-0.750	-1.197	1.236	-2.098	2.186
		$(72.452)^a$	$(2.424)^b$	$(2.247)^b$	$(2.165)^b$	(1.247)	$(5.435)^a$	(0.672)	(0.941)	(0.533)	(0.723)	$(1.660)^d$	(0.655)	(1.130)	(1.143)	$(1.709)^c$	$(2.642)^b$
1971	0.503	11.638	-3.166	6.207	1.841	1.214	-0.571	-1.109	———	1.096	0.898	2.107	0.799	1.066	0.732	1.793	1.335
		$(89.523)^a$	$(1.967)^c$	$(2.065)^b$	$(1.749)^c$	$(1.305)^d$	$(5.445)^a$	(0.761)	———	(0.621)	(0.531)	$(2.576)^b$	(0.841)	(1.262)	(0.690)	$(1.943)^c$	$(1.555)^d$
1972	0.577	10.215	-2.790	5.264	1.523	1.024	-0.597	-0.403	———	-0.444	-0.502	0.949	0.870	-0.268	-0.376	-0.222	-0.889
		$(82.379)^a$	$(2.341)^b$	$(2.010)^c$	$(2.165)^b$	(1.180)	$(5.707)^a$	(0.318)	———	(0.571)	(0.719)	$(1.343)^d$	(0.763)	(0.170)	(0.525)	(0.407)	(0.952)

t = test values are shown in brackets a = Significant at the 0.01 level b = Significant at the 0.05 level
c = Significant at the 0.10 level d = Significant at the 0.20 level

<u>TABLE (SA-49)</u> $DYMK_o = a_o + a_1 \frac{V_D}{V_T} + a_2 \left[\frac{V_D}{V_T}\right]^2 + a_3 R_N + a_4 R_N^2 \cdot a_5 S + a_{6 \cdots 15} ID$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}
1967	0.550	10.682	-3.102	5.559	1.863	1.386	-0.652	0.641	0.229	0.944	0.546	3.023	0.688	0.019	0.824	0.251	0.634
		(72.666)^a	(1.667)^d	(2.606)^b	(2.710)^a	(1.715)^c	(4.329)^a	(0.693)	(0.235)	(0.772)	(0.521)	(2.310)^b	(0.758)	(0.019)	(0.512)	(0.276)	(0.441)
1968	0.572	9.640	-2.607	4.809	1.453	0.963	-0.599	0.436	0.831	0.655	0.392	2.511	2.492	2.875	1.219	1.534	1.859
		(57.724)^a	(2.169)^b	(2.169)^b	(1.670)^d	(1.377)^d	(4.298)^a	(0.533)	(0.862)	(0.626)	(0.265)	(2.494)^b	(2.198)^b	(2.523)^b	(1.110)	(1.298)	(1.681)^d
1969	0.556	10.072	-2.652	4.556	1.523	1.085	-0.629	0.808	0.994	0.823	0.925	2.579	2.516	1.966	1.728	0.681	2.791
		(53.524)^a	(1.625)^d	(2.052)^b	(1.635)^d	(1.715)^c	(4.593)^a	(0.731)	(0.924)	(0.735)	(0.936)	(2.946)^a	(2.429)^b	(1.659)^d	(1.463)^d	(0.673)	(2.969)^a
1970	0.585	11.199	-2.692	4.471	1.729	1.140	-0.477	-0.130	-1.257	1.323	-1.217	-2.121	-1.160	2.191	-0.806	-2.122	3.018
		(68.705)^a	(1.645)^d	(2.000)^c	(2.129)^b	(1.052)	(3.505)^a	(0.157)	(1.427)^d	(1.022)	(1.260)	(2.480)^b	(1.525)^d	(2.094)^c	(1.387)^d	(2.055)^b	(2.812)^a
1971	0.582	13.358	-3.956	7.849	2.424	1.747	-0.512	-0.408	——	1.455	1.020	2.879	1.425	1.262	1.759	1.836	2.342
		(75.897)^a	(1.635)^d	(3.566)^a	(2.720)^a	(1.680)^d	(3.273)^a	(0.583)	——	(1.649)^d	(1.288)	(2.715)^a	(1.623)^d	(0.915)	(1.675)^d	(1.690)^c	(1.726)^c
1972	0.496	10.367	-2.941	5.327	1.671	1.194	-0.481	0.340	——	0.666	0.833	1.468	1.385	1.066	-0.595	-0.468	-0.583
		(57.276)^a	(1.710)^c	(2.592)^b	(2.176)^b	(1.645)^d	(3.889)^a	(0.378)	——	(0.771)	(1.122)	(1.602)^d	(1.207)	(1.287)	(0.611)	(0.211)	(0.434)

t = test values are shown in brackets   a = Significant at the 0.01 level b = Significant at the 0.05 level
c = Significant at the 0.10 level d = Significant at the 0.20 level

TABLE (5A-50) $_{RIM}X_o = a_o + a_1 \frac{V_D}{V_T} + a_2 \left[\frac{V_D}{V_T}\right]^2 + a_3 P_X + a_4 R_i^2 + a_5 S + a_{6 \cdots 15} ID$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}
1967	0.532	11.491	-3.470	5.088	1.887	1.329	-0.729	0.823	0.196	1.256	1.226	2.887	0.396	0.253	0.226	0.977	0.300
		(64.195)[a]	(1.665)[d]	(2.241)[b]	(2.640)[b]	(1.941)[c]	(6.362)[a]	(0.939)	(0.150)	(1.104)	(1.085)	(2.363)[b]	(0.542)	(0.509)	(0.474)	(0.733)	(0.314)
1968	0.513	10.160	-2.728	4.012	1.585	1.116	-0.536	0.373	0.472	0.876	1.654	2.875	1.013	1.853	0.733	1.419	2.008
		(65.548)[a]	(2.403)[b]	(1.980)[c]	(1.975)[c]	(1.240)	(4.076)[a]	(0.366)	(0.477)	(1.220)	(1.239)	(2.889)[a]	(1.403)[d]	(2.127)[b]	(0.988)	(1.721)[c]	(2.288)[b]
1969	0.535	10.115	-2.613	4.033	1.802	1.201	-0.594	1.021	0.693	1.139	1.194	1.889	0.396	1.570	0.968	0.718	2.118
		(52.958)[a]	(1.637)[d]	(1.998)[c]	(2.745)[a]	(1.224)	(4.818)[a]	(0.751)	(0.455)	(1.127)	(1.237)	(1.727)[c]	(0.203)	(1.625)[d]	(0.945)	(0.618)	(2.712)[a]
1970	0.556	12.485	-3.278	4.778	1.843	1.367	-0.553	-0.835	-0.845	-0.727	-1.141	-1.806	-0.358	-1.013	-1.081	-1.204	2.829
		(99.087)[a]	(2.000)[c]	(2.047)[b]	(1.600)[d]	(1.685)[c]	(4.732)[a]	(0.870)	(0.614)	(0.433)	(0.882)	(1.506)[d]	(0.269)	(1.089)	(0.834)	(1.147)	(2.530)[b]
1971	0.578	13.286	-4.045	6.185	2.419	1.778	-0.529	-0.594	———	0.521	0.378	2.052	0.648	0.395	1.199	1.735	1.300
		(76.356)[a]	(2.018)[c]	(2.227)[b]	(1.325)[c]	(1.941)[c]	(4.730)[a]	(0.550)	———	(0.357)	(0.269)	(2.249)[b]	(0.500)	(0.276)	(1.132)	(1.505)[d]	(1.399)[d]
1972	0.578	10.708	-3.067	4.537	2.051	1.531	-0.595	-0.673	———	-0.499	-0.908	0.488	0.430	-0.865	-0.795	-0.598	-0.134
		(55.770)[a]	(1.695)[c]	(2.162)[b]	(2.745)[a]	(1.798)[c]	(4.893)[a]	(0.621)	———	(0.403)	(1.387)	(0.391)	(0.462)	(0.834)	(0.772)	(0.664)	(0.076)

t = test values are shown in brackets   a = Significant at the 0.01 level   b = Significant at the 0.05 level
c = Significant at the 0.10 level   d = Significant at the 0.20 level

<u>TABLE (5A-51)</u> $CPM^{K}_{o} = a_o + a_1 \frac{V_D}{V_T} + a_2 \left[\frac{V_D}{V_T}\right]^2 + a_3 R_N + a_4 R_N^2 + a_5 S + a_{6 \cdots 15} ID$

Year	$\bar{R}^2$	a_0	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}
1967	0.561	10.079	-2.770	4.122	1.432	1.072	-0.608	0.872	0.526	0.361	1.264	2.222	0.808	0.052	0.510	0.917	0.616
		(75.216)^a	(1.632)^d	(2.458)^b	(2.236)^b	(1.006)	(4.385)^a	(1.249)	(0.301)	(0.417)	(1.075)	(2.394)^b	(0.825)	(0.031)	(0.735)	(0.500)	(0.833)
1968	0.553	9.278	-2.242	3.548	1.323	0.877	-0.556	0.510	0.830	0.991	0.281	2.000	1.656	1.821	1.417	1.144	2.029
		(62.268)^a	(1.647)^d	(2.006)^c	(2.705)^a	(1.076)	(3.574)^a	(0.476)	(0.994)	(1.124)	(0.249)	(2.401)^b	(1.863)^c	(1.972)^c	(1.099)	(0.747)	(1.872)^c
1969	0.578	9.392	-2.229	3.679	1.473	1.061	-0.575	0.341	0.876	0.934	0.954	2.416	1.233	1.702	1.815	0.308	2.557
		(61.789)^a	(1.682)^d	(2.020)^c	(2.203)^b	(1.347)^d	(3.756)^a	(0.749)	(0.634)	(0.702)	(0.750)	(1.982)^c	(1.545)^d	(1.884)^c	(1.604)^d	(0.651)	(2.956)^a
1970	0.568	10.925	-2.456	4.121	1.487	1.106	-0.537	-0.082	-0.931	-0.886	-0.475	1.612	-1.180	1.412	-1.704	2.041	1.698
		(104.047)^a	(2.306)^b	(2.274)^b	(2.198)^b	(1.855)^c	(3.008)^a	(0.092)	(0.763)	(0.551)	(0.574)	(1.531)^d	(1.196)	(1.241)	(1.402)^d	(2.021)^b	(1.804)^c
1971	0.558	13.472	-4.138	6.507	2.425	1.661	-0.504	-0.818	——	1.328	1.044	2.632	0.890	1.165	1.612	1.692	2.718
		(68.734)^a	(2.015)^c	(2.529)^b	(3.620)^a	(1.789)^c	(3.009)^a	(0.634)	——	(1.136)	(1.515)^d	(2.365)^b	(1.276)	(1.565)^d	(1.821)^c	(1.903)^c	(2.456)^b
1972	0.499	9.699	-2.490	4.069	1.637	1.247	-0.578	-0.348	——	-0.751	-0.470	1.155	0.397	-0.501	-0.965	-0.718	-0.663
		(51.590)^a	(1.647)^d	(2.162)^b	(2.206)^b	(1.328)^d	(3.674)^a	(0.191)	——	(0.621)	(0.361)	(1.309)^d	(0.197)	(0.510)	(0.752)	(0.843)	(0.695)

t = test values are shown in brackets a = Significant at the 0.01 level b = Significant at the 0.05 level
c = Significant at the 0.10 level d = Significant at the 0.20 level

TABLE (5A-52) $DVX^E_e = a_o + a_1 \frac{V_D}{V_S} + a_2 \left[\frac{V_D}{V_S}\right]^2 + a_3 \frac{V_P}{V_S} + a_4 \left[\frac{V_P}{V_S}\right]^2 + a_5 R_N + a_6 R_N^2 + a_7 S + a_{8 \cdots 17} ID$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8
1967	0.536	9.497	1.023	0.605	0.701	0.036	0.995	0.591	-0.702	——
		(50.786)^a	(1.178)	(0.423)	(0.251)	(0.030)	(1.350)^d	(0.421)	(5.553)^a	——
1968	0.606	8.781	0.718	0.294	0.637	0.011	0.653	0.374	-0.631	——
		(53.871)^a	(1.330)^d	(0.428)	(0.214)	(0.010)	(1.961)^c	(0.436)	(4.728)^a	——
1969	0.532	9.346	0.590	0.221	0.922	0.016	0.567	0.321	-0.636	——
		(51.351)^a	(1.360)^d	(0.392)	(0.305)	(0.011)	(1.326)^d	(0.441)	(4.743)^a	——
1970	0.548	10.369	0.891	0.411	1.029	0.030	0.879	0.498	-0.708	——
		(89.387)^a	(1.395)^d	(0.287)	(0.412)	(0.028)	(1.844)^c	(0.441)	(5.817)^a	——
1971	0.559	10.161	0.712	0.247	1.139	0.032	0.758	0.426	-0.639	——
		(73.630)^a	(1.721)^c	(0.363)	(0.396)	(0.027)	(1.667)^d	(0.444)	(4.613)^a	——
1972	0.560	9.277	0.595	0.205	0.906	0.024	0.618	0.350	-0.704	——
		(46.853)^a	(1.292)	(0.492)	(0.306)	(0.023)	(1.726)^c	(0.441)	(5.666)^a	——

Year	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}	a_{16}	a_{17}
1967	1.218	0.843	1.014	2.773	1.232	0.647	0.677	0.402	0.136
	(0.752)	(1.149)	(1.231)	(2.068)^b	(0.909)	(0.453)	(0.567)	(0.374)	(0.154)
1968	0.318	0.827	0.886	2.746	1.634	1.834	0.514	1.227	2.217
	(0.462)	(0.781)	(0.762)	(2.342)^b	(1.854)^c	(2.162)^b	(0.854)	(1.734)^c	(2.106)^b
1969	-0.599	-0.844	1.106	2.740	-1.274	-1.510	0.684	-0.396	2.041
	(0.623)	(0.450)	(0.916)	(2.061)^b	(1.141)	(2.265)^b	(0.826)	(0.185)	(2.474)^b
1970	0.857	0.623	0.207	2.461	1.739	1.469	0.644	1.917	——
	(0.551)	(0.792)	(0.362)	(2.654)^b	(1.563)^d	(1.682)^d	(0.753)	(1.754)^c	——
1971	0.840	0.959	0.861	2.992	0.897	1.508	1.168	1.271	1.991
	(0.680)	(0.754)	(0.654)	(2.551)^b	(0.765)	(1.241)	(0.963)	(1.351)^d	(1.654)^d
1972	0.220	-0.770	-0.599	-1.166	-0.262	0.236	-0.940	0.649	-1.222
	((0.188)	(0.758)	(0.537)	(0.878)	(0.243)	(0.219)	(0.894)	(0.386)	(1.037)

t = test values are shown in brackets a = Significant at the 0.01 level b = Significant at the 0.05 level
c = Significant at the 0.10 level d = Significant at the 0.20 level

TABLE (5A-53) $DVMX_e = a_o + a_1 \frac{V_D}{V_S} + a_2 \left[\frac{V_D}{V_S}\right]^2 + a_3 \frac{V_P}{V_S} + a_4 \left[\frac{V_P}{V_S}\right]^2 + a_5 R_N \; a_6 R_N^2 + a_7 + a_{8 \cdots 17} ID$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}	a_{16}	a_{17}
1967	0.576	9.603	1.016	0.352	0.743	0.016	1.045	0.605	-0.694	——	1.064	-1.032	1.286	2.661	0.573	0.990	0.943	0.710	1.068
		(69.586)[a]	(1.248)	(0.285)	(0.285)	(0.014)	(1.360)[d]	(0.432)	(4.339)[a]	——	(1.484)[d]	(0.970)	(1.052)	(2.661)[b]	(0.579)	(1.146)	(1.267)	(1.112)	(0.722)
1968	0.522	8.908	0.685	0.297	0.658	0.029	0.741	0.440	-0.704	——	0.516	1.050	1.204	2.110	1.704	2.190	0.935	1.701	2.110
		(63.177)[a]	(1.650)[d]	(0.478)	(0.211)	(0.025)	(1.088)	(0.421)	(4.689)[a]	——	(0.487)	(1.206)	(0.962)	(1.873)[c]	(1.689)[c]	(2.362)[b]	(1.083	(1.529)[d]	(1.699)[c]
1969	0.562	9.175	0.621	0.191	0.813	0.016	0.567	0.325	-0.633	——	-0.478	-1.605	-1.205	2.306	-2.108	-2.498	-0.915	-0.906	3.084
		(80.482)[a]	(1.285)	(0.295)	(0.289)	(0.010)	(1.380)[d]	(0.436)	(3.286)[a]	——	(0.561)	(1.221)	(1.431)[d]	(1.874)[c]	(2.038)[b]	(2.177)[b]	(0.641)	(1.290)	(2.683)[b]
1970	0.493	9.924	0.708	0.259	0.776	0.024	0.768	0.435	-0.614	——	0.763	1.544	1.517	2.926	1.141	2.114	1.419	2.704	——
		(57.034)[a]	(1.647)[d]	(0.438)	(0.254)	(0.028)	(1.260)	(0.380)	(3.386)[a]	——	(0.628)	(1.263)	(1.389)[d]	(2.265)[b]	(1.367)[d]	(1.695)[c]	(1.283)	(1.832)[c]	——
1971	0.559	11.335	0.935	0.291	1.544	0.029	0.921	0.522	-0.613	——	1.726	1.107	1.716	2.215	1.193	1.335	1.470	1.900	2.820
		(74.572)[a]	(1.023)	(0.279)	(0.514)	(0.025)	(1.320)[d]	(0.320)	(3.412)[a]	——	(1.421)[d]	(1.367)[d]	(1.389)[d]	(1.871)[c]	(1.314)[d]	(1.465)[d]	(1.729)[c]	(1.701)[c]	(2.329)[b]
1972	0.496	9.078	0.623	0.206	0.810	0.027	0.623	0.354	-0.629	——	1.571	-0.828	-0.599	-1.671	-0.358	0.268	-0.954	0.818	0.899
		(52.779)[a]	(1.285)	(0.511)	(0.276)	(0.021)	(1.285)	(0.285)	(4.024)[a]	——	(0.919)	(0.593)	(0.391)	(1.224)	(0.242)	(0.182)	(0.660)	(0.787)	(1.173)

t = test values are shown in brackets a = Significant at the 0.01 level b = Significant at the 0.05 level
c = Significant at the 0.10 level d = Significant at the 0.20 level

TABLE (5A-54) $RIN^{K}_{e} = a_o + a_1 \frac{V_D}{V_S} + a_2 \left[\frac{V_D}{V_S}\right]^2 + a_3 \frac{V_P}{V_S} + a_4 \left[\frac{V_P}{V_S}\right]^2 + a_5 R_N + a_6 R_N^2 + a_7 S + a_{8 \cdots 17} ID$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}	a_{16}	a_{17}
1967	0.542	8.965	0.977	0.494	0.617	0.006	0.951	0.569	-0.780	——	1.166	0.845	0.968	2.785	1.153	0.642	0.664	0.384	0.103
		$(48.198)^a$	$(1.769)^c$	(0.494)	(0.214)	(0.003)	$(1.700)^c$	(0.418)	$(6.468)^a$	——	(0.726)	(1.155)	(1.213)	$(2.800)^b$	(0.875)	(0.459)	(0.571)	(0.372)	(0.144)
1968	0.499	8.833	0.761	0.411	0.624	0.033	0.728	0.432	-0.690	——	0.549	0.190	0.133	2.113	1.562	2.094	0.802	1.516	2.383
		$(53.533)^a$	$(1.682)^d$	(0.463)	(0.211)	(0.030)	$(1.330)^d$	(0.330)	$(5.632)^a$	——	(0.763)	(0.210)	(0.201)	$(2.416)^b$	$(1.832)^c$	$(2.104)^b$	(0.901)	$(1.983)^c$	$(2.573)^b$
1969	0.550	9.346	0.658	0.323	0.947	0.012	0.658	0.391	-0.692	——	-0.926	-0.949	-0.270	2.336	-1.421	-1.568	-0.776	-0.312	1.872
		$(52.802)^a$	(1.271)	(0.509)	(0.301)	(0.010)	(1.207)	(0.421)	$(5.847)^a$	——	(1.428)	(0.517)	(0.253)	$(1.917)^c$	$(1.392)^d$	$(1.853)^c$	(0.836)	(0.476)	$(2.026)^b$
1970	0.588	10.369	0.800	0.260	0.994	0.031	0.789	0.449	-0.573	——	0.937	0.978	0.649	2.476	1.675	1.713	1.045	1.689	——
		$(79.761)^a$	$(1.673)^d$	(0.769)	(0.342)	(0.028)	(1.256)	(0.350)	$(4.451)^a$	——	(0.716)	(0.721)	(0.480)	$(2.016)^c$	$(1.476)^d$	$(1.672)^d$	(0.962)	$(1.875)^c$	——
1971	0.578	10.154	0.734	0.376	1.104	0.030	0.756	0.439	-0.583	——	0.510	0.595	0.408	2.711	0.410	0.966	1.775	1.068	1.784
		$(76.345)^a$	(1.259)	(0.487)	(0.387)	(0.027)	$(1.335)^d$	(0.430)	$(4.510)^a$	——	(0.495)	(0.601)	(0.562)	$(1.923)^b$	(0.503)	(1.173)	$(1.573)^d$	(0.972)	$(1.987)^c$
1972	0.556	8.762	0.586	0.217	0.821	0.019	0.596	0.356	-0.678	——	0.240	-0.740	-0.630	-1.163	-0.234	0.195	-0.971	0.746	-1.284
		$(44.030)^a$	(1.022)	(0.673)	(0.291)	(0.015)	$(1.646)^d$	(0.295)	$(5.750)^a$	——	(0.204)	(0.727)	(0.563)	(0.866)	(0.217)	(0.179)	(0.918)	(0.442)	(1.077)

t = test values are shown in brackets   a = Significant at the 0.01 level   b = Significant at the 0.05 level
c = Significant at the 0.10 level   d = Significant at the 0.20 level

TABLE (5A-55) $CPM^K_e = a_o + a_1 \frac{V_D}{V_S} + a_2 \left[\frac{V_D}{V_S}\right]^2 + a_3 \frac{V_P}{V_S} + a_4 \left[\frac{V_P}{V_S}\right]^2 + a_5 R_N + a_6 R_N^2 + a_7 S + a_{8 \cdots 17} ID$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}	a_{16}	a_{17}
1967	0.578	8.717	0.910	0.294	0.565	0.017	0.862	0.514	-0.763	—	1.965	0.936	1.203	2.678	0.517	0.892	0.910	0.198	0.928
		(63.166)^a	(1.773)^c	(0.380)	(0.254)	(0.015)	(1.419)^d	(0.360)	(5.289)^a	—	(1.441)^d	(0.921)	(1.020)	(2.665)^b	(0.559)	(1.107)	(1.259)	(0.163)	(0.667)
1968	0.517	9.316	0.840	0.411	0.749	0.030	0.778	0.462	-0.759	—	1.150	0.863	0.906	2.476	1.079	2.813	1.685	1.462	1.784
		(65.605)^a	(1.396)^d	(0.340)	(0.251)	(0.028)	(1.315)^d	(0.421)	(4.621)^a	—	(1.358)^d	(0.976)	(1.063)	(1.860)^c	(0.960)	(2.076)^b	(1.800)^c	(1.137)	(1.589)^d
1969	0.577	8.692	0.558	0.237	0.726	0.036	0.558	0.316	-0.699	—	-1.810	-1.707	-1.362	1.856	-1.285	-2.556	-2.012	-0.802	1.908
		(80.481)^a	(1.380)^d	(0.290)	(0.246)	(0.031)	(1.672)^d	(0.290)	(4.422)^a	—	(1.254)	(1.262)	(1.495)^d	(1.761)^c	(1.101)	(2.200)^b	(1.683)^d	(0.620)	(1.847)^c
1970	0.537	9.836	0.731	0.247	0.857	0.029	0.751	0.427	-0.690	—	1.415	1.440	1.467	2.230	1.788	1.764	2.096	1.950	—
		(52.319)^a	(1.270)	(0.370)	(0.287)	(0.025)	(1.766)^c	(0.439)	(4.170)^a	—	(1.671)^d	(1.753)^c	(1.362)^d	(2.554)^b	(1.581)^d	(1.986)^c	(1.853)^c	(1.780)^c	—
1971	0.564	11.100	0.854	0.374	1.336	0.009	0.868	0.492	-0.649	—	1.465	1.900	1.319	2.061	1.882	1.847	1.231	1.997	2.743
		(74.000)^a	(1.756)^c	(0.310)	(0.416)	(0.005)	(1.250)	(0.315)	(4.276)^a	—	(1.679)^d	(1.584)^d	(1.021)	(2.167)^b	(1.547)^d	(1.683)^d	(1.459)^d	(1.657)^d	(2.095)^b
1972	0.600	8.926	0.569	0.187	0.765	0.036	0.569	0.330	-0.709	—	0.861	-0.813	-0.615	-1.126	-0.330	1.296	-0.962	0.972	-0.857
		(52.198)^a	(1.760)^c	(0.270)	(0.254)	(0.030)	(1.380)^d	(0.430)	(4.962)^a	—	(0.535)	(0.585)	(0.402)	(0.614)	(0.224)	(1.199)	(0.666)	(0.858)	(1.142)

t = test values are shown in brackets a = Significant at the 0.01 level b = Significant at the 0.05 level
c = Significant at the 0.10 level d = Significant at the 0.20 level

TABLE (5A-56) $DVW^{X}_{e} = a_o + a_1 \frac{V_D}{V_S} + a_2 \left[\frac{V_D}{V_S}\right]^2 + a_3 \frac{V_P}{V_S} + a_4 \left[\frac{V_P}{V_S}\right]^2 + a_5 R_N \; a_6 R_N^{2} + a_7 S + a_8 \cdots {}_{17} ID$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}	a_{16}	a_{17}
1967	0.551	10.196	1.769	0.866	1.732	0.018	1.671	1.029	-0.765	-0.419	———	-0.941	-0.871	2.005	-0.277	0.334	0.035	-0.895	0.310
		(53.382)^a	(1.867)^c	(1.343)^d	(0.572)	(0.015)	(1.515)^d	(0.972)	(5.016)^a	(0.326)	———	(0.859)	(0.728)	(2.328)^b	(0.265)	(0.315)	(0.030)	(0.541)	(0.229)
1968	0.514	9.344	1.219	0.612	1.224	0.003	1.206	0.719	-0.674	0.767	0.705	-1.076	0.801	———	1.968	2.238	0.360	-1.966	———
		(67.223)^a	(1.740)^c	(0.524)	(0.411)	(0.000)	(2.100)^b	(1.006)	(4.852)^a	(0.888)	(0.945)	(1.062)	(0.649)	———	(1.796)^c	(2.194)^b	(0.279)	(1.598)^d	———
1969	0.602	9.226	0.905	0.528	1.056	0.019	0.960	0.577	-0.728	0.541	-0.330	0.910	0.563	1.666	1.489	2.221	1.016	0.607	2.558
		(73.808)^a	(1.686)^c	(1.368)^d	(0.315)	(0.015)	(2.062)^b	(1.416)^d	(4.859)^a	(0.419)	(0.241)	(0.774)	(0.428)	(1.992)^c	(1.154)	(2.065)^b	(0.905)	(0.355)	(2.108)^b
1970	0.578	10.755	1.303	0.988	1.977	0.009	1.229	0.713	-0.595	-0.136	-0.480	0.911	0.468	1.715	1.583	0.726	0.994	2.040	2.091
		(57.513)^a	(1.530)^d	(1.208)	(0.651)	(0.007)	(2.154)^b	(1.206)	(3.809)^a	(0.144)	(0.244)	(0.527)	(0.562)	(1.993)^c	(1.317)^d	(0.391)	(0.571)	(2.172)^b	(2.626)^b
1971	0.577	10.717	1.200	0.887	1.775	0.002	1.175	0.683	-0.657	———	0.744	0.520	0.776	2.782	0.434	1.209	1.042	1.984	2.632
		(68.698)^a	(2.000)^c	(0.867)	(0.582)	(0.000)	(1.665)^c	(1.430)^d	(4.338)^a	———	(1.265)	(0.863)	(0.434)	(2.479)^b	(0.225)	(1.452)^d	(1.061)	(1.455)^d	(2.284)^b
1972	0.566	10.493	1.187	0.797	1.594	0.006	1.201	0.745	-0.633	———	-0.144	1.229	0.627	0.908	0.463	0.410	0.907	0.674	0.892
		(81.976)^a	(1.900)^c	(1.000)	(0.514)	(0.002)	(1.410)^d	(0.945)	(4.171)^a	———	(0.093)	(0.997)	(0.510)	(0.667)	(0.350)	(0.316)	(0.934)	(0.542)	(0.994)

t = test values are shown in brackets a = Significant at the 0.01 level b = Significant at the 0.05 level
c = Significant at the 0.10 level d = Significant at the 0.20 level

TABLE (SA-57) $DVM^X_e = a_o + a_1 \frac{V_D}{V_S} + a_2 \left[\frac{V_D}{V_S}\right]^2 + a_3 \frac{V_P}{V_S} + a_4 \left[\frac{V_P}{V_S}\right]^2 + a_5 R_\lambda + a_6 R_N^2 + a_7 S + a_{8 \cdots 17} ID$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}	a_{16}	a_{17}
1967	0.611	9.355	1.491	0.855	1.305	0.034	1.491	1.029	-0.739	-0.560	———	-0.305	-0.410	2.913	0.161	1.034	0.581	0.297	-0.187
		(68.284)^a	(2.540)^b	(0.762)	(0.412)	(0.032)	(1.430)^d	(1.006)	(4.684)^a	(0.351)	———	(0.225)	(0.276)	(2.033)^b	(0.124)	(0.787)	(0.408)	(0.145)	(0.111)
1968	0.527	9.064	1.061	0.584	1.021	0.036	1.131	0.719	-0.605	1.283	0.376	1.393	1.150	———	2.445	2.620	1.389	1.161	———
		(46.010)^a	(2.334)^b	(1.323)^d	(0.316)	(0.030)	(2.244)^b	(1.020)	(2.869)^a	(0.926)	(0.529)	(1.259)	(0.752)	———	(1.959)^b	(2.408)^b	(0.870)	(1.080)	———
1969	0.518	9.562	1.025	0.471	1.205	0.038	1.025	0.577	-0.732	-0.850	1.371	0.762	0.570	2.824	2.596	2.078	1.435	0.456	1.860
		(64.174)^a	(1.828)^c	(1.353)^d	(0.305)	(0.031)	(2.542)^b	(0.962)	(4.816)^a	(1.388)^d	(1.175)	(0.656)	(0.516)	(2.069)^b	(2.009)^b	(2.170)^b	(1.401)^d	(0.549)	(1.772)^c
1970	0.585	12.179	1.747	0.906	2.862	0.025	1.667	0.713	-0.605	-1.459	1.009	0.797	1.806	2.408	1.932	2.598	0.836	2.405	1.979
		(91.571)^a	(2.545)^b	(1.207)	(0.954)	(0.028)	(2.109)^b	(0.842)	(2.638)^a	(1.109)	(1.003)	(0.754)	(1.331)^d	(2.632)^b	(1.367)^d	(2.233)^b	(0.764)	(2.107)^b	(1.899)^c
1971	0.565	11.879	1.503	0.726	2.410	0.001	1.455	0.683	-0.607	———	1.095	1.544	1.549	2.978	1.692	1.302	1.997	1.721	2.061
		(72.432)^a	(1.680)^d	(1.300)^d	(0.815)	(0.000)	(1.460)^d	(1.056)	(2.741)^a	———	(1.026)	(1.107)	(1.280)	(2.214)^b	(1.275)	(1.534)^d	(1.840)^c	(1.390)^d	(1.712)^c
1972	0.530	10.297	1.230	0.564	1.387	0.014	1.230	0.745	-0.665	———	1.153	0.823	0.386	0.505	1.726	0.904	0.718	1.257	0.610
		(57.205)^a	(1.574)^d	(0.828)	(0.454)	(0.010)	(2.029)^b	(1.417)^d	(3.512)^a	———	(1.060)	(1.402)^d	(0.689)	(0.676)	(1.335)^d	(1.427)^d	(0.717)	(1.027)	(0.944)

t = test values are shown in brackets a = Significant at the 0.01 level b = Significant at the 0.05 level
c = Significant at the 0.10 level d = Significant at the 0.20 level

<u>TABLE (5A-58)</u> $RIM^{K}_{e} = a_o + a_1 \frac{V_D}{V_S} + a_2 \left[\frac{V_D}{V_S}\right]^2 + a_3 \frac{V_P}{V_S} + a_4 \left[\frac{V_P}{V_S}\right]^2 + a_5 R_N + a_6 R_N^2 + a_7 S + a_{8 \cdots 17} ID$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}	a_{16}	a_{17}
1967	0.567	9.260	1.394	0.818	1.279	0.001	1.421	0.869	-0.748	-0.775	——	-0.851	-0.868	2.308	-0.308	0.189	0.091	-0.828	0.179
		(49.518)^{a}	(2.515)^{b}	(1.426)^{d}	(0.409)	(0.000)	(2.009)^{c}	(0.840)	(6.078)^{a}	(0.609)	——	(0.783)	(0.736)	(1.868)^{c}	(0.297)	(0.181)	(0.079)	(0.501)	(0.135)
1968	0.547	9.536	1.244	0.762	1.304	0.039	1.192	0.722	-0.640	0.373	0.484	-0.191	0.540	——	1.708	-2.055	0.344	-1.128	——
		(72.793)^{a}	(1.716)^{c}	(1.408)^{d}	(0.420)	(0.035)	(1.460)^{d}	(1.154)	(5.375)^{a}	(0.549)	(0.311)	(0.161)	(0.452)	——	(1.599)^{d}	(2.046)^{b}	(0.277)	(0.724)	——
1969	0.508	9.564	1.061	0.627	1.166	0.026	1.013	0.587	-0.699	0.125	-0.351	0.885	0.522	2.583	1.392	2.129	1.003	0.531	2.534
		(77.129)^{a}	(1.710)^{c}	(0.980)	(0.376)	(0.027)	(2.022)^{b}	(1.304)^{d}	(6.016)^{a}	(0.176)	(0.265)	(0.758)	(0.497)	(1.917)^{c}	(1.062)	(1.985)^{c}	(0.898)	(0.313)	(2.097)^{b}
1970	0.578	11.948	1.557	0.809	2.687	0.001	1.665	0.959	-0.641	-0.524	-0.486	0.958	0.447	2.824	1.340	1.400	1.042	1.734	2.106
		(63.893)^{a}	(1.878)^{c}	(1.085)	(0.862)	(0.000)	(2.154)^{b}	(1.431)^{d}	(5.772)^{a}	(0.470)	(0.247)	(0.756)	(0.354)	(2.038)^{b}	(1.182)	(1.209)	(1.599)^{d}	(1.962)^{c}	(2.637)^{b}
1971	0.494	11.859	1.450	0.761	2.275	0.022	1.482	0.853	-0.649	——	1.727	1.376	0.602	2.354	1.201	1.084	1.920	1.695	2.653
		(79.060)	(2.460)^{b}	(1.476)^{d}	(0.709)	(0.023)	(1.708)^{d}	(1.070)	(5.865)^{a}	——	(1.265)	(0.992)	(0.343)	(2.255)^{b}	(1.105)	(1.583)^{d}	(1.511)^{d}	(1.328)^{d}	(2.299)^{b}
1972	0.508	9.539	1.057	0.503	1.084	0.006	1.008	0.606	-0.624	——	-0.095	0.299	0.476	0.952	0.329	0.352	0.895	0.561	0.746
		(72.265)	(1.593)^{d}	(0.860)	(0.385)	(0.005)	(1.685)^{d}	(0.629)	(5.134)^{a}	——	(0.061)	(0.208)	(0.405)	(0.743)	(0.262)	(0.282)	(0.507)	(0.201)	(0.995)

t = test values are shown in brackets   a = Significant at the 0.01 level   b = Significant at the 0.05 level
c = Significant at the 0.10 level   d = Significant at the 0.20 level

TABLE (5A-59) $CPM^{K}_{e} = a_o + a_1 \frac{V_D}{V_S} + a_2 \left[\frac{V_D}{V_S}\right]^2 + a_3 \frac{V_P}{V_S} + a_4 \left[\frac{V_P}{V_S}\right]^2 + a_5 R_N + a_6 R_N^2 + a_7 S + a_{8 \cdots 17} ID$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}	a_{16}	a_{17}
1967	0.522	10.380	1.810	1.082	1.844	0.023	1.743	1.060	-0.724	-0.869	—	-0.212	-0.388	2.338	0.150	0.925	0.652	0.387	-0.288
		(77.462)[a]	(2.010)[c]	(1.210)	(0.608)	(0.021)	(2.069)[b]	(1.411)[d]	(4.888)[a]	(0.545)	—	(0.156)	(0.262)	(2.709)[a]	(0.116)	(0.706)	(0.454)	(0.187)	(0.174)
1968	0.535	9.308	1.172	0.634	1.169	0.017	1.147	0.708	-0.673	0.810	1.056	0.320	1.951	—	1.274	2.393	1.391	1.034	—
		(47.979)[a]	(2.154)[b]	(1.304)[d]	(0.362)	(0.015)	(1.465)[d]	(1.103)	(4.690)[a]	(0.727)	(0.748)	(0.212)	(1.626)[d]	—	(0.847)	(2.260)[b]	(1.879)[c]	(1.017)	—
1969	0.519	9.123	0.936	0.567	0.999	0.026	0.861	0.522	-0.701	0.628	1.310	1.775	0.568	2.837	2.609	2.058	1.448	1.346	1.819
		(61.228)[a]	(1.685)[c]	(1.310)[d]	(0.309)	(0.025)	(1.309)[d]	(0.793)	(4.820)[a]	(0.891)	(1.147)	(1.663)[d]	(0.515)	(2.055)[b]	(2.000)[c]	(2.154)[b]	(1.409)[d]	(1.510)[d]	(1.756)[c]
1970	0.576	12.139	1.672	0.821	2.788	0.012	1.593	0.932	-0.677	-0.745	-1.015	0.925	1.768	2.506	1.898	2.580	1.933	1.536	2.120
		(88.605)[a]	(2.186)[b]	(0.054)	(0.922)	(0.010)	(1.830)[c]	(1.427)[d]	(4.452)[a]	(0.674)	(0.935)	(0.804)	(1.314)[d]	(2.019)[c]	(1.345)[d]	(2.219)[b]	(1.799)[c]	(1.026)	(1.941)[c]
1971	0.578	10.563	1.138	0.593	1.797	0.024	1.199	0.710	-0.619	—	1.060	1.361	1.090	2.488	1.436	1.276	1.905	1.452	2.733
		(66.018)[a]	(1.713)[c]	(1.307)[d]	(0.596)	(0.025)	(1.485)[d]	(1.154)	(3.443)[a]	—	(0.916)	(1.037)	(1.474)[d]	(2.642)[b]	(1.174)	(1.523)[d]	(1.806)[c]	(1.297)	(2.100)[b]
1972	0.538	10.231	1.117	0.526	1.412	0.011	1.200	0.720	-0.670	—	1.315	1.939	0.433	0.678	0.785	0.014	0.777	1.313	0.669
		(53.010)[a]	(1.793)[c]	(1.010)	(0.461)	(0.012)	(1.793)[c]	(1.186)	(4.553)[a]	—	(1.127)	(1.481)[d]	(0.721)	(0.773)	(0.370)	(0.010)	(0.774)	(1.052)	(0.700)

t = test values are shown in brackets a = Significant at the 0.01 level b = Significant at the 0.05 level
c = Significant at the 0.10 level d = Significant at the 0.20 level

TABLE (SA-60) $DVM^{X}_{e} = a_0 + a_1 \frac{V_D}{V_S} + a_2 \left[\frac{V_D}{V_S}\right]^2 + a_3 \frac{V_P}{V_S} + a_4 \left[\frac{V_P}{V_S}\right]^2 + a_5 R_X + a_6 R_X^2 + a_7 S + a_{8 \cdots 17} ID$

Year	$\bar{R}^2$	a_0	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}	a_{16}	a_{17}
1967	0.609	10.057	1.456	0.668	1.531	0.012	1.456	0.914	-0.804	——	-0.602	-1.102	-1.318)	-2.806	-0.740	-0.300	-0.817	-0.196	-0.879
		(88.219)[a]	(2.166)[b]	(1.166)	(0.510)	(0.010)	(1.854)[c]	(0.942)	(5.104)[a]	——	(1.115)	(1.047)	(1.095	(2.364)[b]	(0.432)	(0.260)	(0.866)	(0.289)	(0.848)
1968	0.576	8.975	1.245	0.688	1.121	0.008	1.153	0.779	-0.634	——	0.500	0.870	1.576	2.575	1.527	2.482	0.392	2.251	2.550
		(55.061)[a]	(1.600)[d]	(1.545)[d]	(0.384)	(0.006)	(1.710)[c]	(1.370)[d]	(4.630)[a]	——	(0.447)	(0.895)	(1.120)	(1.969)[c]	(1.467)[d]	(2.395)[b]	(0.180)	(1.176)	(2.134)[b]
1969	0.527	10.624	1.706	1.159	2.093	0.025	1.618	1.016	-0.697	——	0.534	1.499	0.617	2.507	1.887	1.703	0.660	——	2.957
		(68.541)[a]	(1.680)[d]	(1.495)[d]	(0.651)	(0.022)	(1.680)[d]	(0.965)	(4.777)[a]	——	(0.511)	(0.808)	(0.814)	(2.242)[b]	(1.493)[d]	(1.933)[c]	(0.601)	——	(2.465)[b]
1970	0.516	9.813	0.972	0.638	1.364	0.024	0.972	0.639	-0.558	——	0.597	0.993	0.231	2.713	1.744	1.089	0.846	0.565	1.978
		(83.871)[a]	(1.965)[c]	(1.394)[d]	(0.414)	(0.020)	(1.686)[c]	(1.380)[d]	(4.080)[a]	——	(0.560)	(0.839)	(0.215)	(2.168)[b]	(1.597)[d]	(0.839)	(0.854)	(0.583)	(2.334)[b]
1971	0.544	12.315	1.781	1.102	2.920	0.033	1.832	1.174	-0.615	1.009	-1.158	-1.222	-0.288	2.807	0.421	-1.734	-1.488	1.518	1.450
		(117.285)[a]	(1.684)[c]	(0.942)	(0.954)	(0.031)	(2.000)[c]	(1.390)[d]	(4.427)[a]	(1.359)[d]	(0.660)	(0.775)	(0.176)	(2.327)[b]	(0.642)	(1.433)[d]	(0.912)	(1.212)	(1.771)[c]
1972	0.545	10.297	1.682	1.043	1.925	0.033	1.626	1.023	-0.672	1.155	1.339	-0.793	-0.620	-0.550	-0.290	-0.241	-0.528	0.379	-0.453
		(91.123)[a]	(1.828)[c]	(1.595)[d]	(0.659)	(0.031)	(2.160)[b]	(1.397)[d]	(5.097)[a]	(1.238)	(1.129)	(1.352)[d]	(0.762)	(0.210)	(0.494)	(0.454)	(0.372)	(0.251)	(0.718)

t = test values are shown in brackets a = Significant at the 0.01 level b = Significant at the 0.05 level
c = Significant at the 0.10 level d = Significant at the 0.20 level

TABLE (5A-61) $DVM^{X}_{e} = a_o + a_1 \frac{V_D}{V_S} + a_2 \left[\frac{V_D}{V_S}\right]^2 + a_3 \frac{V_P}{V_S} + a_4 \left[\frac{V_P}{V_S}\right]^2 + a_5 R_N \; a_6 R_N^2 + a_7 S + a_{8 \cdots 17} ID$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}	a_{16}	a_{17}
1967	0.582	11.018	1.840	1.186	2.004	0.039	1.840	1.189	-0.772	——	-0.452	1.179	-0.892	2.469	0.251	1.270	-0.377	-0.942	-0.089
		$(80.423)^a$	$(2.015)^c$	(0.850)	(0.610)	(0.035)	$(2.495)^b$	$(1.387)^d$	$(4.648)^a$	——	(0.565)	$(1.391)^d$	$(1.303)^d$	$(2.152)^b$	(0.284)	(1.090)	(0.326)	(0.563)	(0.126)
1968	0.559	9.935	1.504	0.705	1.698	0.029	1.504	0.977	-0.630	——	1.698	0.350	0.703	2.343	2.111	2.277	0.535	1.188	1.338
		$(74.141)^a$	$(2.117)^b$	(0.740)	(0.514)	(0.025)	$(1.950)^c$	$(1.385)^d$	$(3.208)^a$	——	(1.215)	(0.344)	(0.735)	$(2.107)^b$	$(2.097)^b$	$(1.787)^c$	(0.681)	(0.694)	$(1.662)^d$
1969	0.492	9.588	1.354	0.851	1.600	0.022	1.426	0.961	-0.693	——	1.101	0.610	1.016	2.386	1.850	1.639	0.996	——	2.004
		$(70.500)^a$	$(1.813)^c$	(1.012)	(0.506)	(0.021)	$(1.872)^c$	(0.890)	$(4.334)^a$	——	(1.299)	(0.657)	$(1.387)^d$	$(2.139)^b$	$(1.358)^d$	$(1.680)^d$	$(1.425)^d$	——	$(2.001)^c$
1970	0.513	10.104	0.963	0.485	1.467	0.005	0.994	0.649	-0.658	——	1.176	1.260	0.886	2.837	1.399	1.914	1.293	1.977	1.999
		$(58.744)^a$	$(1.565)^d$	(0.864)	(0.482)	(0.003)	$(1.595)^d$	(0.750)	$(4.521)^a$	——	$(1.317)^d$	(0.934)	(0.534)	$(2.101)^b$	$(1.546)^d$	$(1.785)^c$	(1.023)	$(2.390)^b$	$(2.202)^b$
1971	0.583	10.593	1.269	0.674	1.980	0.010	1.332	0.851	-0.637	1.179	1.366	-1.592	1.572	2.240	1.416	-1.588	-1.003	2.078	1.856
		$(79.646)^a$	$(1.719)^c$	(0.972)	(0.622)	(0.009)	$(2.100)^b$	$(1.305)^d$	$(4.631)^a$	(0.974)	(1.147)	(1.264)	(1.246)	$(2.354)^b$	(1.171)	(1.244)	$(1.433)^d$	$(1.889)^c$	$(2.287)^b$
1972	0.578	9.293	1.311	0.681	1.466	0.006	1.300	0.846	-0.704	-0.881	1.094	0.845	0.841	1.625	1.475	0.048	0.448	0.951	0.478
		$(54.029)^a$	$(2.117)^b$	(0.699)	(0.423)	(0.005)	$(2.050)^b$	(0.743)	$(4.661)^a$	(1.120)	(0.783)	(1.249)	(1.241)	(1.159)	(1.121)	(0.041)	(0.444)	(0.786)	(0.386)

t = test values are shown in brackets a = Significant at the 0.01 level b = Significant at the 0.05 level
c = Significant at the 0.10 level d = Significant at the 0.20 level

TABLE (SA-62) $RIN^{X}_{e} = a_o + a_1 \frac{V_D}{V_S} + a_2 \left[\frac{V_D}{V_S}\right]^2 + a_3 \frac{V_P}{V_S} + a_4 \left[\frac{V_P}{V_S}\right]^2 + a_5 R_N + a_6 R_N^2 + a_7 S + a_{8 \cdots 17} ID$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}	a_{16}	a_{17}
1967	0.609	9.829	1.745	1.182	1.681	0.033	1.684	1.074	-0.696	——	-1.603	-1.465	-1.480	-2.052	0.555	-0.527	0.842	-0.408	-0.918
		(96.219)^a	(2.575)^b	(1.304)^d	(0.522)	(0.031)	(1.960)^c	(1.254)	(5.076)^a	——	(1.115)	(1.212)	(1.165)	(2.470)^b	(0.498)	(0.701)	(0.877)	(0.359)	(0.865)
1968	0.585	9.129	1.184	0.860	1.386	0.033	1.208	0.757	-0.610	——	0.336	0.470	1.310	2.100	1.668	3.071	1.111	1.874	2.074
		(56.701)^a	(1.975)^c	(1.344)^d	(0.409)	(0.029)	(1.510)^d	(1.301)^d	(4.579)^a	——	(0.373)	(0.655)	(0.938)	(2.674)^b	(1.211)	(2.124)^b	(0.820)	(1.025)	(1.881)^c
1969	0.539	10.688	1.457	0.686	1.787	0.018	1.472	0.946	-0.651	——	0.508	0.445	0.511	2.346	1.801	2.295	0.973	——	2.869
		(70.781)^a	(1.680)^d	(0.946)	(0.649)	(0.015)	(1.842)^c	(1.251)	(4.683)^a	——	(0.522)	(0.793)	(0.768)	(2.168)^b	(1.451)^d	(1.709)^c	(0.556)	——	(1.427)^d
1970	0.538	9.883	1.100	0.508	1.691	0.020	1.100	0.731	-0.625	——	1.469	1.632	0.943	2.133	1.491	1.661	1.499	2.591	2.525
		(89.845)^a	(2.035)^b	(0.975)	(0.524)	(0.018)	(1.659)^c	(1.376)^d	(4.328)^a	——	(1.830)^c	(1.120)	(0.815)	(2.051)^b	(1.885)^c	(1.101)	(1.148)	(1.890)^c	(2.574)^b
1971	0.560	10.796	1.323	0.626	2.272	0.002	1.414	0.958	-0.679	0.557	-1.182	-1.384	-0.287	2.440	-0.459	-1.549	-1.094	1.265	1.976
		(107.960)^a	(2.279)^b	(1.001)	(0.780)	(0.000)	(1.754)^c	(1.241)	(4.690)^a	(0.678)	(1.686)^c	(0.889)	(0.179)	(2.180)^b	(0.375)	(1.247)	(1.043)	(1.110)	(1.523)^d
1972	0.535	9.481	1.091	0.513	1.262	0.022	1.115	0.733	-0.649	1.142	1.843	1.021	0.233	0.229	-0.630	-0.763	0.597	1.063	0.337
		(81.732)^a	(2.025)^b	(0.813)	(0.400)	(0.021)	(1.692)^c	(1.015)	(4.836)^a	(0.682)	(1.333)^d	(1.009)	(0.104)	(0.392)	(0.450)	(0.455)	(0.463)	(1.445)^d	(0.236)

t = test values are shown in brackets a = Significant at the 0.01 level b = Significant at the 0.05 level
c = Significant at the 0.10 level d = Significant at the 0.20 level

TABLE (5A-63) $CPM^{K}_{e} = a_0 + a_1 \frac{V_D}{V_S} + a_2 \left[\frac{V_D}{V_S}\right]^2 + a_3 \frac{V_P}{V_S} + a_4 \left[\frac{V_P}{V_S}\right]^2 + a_5 R_N + a_6 R_N^2 + a_7 S + a_8 \cdots {}_{17} ID$

Year	$\bar{R}^2$	a_0	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}	a_{16}	a_{17}
1967	0.574	10.006	1.741	0.809	1.872	0.039	1.772	1.169	-0.741	——	-0.595	1.120	-0.882	2.445	1.532	1.289	1.012	-0.852	-0.349
		(71.471)[a]	(1.680)[d]	(1.020)	(0.644)	(0.035)	(1.683)[d]	(1.565)[d]	(4.554)[a]	——	(0.682)	(1.364)[d]	(1.296)	(2.145)[b]	(1.346)[d]	(1.094)	(1.004)	(0.527)	(0.112)
1968	0.553	9.923	1.529	0.793	1.626	0.033	1.473	0.992	-0.699	——	1.253	1.110	0.587	2.117	2.113	3.127	1.409	1.965	1.318
		(72.963)[a]	(2.106)[b]	(1.060)	(0.526)	(0.031)	(2.029)[b]	(1.297)	(4.773)[a]	——	(1.499)[d]	(1.249)	(0.681)	(2.001)[c]	(1.705)[c]	(2.009)[b]	(1.623)[d]	(1.644)[d]	(1.240)
1969	0.484	9.338	1.121	0.533	1.213	0.036	1.031	0.659	-0.624	——	1.157	0.626	1.092	2.297	1.890	1.582	1.997	——	2.566
		(67.179)[a]	(1.685)[c]	(1.300)	(0.495)	(0.033)	(1.701)[c]	(0.791)	(4.153)[a]	——	(1.302)	(0.661)	(1.411)[d]	(2.107)[b]	(1.371)[d]	(1.641)[d]	(1.422)[d]	——	(2.353)[b]
1970	0.525	10.083	1.200	0.616	1.823	0.001	1.189	0.791	-0.654	——	1.083	0.870	1.585	2.315	2.145	1.466	0.969	2.037	2.004
		(60.017)[a]	(1.671)[d]	(1.307)[d]	(0.685)	(0.000)	(1.465)[d]	(0.806)	(4.173)[a]	——	(1.461)[d]	(1.087)	(1.706)[c]	(2.234)[b]	(1.712)[c]	(1.934)[c]	(1.210)	(1.579)[d]	(2.501)[b]
1971	0.603	10.507	1.270	0.590	1.748	0.036	1.331	0.862	-0.629	0.451	0.184	-0.719	1.577	1.919	1.279	-1.475	-1.196	1.728	2.810
		(83.388)[a]	(2.025)[b]	(1.101)	(0.505)	(0.036)	(1.545)[d]	(0.563)	(3.817)[a]	(0.476)	(0.075)	(0.325)	(1.253)	(2.264)[b]	(1.117)	(1.199)	(1.524)[d]	(1.800)[c]	(2.683)[b]
1972	0.565	10.227	1.325	1.010	1.549	0.007	1.297	0.825	-0.650	0.561	1.490	0.964	0.862	0.566	0.133	0.955	0.760	0.704	0.421
		(57.779)[a]	(2.030)[b]	(1.293)	(0.506)	(0.008)	(2.022)[b]	(1.393)[d]	(4.222)[a]	(0.513)	(0.916)	(0.603)	(0.553)	(0.398)	(0.298)	(1.256)	(0.688)	(1.029)	(0.648)

t = test values are shown in brackets a = Significant at the 0.01 level b = Significant at the 0.05 level
c = Significant at the 0.10 level d = Significant at the 0.20 level

TABLE (SA-64) $DVM^{K}_{e} = a_o + a_1 \frac{V_D}{V_S} + a_2 \left[\frac{V_D}{V_S}\right]^2 + a_3 \frac{V_P}{V_S} + a_4 \left[\frac{V_P}{V_S}\right]^2 + a_5 R_N + a_6 R_N^{2} + a_7 S + a_8 \cdots {}_{17} ID$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}	a_{16}	a_{17}
1967	0.556	11.497	2.835	2.122	3.288	0.020	2.895	2.227	-0.728	0.600	1.230	-1.349	0.340	2.049	0.248	0.623	0.336	0.662	0.019
		(104.518)[a]	(1.994)[c]	(1.871)[c]	(1.040)	(0.021)	(1.947)[c]	(1.610)[d]	(4.483)[a]	(0.792)	(1.048)	(1.112)	(0.201)	(2.428)[b]	(0.387)	(0.523)	(0.301)	(0.465)	(0.010)
1968	0.492	10.166	1.969	1.192	2.309	0.013	1.911	1.237	-0.638	0.365	0.612	0.641	0.413	2.186	1.660	2.510	1.596	1.416	2.945
		(93.266)[a]	(2.020)[c]	(1.670)[d]	(0.755)	(0.012)	(2.346)[b]	(1.279)	(3.723)[a]	(0.483)	(1.058)	(0.458)	(0.512)	(2.266)[b]	(1.595)[d]	(2.235)[b]	(1.140)	(1.643)[d]	(2.474)[b]
1969	0.572	9.944	1.667	1.029	1.947	0.010	1.576	1.048	-0.624	0.597	0.913	0.478	0.348	2.412	1.705	2.910	0.671	0.723	2.797
		(66.738)[a]	(1.940)[c]	(1.236)	(0.585)	(0.009)	(2.222)[b]	(1.376)[d]	(3.693)[a]	(0.411)	(1.472)[d]	(0.440)	(0.207)	(2.739)[a]	(1.168)	(2.355)[b]	(0.509)	(0.687)	(2.491)[b]
1970	0.566	11.001	1.863	1.130	3.030	0.033	1.824	1.232	-0.530	0.688	-0.612	-0.107	-0.893	1.865	-1.268	-2.109	1.223	2.008	2.330
		(67.490)[a]	(2.871)[a]	(1.222)	(1.050)	(0.031)	(1.931)[c]	(1.705)[c]	(3.038)[a]	(0.537)	(0.562)	(0.122)	(0.957)	(2.384)[b]	(1.590)[d]	(2.055)[b]	(0.906)	(1.843)[c]	(2.546)[b]
1971	0.543	13.225	2.593	1.995	4.393	0.012	2.574	1.950	-0.672	0.370	———	0.951	0.945	2.662	0.621	0.680	1.667	0.982	1.627
		(81.134)[a]	(2.015)[c]	(1.670)[d]	(1.264)	(0.015)	(2.629)[b]	(1.231)	(3.980)[a]	(0.418)	———	(1.397)[d]	(1.414)[d]	(2.355)[b]	(0.985)	(0.715)	(1.269)	(1.390)[d]	(1.574)[d]
1972	0.575	10.539	1.832	1.251	2.356	0.032	1.787	1.231	-0.605	0.824	———	-0.566	-0.683	0.953	1.064	-0.212	-0.564	-0.667	-0.194
		(57.277)[a]	(2.588)[b]	(1.246)	(0.871)	(0.034)	(2.375)[b]	(1.246)	(3.194)[a]	(1.233)	———	(0.496)	(0.432)	(1.308)[d]	(0.732)	(0.175)	(0.551)	(0.555)	(0.196)

t = test values are shown in brackets a = Significant at the 0.01 level b = Significant at the 0.05 level
c = Significant at the 0.10 level d = Significant at the 0.20 level

TABLE (5A-65) $DVM^{K}_{e} = a_o + a_1 \frac{V_D}{V_S} + a_2 \left[\frac{V_D}{V_S}\right]^2 + a_3 \frac{V_P}{V_S} + a_4 \left[\frac{V_P}{V_S}\right]^2 + a_5 R_N + a_6 R_N^{2} + a_7 S + a_{8 \cdots 17} ID$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}	a_{16}	a_{17}
1967	0.559	11.636	2.872	1.721	3.579	0.038	2.974	2.082	-0.641	1.391	0.916	1.088	1.390	2.023	0.878	0.508	1.113	0.503	0.153
		(107.740)^{a}	(2.615)^{b}	(1.744)^{c}	(1.193)	(0.040)	(2.625)^{b}	(1.632)^{d}	(4.351)^{a}	(1.088)	(1.301)	(1.264)	(1.088)	(2.435)^{b}	(0.674)	(0.610)	(1.475)^{d}	(0.528)	(0.212)
1968	0.499	9.278	1.666	0.999	1.684	0.021	1.666	1.251	-0.588	1.511	0.424	0.912	0.949	1.989	2.487	2.009	0.966	1.320	1.886
		(79.299)^{a}	(1.956)^{c}	(1.163)	(0.510)	(0.020)	(2.710)^{a}	(1.333)^{d}	(4.158)^{a}	(1.192)	(0.328)	(0.601)	(1.369)^{d}	(1.803)^{c}	(1.994)^{c}	(2.364)^{b}	(1.190)	(1.309)^{d}	(2.070)^{b}
1969	0.534	9.140	1.330	0.872	1.418	0.029	1.351	1.017	-0.594	1.485	0.593	1.375	1.123	1.988	1.916	1.804	1.738	1.380	2.341
		(71.968)^{a}	(2.705)^{a}	(1.305)^{d}	(0.505)	(0.025)	(2.120)^{b}	(1.001)	(4.078)^{a}	(1.192)	(0.628)	(1.508)^{d}	(0.698)	(2.094)^{b}	(1.524)^{d}	(2.328)^{b}	(1.426)^{d}	(0.924)	(2.114)^{b}
1970	0.519	12.252	2.368	1.465	4.003	0.025	2.410	1.740	-0.554	-0.347	-0.977	-1.286	-1.072	-2.641	-1.394	2.457	-1.720	-2.127	1.616
		(64.484)^{a}	(2.700)^{b}	(1.245)	(1.020)	(0.027)	(2.017)^{c}	(1.690)^{c}	(3.765)^{a}	(0.329)	(0.536)	(0.902)	(0.776)	(2.211)^{b}	(1.480)^{d}	(2.171)^{b}	(1.264)	(2.384)^{b}	(1.796)^{c}
1971	0.488	11.078	1.811	1.123	2.912	0.023	1.797	1.310	-0.609	-0.227	——	1.132	0.505	2.019	1.383	1.427	1.332	2.617	1.776
		(69.672)^{a}	(2.010)^{c}	(1.074)	(0.954)	(0.024)	(2.745)^{a}	(1.343)^{d}	(4.012)^{a}	(0.119)	——	(0.919)	(0.770)	(2.564)^{b}	(1.157)	(1.024)	(1.660)^{d}	(2.451)^{b}	(1.857)^{c}
1972	0.609	10.542	1.788	1.152	2.376	0.025	1.891	1.225	-0.572	-1.104	——	0.639	1.682	0.419	0.796	0.173	-0.756	-1.102	-0.897
		(63.890)^{a}	(1.999)^{c}	(1.352)^{d}	(0.820)	(0.027)	(2.245)^{b}	(1.386)^{d}	(3.790)^{a}	(1.020)	——	(0.450)	(1.158)	(0.531)	(1.156)	(0.282)	(1.181)	(1.249)	(1.350)^{d}

t = test values are shown in brackets a = Significant at the 0.01 level b = Significant at the 0.05 level
c = Significant at the 0.10 level d = Significant at the 0.20 level

TABLE (5A-66) $RIM^K_e = a_o + a_1 \frac{V_D}{V_S} + a_2 \left[\frac{V_D}{V_S}\right]^2 + a_3 \frac{V_P}{V_S} + a_4 \left[\frac{V_P}{V_S}\right]^2 + a_5 R_N + a_6 R_N^2 + a_7 S + a_{8 \cdots 17} ID$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}	a_{16}	a_{17}
1967	0.557	10.247	2.046	1.746	2.068	0.004	2.030	1.557	-0.650	0.180	1.482	-1.262	1.457	2.513	0.393	1.801	1.612	0.546	1.075
		(94.009)[a]	(2.700)[b]	(1.690)[c]	(0.754)	(0.001)	(2.015)[c]	(1.326)[d]	(5.246)[a]	(0.204)	(1.100)	(1.085)	(1.137)	(2.605)[b]	(0.435)	(1.536)[d]	(1.183)	(0.428)	(1.268)
1968	0.585	9.282	1.575	1.183	1.662	0.009	1.693	1.162	-0.682	0.238	1.287	0.306	0.313	2.035	1.464	3.303	1.354	1.231	2.676
		(83.621)[a]	(2.562)[b]	(1.337)[d]	(0.507)	(0.008)	(2.462)[b]	(1.309)[d]	(5.904)[a]	(0.160)	(0.931)	(0.261)	(0.427)	(2.183)[b]	(1.459)[d]	(2.067)[b]	(1.004)	(1.203)	(2.344)[b]
1969	0.573	9.136	1.576	1.159	1.667	0.005	1.566	1.032	-0.612	0.601	0.980	1.507	1.318	2.753	1.693	2.904	0.715	1.264	1.774
		(61.315)[a]	(2.707)[a]	(1.100)	(0.505)	(0.006)	(2.710)[a]	(1.305)[d]	(5.003)[a]	(0.332)	(0.512)	(1.173)	(1.074)	(2.426)[b]	(1.155)	(2.337)[b]	(0.552)	(1.690)[c]	(1.772)[c]
1970	0.494	12.222	2.001	1.494	3.259	0.004	2.050	1.525	-0.614	-0.366	-1.090	-0.395	-1.518	-1.176	-0.972	-1.442	-0.540	-2.382	2.778
		(78.851)[a]	(2.818)[a]	(1.335)[d]	(1.086)	(0.002)	(2.998)[a]	(1.116)	(5.039)[a]	(0.551)	(0.738)	(0.294)	(1.266)	(1.532)[d]	(0.906)	(1.227)	(0.776)	(1.644)[d]	(2.321)[b]
1971	0.607	11.015	1.775	1.446	2.785	0.034	1.870	1.452	-0.596	-0.129	———	0.992	1.766	2.566	0.984	1.508	1.528	0.908	1.246
		(61.882)[a]	(2.010)[c]	(1.685)[c]	(0.962)	(0.031)	(2.874)[a]	(1.152)	(4.730)[a]	(0.097)	———	(1.399)[d]	(1.324)[d]	(2.268)[b]	(1.087)	(1.615)[d]	(1.205)	(1.344)[d]	(1.424)[d]
1972	0.571	10.728	2.259	1.691	2.769	0.030	2.244	1.695	-0.614	-1.387	———	-1.706	-0.983	0.805	0.936	-0.457	-0.760	-0.931	-1.291
		(57.989)[a]	(2.703)[b]	(1.334)[d]	(0.962)	(0.032)	(2.020)[c]	(1.165)	(4.996)[a]	(1.110)	———	(1.232)	(1.321)[d]	(1.249)	(0.648)	(0.356)	(0.580)	(0.612)	(1.583)[d]

t = test values are shown in brackets a = Significant at the 0.01 level b = Significant at the 0.05 level
c = Significant at the 0.10 level d = Significant at the 0.20 level

TABLE (SA-67) $CPMK_e = a_o + a_1 \frac{V_D}{V_S} + a_2 \left[\frac{V_D}{V_S}\right]^2 + a_3 \frac{V_P}{V_S} + a_4 \left[\frac{V_P}{V_S}\right]^2 + a_5 R_N + a_6 R_N^2 + a_7 S + a_8 \cdots {}_{17} ID$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8
1967	0.559	10.054	1.913	1.268	2.099	0.031	1.992	1.439	-0.696	0.500
		(93.092)[a]	(2.562)[b]	(1.377)[d]	(0.707)	(0.028)	(1.890)[c]	(1.162)	(4.320)[a]	(0.601)
1968	0.491	9.479	1.767	1.468	1.768	0.001	1.690	1.221	-0.680	0.617
		(78.338)[a]	(2.567)[b]	(1.160)	(0.615)	(0.000)	(2.710)[a]	(1.689)[c]	(4.402)[a]	(0.669)
1969	0.530	10.177	1.874	1.365	2.427	0.003	1.921	1.357	-0.616	0.709
		(79.507)[a]	(2.754)[a]	(1.347)[d]	(0.890)	(0.001)	(2.630)[b]	(1.701)[c]	(3.135)[a]	(0.765)
1970	0.608	10.740	1.540	1.262	2.452	0.010	1.642	1.140	-0.623	-0.528
		(57.433)[a]	(2.580)[b]	(1.116)	(0.819)	(0.008)	(1.910)[c]	(1.305)[d]	(3.878)[a]	(0.432)
1971	0.557	11.248	1.898	1.412	3.051	0.010	1.898	1.265	-0.659	-1.042
		(63.909)[a]	(2.659)[b]	(1.337)[d]	(1.009)	(0.009)	(1.920)[c]	(1.157)	(3.787)[a]	(0.900)
1972	0.602	9.825	1.806	1.236	2.217	0.017	1.806	1.279	-0.676	1.079
		(58.482)[a]	(2.690)[b]	(1.054)	(0.733)	(0.015)	(1.950)[c]	(1.310)[d]	(4.007)[a]	(1.015)

Year	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}	a_{16}	a_{17}
1967	0.995	1.087	0.525	2.237	0.971	0.649	0.376	0.521	0.517
	(1.314)[d]	(1.266)	(0.619)	(2.526)[b]	(0.698)	(0.650)	(0.538)	(0.526)	(0.285)
1968	0.905	0.582	1.033	1.756	1.301	2.891	0.671	1.394	1.493
	(1.178)	(0.450)	(1.385)[d]	(1.706)[c]	(1.884)[c]	(2.265)[b]	(1.066)	(1.193)	(0.927)
1969	0.481	1.384	1.111	1.925	1.871	2.743	1.689	1.316	2.299
	(0.588)	(0.818)	(0.688)	(2.057)[b]	(1.489)[d]	(2.289)[b]	(1.404)[d]	(0.881)	(2.116)[b]
1970	-0.412	-1.508	-0.583	-1.859	-1.932	1.184	-1.030	-0.407	2.206
	(0.612)	(0.987)	(0.947)	(2.296)[b]	(1.647)[d]	(1.069)	(1.378)[d]	(0.478)	(2.665)[b]
1971	———	0.579	0.848	2.342	1.604	1.639	1.578	0.936	2.934
	———	(0.733)	(0.553)	(2.342)[b]	(1.185)	(1.760)[c]	(1.433)[d]	(1.251)	(2.632)[b]
1972	———	1.291	0.493	1.508	0.882	0.089	-0.833	-1.234	0.847
	———	(1.065)	(0.609)	(1.317)[d]	(0.881)	(0.060)	(0.409)	(1.480)[d]	(0.491)

t = test values are shown in brackets   a = Significant at the 0.01 level   b = Significant at the 0.05 level
c = Significant at the 0.10 level   d = Significant at the 0.20 level

TABLE (5A-68) $_{DVH}X_o = a_o + a_1 \frac{V_D}{V_T} + a_2 \left[\frac{V_D}{V_T}\right]^2 + a_3 \frac{V_P}{V_T} + a_4 \left[\frac{V_P}{V_T}\right]^2 + a_5 R_N + a_6 R_N^2 + a_7 S + a_8 \cdots _{17} ID$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}	a_{16}	a_{17}
1967	0.545	9.063	-4.224	5.770	-1.596	0.009	0.709	0.404	-0.622	——	1.685	1.024	1.052	1.762	0.954	1.652	1.594	1.402	1.158
		(53.946)[a]	(3.118)[a]	(1.918)[c]	(0.535)	(0.006)	(1.683)[d]	(0.918)	(5.725)[a]	——	(1.484)[d]	(0.718)	(0.724)	(1.944)[c]	(1.309)[d]	(1.020)	(1.045)	(0.902)	(0.706)
1968	0.569	9.397	-4.252	6.384	-1.979	0.019	0.638	0.364	-0.563	——	0.715	0.219	1.094	2.364	1.701	1.720	0.623	1.251	1.828
		(77.661)[a]	(2.703)[b]	(2.360)[b]	(0.612)	(0.020)	(1.302)[d]	(0.762)	(4.940)[a]	——	(0.816)	(0.320)	(1.263)	(2.016)[c]	(1.962)[c]	(2.094)[b]	(0.863)	(1.783)[c]	(2.100)[b]
1969	0.611	8.727	-3.428	6.015	-1.351	0.030	0.519	0.294	-0.572	——	-0.597	-0.815	-1.142	2.128	-0.212	-2.482	-1.410	-0.390	2.121
		(67.130)[a]	(2.864)[a]	(2.233)[b]	(0.421)	(0.029)	(1.441)[d]	(0.520)	(4.912)[a]	——	(0.332)	(0.526)	(0.728)	(2.007)[c]	(0.133)	(2.305)[b]	(0.846)	(0.223)	(2.252)[b]
1970	0.504	9.781	-3.428	5.953	-2.206	0.001	0.625	0.363	-0.611	——	1.058	0.701	1.014	1.862	1.157	1.146	0.663	2.045	——
		(51.478)[a]	(2.542)[b]	(2.130)[b]	(0.721)	(0.000)	(1.692)[c]	(0.760)	(4.828)[a]	——	(0.960)	(0.836)	(0.962)	(2.015)[c]	(1.059)	(1.236)	(0.675)	(1.872)[c]	——
1971	0.573	10.309	-4.129	6.768	-2.585	0.036	0.730	0.418	-0.579	——	0.157	0.322	1.041	1.501	0.901	1.041	0.786	2.345	2.662
		(68.271)[a]	(3.059)[a]	(2.703)[b]	(0.319)	(0.037)	(1.714)[c]	(0.840)	(4.216)[a]	——	(0.201)	(0.297)	(1.362)[d]	(1.863)[c]	(1.075)	(1.453)[d]	(0.812)	(1.999)[c]	(2.482)[b]
1972	0.480	9.395	-4.229	5.940	-1.850	0.022	0.553	0.329	-0.574	——	-0.494	-0.810	-0.560	-1.218	-0.312	0.122	-0.687	0.010	-0.264
		(65.243)[a]	(2.699)[b]	(2.188)[b]	(0.610)	(0.025)	(1.687)[c]	(0.612)	(4.713)[a]	——	(0.572)	(1.102)	(0.685)	(1.267)	(0.400)	(0.157)	(0.894)	(0.008)	(0.469)

t = test values are shown in brackets a = Significant at the 0.01 level b = Significant at the 0.05 level
c = Significant at the 0.10 level d = Significant at the 0.20 level

TABLE (5A-69) $_{DVW}X_o = a_o + a_1 \frac{V_D}{V_T} + a_2 \left[\frac{V_D}{V_T}\right]^2 + a_3 \frac{V_P}{V_T} + a_4 \left[\frac{V_P}{V_T}\right]^2 + a_5 R_N + a_6 R_N^2 + a_7 S + a_{8 \cdots 17} ID$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}	a_{16}	a_{17}
1967	0.534	9.013	-4.132	6.059	-1.709	0.034	0.701	0.413	-0.691	———	0.928	0.349	0.541	2.471	0.521	1.165	1.160	0.889	1.252
		(79.761)^a	(2.625)^b	(2.241)^b	(0.662)	(0.035)	(1.241)	(0.742)	(4.428)^a	———	(1.077)	(0.300)	(0.382)	(2.646)^b	(0.863)	(1.543)^d	(0.636)	(1.469)^d	(1.085)
1968	0.607	8.781	-3.656	6.013	-1.553	0.001	0.552	0.313	-0.616	———	0.767	0.329	0.257	1.656	0.752	1.002	0.871	0.859	2.493
		(47.464)^a	(2.477)^b	(2.233)^b	(0.525)	(0.000)	(1.441)^d	(0.539)	(3.899)^a	———	(0.654)	(0.467)	(0.208)	(1.813)^c	(0.671)	(0.980)	(0.973)	(0.999)	(2.010)^c
1969	0.558	8.958	-3.741	6.384	-1.634	0.005	0.551	0.322	-0.616	———	-1.560	-1.736	-1.341	1.434	-1.174	-2.585	-0.652	-0.949	2.566
		(65.867)^a	(2.705)^a	(2.477)^b	(0.524)	(0.006)	(1.686)^c	(0.681)	(4.432)^a	———	(1.213)	(1.325)^d	(1.586)^d	(1.789)^c	(1.075)	(2.254)^b	(0.679)	(1.372)^d	(2.443)^b
1970	0.488	10.547	-4.248	6.379	-2.733	0.036	0.754	0.427	-0.572	———	0.401	0.759	1.128	2.618	1.227	1.376	1.712	1.462	———
		(78.125)^a	(2.642)^b	(2.346)^b	(0.991)	(0.034)	(1.260)	(0.782)	(3.443)^a	———	(0.592)	(0.582)	(1.453)^d	(2.254)^b	(1.162)	(1.457)^d	(1.841)^c	(1.531)^d	———
1971	0.589	11.196	-5.009	8.548	-3.050	0.028	0.875	0.498	-0.536	———	0.772	1.037	1.454	1.926	1.668	1.428	2.540	1.625	2.904
		(81.722)^a	(2.703)^b	(3.126)^a	(1.020)	(0.031)	(1.295)	(0.896)	(3.568)^a	———	(1.071)	(1.263)	(1.671)^d	(2.042)^b	(1.289)	(1.298)	(2.259)^b	(1.975)^c	(2.690)^b
1972	0.543	8.860	-3.645	5.643	-1.493	0.025	0.487	0.290	-0.537	———	-0.089	-0.943	-0.580	-1.448	-0.458	0.019	-0.678	0.570	-1.938
		(86.862)^a	(2.539)^b	(1.961)^c	(0.485)	(0.024)	(1.193)	(0.441)	(3.371)^a	———	(0.075)	(0.919)	(0.508)	(1.079)	(0.420)	(0.018)	(0.631)	(0.337)	(1.613)^d

t = test values are shown in brackets a = Significant at the 0.01 level b = Significant at the 0.05 level
c = Significant at the 0.10 level d = Significant at the 0.20 level

TABLE (SA-70) $RIM^{K}_{o} = a_o + a_1 \frac{V_D}{V_T} + a_2 \left[\frac{V_D}{V_T}\right]^2 + a_3 \frac{V_P}{V_T} + a_4 \left[\frac{V_P}{V_T}\right]^2 + a_5 R_N + a_6 R_N^{2} + a_7 S + a_8 \cdots {}_{17} ID$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}	a_{15}	a_{17}
1967	0.507	9.621	-4.589	5.179	-1.986	0.036	0.786	0.455	-0.594	——	0.661	0.974	0.886	2.164	1.647	1.523	1.454	1.263	1.007
		(61.280)[a]	(3.618)[a]	(2.184)[b]	(0.705)	(0.035)	(1.805)[c]	(0.750)	(4.637)[a]	——	(0.502)	(0.730)	(0.658)	(1.963)[b]	(1.203)	(1.013)	(1.036)	(0.871)	(0.660)
1968	0.588	8.614	-3.517	3.702	-1.369	0.015	0.512	0.290	-0.595	——	0.889	1.167	1.071	2.398	1.646	1.791	0.847	1.331	2.746
		(83.631)[a]	(2.987)[a]	(1.685)[c]	(0.407)	(0.016)	(1.350)[d]	(0.441)	(4.907)[a]	——	(1.021)	(0.963)	(1.243)	(1.789)[c]	(1.563)[d]	(1.874)[c]	(0.963)	(1.562)[d]	(2.532)[b]
1969	0.608	8.802	-3.490	3.705	-1.384	0.014	0.502	0.295	-0.590	——	-0.759	-0.882	-1.256	2.617	-0.386	-2.489	-1.395	-0.351	2.100
		(79.297)[a]	(2.710)[a]	(1.689)[c]	(0.496)	(0.015)	(1.364)[d]	(0.444)	(4.841)[a]	——	(0.461)	(0.624)	(0.872)	(2.289)[b]	(0.262)	(2.001)[c]	(0.913)	(0.219)	(1.713)[c]
1970	0.526	10.254	-3.819	4.473	-2.434	0.037	0.725	0.408	-0.562	——	0.701	1.390	0.685	1.613	0.689	0.824	1.724	1.104	——
		(57.932)[a]	(3.092)[a]	(1.860)[c]	(0.864)	(0.038)	(1.301)[d]	(0.641)	(4.844)[a]	——	(0.821)	(1.405)[d]	(0.650)	(1.654)[c]	(0.782)	(0.796)	(1.534)[d]	(1.201)	——
1971	0.490	11.363	-4.972	5.312	-3.442	0.035	0.903	0.509	-0.534	——	0.658	0.798	0.675	2.837	0.503	0.521	1.463	1.108	1.185
		(89.472)[a]	(3.796)[a]	(2.360)[b]	(1.107)	(0.033)	(1.845)[c]	(0.845)	(4.032)[a]	——	(0.752)	(0.695)	(0.751)	(2.698)[b]	(0.598)	(0.693)	(1.453)[d]	(1.095)	(1.362)[d]
1972	0.571	9.315	-4.052	5.065	-1.765	0.007	0.575	0.337	-0.543	——	-0.494	-0.756	-0.612	-1.154	-0.280	0.027	-0.698	0.019	-1.289
		(67.014)[a]	(2.703)[b]	(2.071)[b]	(0.684)	(0.005)	(1.365)[d]	(0.520)	(4.121)[a]	——	(0.594)	(1.072)	(0.777)	(1.245)	(0.373)	(0.036)	(0.940)	(0.016)	(1.550)[d]

t = test values are shown in brackets   a = Significant at the 0.01 level   b = Significant at the 0.05 level
c = Significant at the 0.10 level   d = Significant at the 0.20 level

<u>TABLE (5A-71)</u> $CPM^{K}_{o} = a_o + a_1 \frac{V_D}{V_T} + a_2 \left[\frac{V_D}{V_T}\right]^2 + a_3 \frac{V_P}{V_T} + a_4 \left[\frac{V_P}{V_T}\right]^2 + a_5 R_N + a_6 R_N^2 + a_7 S + a_8 \ldots{}_{17} ID$

Year	$\bar{R}^2$	a_0	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}	a_{16}	a_{17}
1967	0.494	9.492	-4.497	5.552	-2.022	0.031	0.735	0.416	-0.580	——	0.848	1.113	1.204	2.556	1.025	0.779	1.770	0.507	0.882
		(94.920)[a]	(3.204)[a]	(2.699)[b]	(0.681)	(0.032)	(1.280)	(0.641)	(4.428)[a]	——	(1.103)	(1.246)	(1.288)	(2.453)[b]	(0.737)	(0.454)	(1.552)[d]	(0.360)	(0.970)
1968	0.515	9.152	-4.072	4.524	-1.861	0.026	0.662	0.390	-0.626	——	0.953	0.671	0.661	2.040	1.705	1.740	1.457	0.622	1.864
		(55.466)[a]	(3.042)[a]	(1.850)[c]	(0.649)	(0.027)	(1.561)[d]	(0.593)	(4.812)[a]	——	(0.800)	(0.696)	(0.613)	(2.136)[b]	(1.862)[c]	(1.712)[c]	(1.674)[d]	(0.753)	(2.355)[b]
1969	0.560	9.183	-3.834	4.131	-1.689	0.012	0.543	0.308	-0.619	——	-0.693	-0.787	-1.443	2.853	-1.409	-2.573	-1.579	-1.853	1.985
		(89.155)[a]	(2.710)[a]	(1.692)[c]	(0.531)	(0.011)	(1.432)[d]	(0.444)	(4.617)[a]	——	(0.693)	(1.387)[d]	(1.696)[c]	(2.661)[b]	(1.193)	(2.274)[b]	(1.718)[c]	(1.370)[d]	(2.333)[b]
1970	0.585	10.369	-3.920	5.013	-2.454	0.007	0.745	0.419	-0.661	——	0.560	1.052	0.433	2.779	1.071	1.562	1.298	1.039	——
		(84.300)[a]	(2.971)[a]	(2.104)[b]	(0.849)	(0.005)	(1.302)	(0.650)	(4.510)[a]	——	(0.760)	(0.953)	(0.536)	(2.562)[b]	(1.000)	(1.459)[d]	(1.375)[d]	(1.436)[d]	——
1971	0.601	10.000	-3.768	5.352	-2.347	0.018	0.630	0.366	-0.581	——	0.799	1.094	0.771	2.808	1.878	1.541	0.844	1.081	2.106
		(90.090)[a]	(2.699)[b]	(2.280)[b]	(0.777)	(0.020)	(1.686)[c]	(0.572)	(4.270)[a]	——	(0.750)	(1.137)	(0.859)	(2.691)[b]	(1.746)[c]	(1.693)[d]	(0.902)	(1.074)	(2.237)[b]
1972	0.548	9.551	-4.367	4.695	-2.058	0.010	0.617	0.357	-0.600	——	-0.111	-0.890	-0.619	-1.309	-0.412	-0.023	-0.660	0.596	-1.841
		(49.744)[a]	(3.100)[a]	(1.977)[c]	(0.650)	(0.015)	(1.522)[d]	(0.551)	(4.540)[a]	——	(0.096)	(0.914)	(0.570)	(1.023)	(0.398)	(0.022)	(0.645)	(0.372)	(1.605)[d]

t = test values are shown in brackets a = Significant at the 0.01 level b = Significant at the 0.05 level
c = Significant at the 0.10 level d = Significant at the 0.20 level

TABLE (SA- 72) $DVX_o = a_o + a_1 \frac{V_D}{V_T} + a_2 \left[\frac{V_D}{V_T}\right]^2 + a_3 \frac{V_P}{V_T} + a_4 \left[\frac{V_P}{V_T}\right]^2 + a_5 R_N + a_6 R_N^2 + a_7 S + a_8 \cdots {}_{17} ID$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8
1967	0.529	9.543	-4.049	6.594	-1.613	0.003	1.156	0.680	-0.652	0.280
		(60.018)^a	(2.019)^c	(2.198)^b	(0.593)	(0.001)	(2.425)^b	(1.425)^d	(6.156)^a	(0.258)
1968	0.578	9.535	-3.894	6.028	-1.558	0.031	0.996	0.613	-0.540	1.067
		(85.900)^a	(2.001)^c	(1.999)^c	(0.515)	(0.030)	(2.035)^b	(0.826)	(5.613)^a	(1.178)
1969	0.531	9.043	-3.379	-6.652	-1.382	0.037	0.792	0.492	-0.604	1.134
		(48.618)^a	(2.709)^a	(2.211)^b	(0.440)	(0.035)	(1.770)^c	(1.355)^d	(5.329)^a	(1.433)^d
1970	0.573	10.510	-3.658	7.259	-2.157	0.033	1.138	0.660	-0.616	0.998
		(99.150)^a	(2.723)^a	(2.641)^b	(0.721)	(0.035)	(1.680)^d	(1.406)^d	(5.126)^a	(1.408)^d
1971	0.534	11.618	-4.862	7.767	-2.675	0.029	1.232	0.718	-0.649	——
		(61.470)^a	(2.703)^b	(2.698)^b	(0.897)	(0.027)	(1.910)^c	(1.169)	(5.029)^a	——
1972	0.556	9.615	-3.891	5.967	-1.585	0.031	0.927	0.558	-0.635	——
		(55.258)^a	(2.011)^c	(1.745)^c	(0.568)	(0.035)	(1.431)^d	(1.351)^d	(5.225)^a	——

Year	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}	a_{16}	a_{17}
1967	——	-0.454	-0.275	2.189	-0.064	0.686	0.281	-0.341	0.620
	——	(0.499)	(0.268)	(1.937)^c	(0.076)	(0.787)	(0.294)	(0.243)	(0.548)
1968	1.374	1.008	0.789	——	0.953	2.259	0.307	-1.903	——
	(0.927)	(1.007)	(0.723)	——	(0.884)	(2.239)^b	(0.270)	(1.653)	——
1969	-0.201	0.619	0.317	2.170	1.182	1.070	0.924	0.183	2.344
	(0.184)	(0.819)	(0.456)	(2.001)^c	(1.266)	(1.145)	(0.998)	(0.130)	(2.156)^b
1970	-0.180	1.094	0.507	2.353	0.580	0.825	1.124	3.250	2.487
	(0.116)	(0.798)	(0.362)	(1.872)^c	(0.387)	(0.571)	(0.833)	(2.213)^b	(2.665)^b
1971	0.729	1.450	0.674	2.836	1.601	1.113	1.143	1.684	1.755
	(0.321)	(1.016)	(0.468)	(2.170)^b	(1.556)^d	(0.733)	(0.773)	(1.605)^d	(1.419)^d
1972	-0.492	0.909	0.439	0.692	0.328	0.289	0.347	0.299	1.214
	(0.399)	(0.936)	(0.454)	(0.813)	(0.319)	(0.291)	(0.247)	(0.244)	(0.960)

t = test values are shown in brackets   a = Significant at the 0.01 level   b = Significant at the 0.05 level
c = Significant at the 0.10 level   d = Significant at the 0.20 level

TABLE (5A-73) $DVM^{I}_{o} = a_o + a_1 \frac{V_D}{V_T} + a_2 \left[\frac{V_C}{V_T}\right]^2 + a_3 \frac{V_P}{V_T} + a_4 \left[\frac{V_P}{V_T}\right]^2 + a_5 R_N + a_6 R_N^2 + a_7 S + a_{8 \cdots 17} ID$

Year	$\bar{R}^2$	a_0	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}	a_{16}	a_{17}
1967	0.491	10.364	-4.872	7.660	-2.310	0.003	1.259	0.739	-0.736	1.048	———	0.047	0.295	2.048	0.214	1.161	0.702	0.822	0.167
		$(52.080)^a$	$(3.962)^a$	$(2.540)^b$	(0.851)	(0.001)	$(1.542)^d$	$(1.398)^d$	$(4.812)^a$	(1.035)	———	(0.042)	(0.230)	$(1.662)^d$	(0.201)	(1.067)	(0.588)	$(1.470)^d$	(0.118)
1968	0.533	8.875	-3.369	5.612	-1.322	0.004	0.902	0.520	-0.669	1.487	0.810	0.396	1.051	———	1.450	2.554	1.174	1.056	———
		$(57.250)^a$	$(2.965)^a$	$(1.904)^c$	(0.423)	(0.003)	$(1.804)^c$	(0.924)	$(4.738)^a$	(1.169)	(0.906)	(0.302)	(0.794)	———	(1.110)	$(2.421)^b$	(0.852)	$(1.320)^d$	———
1969	0.590	9.753	-3.379	6.652	-1.382	0.010	0.977	0.563	-0.679	0.575	0.499	1.356	1.249	2.542	1.399	2.846	1.277	0.820	2.405
		$(54.183)^a$	$(2.434)^b$	$(2.268)^b$	(0.421)	(0.012)	$(1.824)^c$	$(1.305)^d$	$(4.768)^a$	(0.667)	(0.304)	$(1.765)^c$	$(1.658)^d$	$(2.498)^b$	$(1.353)^d$	$(2.314)^b$	$(1.640)^d$	$(1.387)^d$	$(1.951)^c$
1970	0.609	11.974	-3.658	7.259	-2.357	0.021	1.402	0.861	-0.665	1.071	2.348	1.001	0.890	2.241	0.810	1.857	1.034	1.409	2.059
		$(99.783)^a$	$(3.123)^a$	$(2.482)^b$	(0.715)	(0.020)	$(1.663)^d$	$(1.426)^d$	$(4.914)^a$	$(1.320)^d$	(1.164)	(1.006)	(0.464)	$(2.587)^b$	$(1.394)^d$	$(1.433)^d$	(1.100)	$(1.763)^c$	$(1.983)^c$
1971	0.566	10.578	-4.862	7.767	-2.675	0.010	1.021	0.558	-0.598	———	1.541	0.394	1.194	2.491	0.907	1.311	2.657	1.418	2.192
		$(61.500)^a$	$(2.699)^b$	$(2.699)^b$	(0.883)	(0.011)	$(2.024)^b$	$(1.342)^d$	$(4.956)^a$	———	(1.185)	(0.303)	(0.444)	$(2.036)^b$	$(1.453)^d$	$(1.673)^d$	$(2.082)^b$	$(1.589)^d$	$(1.946)^c$
1972	0.511	9.479	-3.891	5.967	-1.585	0.025	0.878	0.514	-0.628	———	-1.335	0.209	1.091	0.420	0.571	0.799	0.857	0.823	0.653
		$(92.931)^a$	$(3.264)^a$	$(2.019)^c$	(0.541)	(0.026)	$(1.405)^d$	(0.735)	$(4.497)^a$	———	(1.163)	(0.369)	(0.678)	(0.778)	(0.334)	(0.482)	(0.640)	(1.032)	(0.943)

t = test values are shown in brackets   a = Significant at the 0.01 level   b = Significant at the 0.05 level
c = Significant at the 0.10 level   d = Significant at the 0.20 level

TABLE (SA-74) $RIN^K_o = a_o + a_1 \frac{V_D}{V_T} + a_2 \left[\frac{V_D}{V_T}\right]^2 + a_3 \frac{V_P}{V_T} + a_4 \left[\frac{V_P}{V_T}\right]^2 + a_5 R_N + a_6 R_N^2 + a_7 S + a_{8 \cdots 17} ID$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}	a_{16}	a_{17}
1967	0.613	10.194	-4.667	7.008	-2.149	0.022	1.306	0.766	-0.577	0.274	——	0.141	-0.044	1.982	0.221	0.732	0.726	0.359	0.691
		$(71.788)^a$	$(3.928)^a$	$(2.699)^b$	(0.715)	(0.021)	$(2.398)^b$	$(1.426)^d$	$(5.992)^a$	(0.277)	——	(0.153)	(0.054)	$(1.835)^c$	(0.286)	(0.937)	(0.835)	(0.278)	(0.690)
1968	0.538	8.640	-3.059	4.608	-1.003	0.020	0.833	0.501	-0.589	0.645	0.814	0.425	-0.289	——	0.926	2.155	0.179	-1.160	——
		$(44.536)^a$	$(2.861)^a$	$(1.724)^c$	(0.387)	(0.021)	$(2.123)^b$	$(1.398)^d$	$(5.841)^a$	(0.992)	$(1.347)^d$	(0.419)	(0.285)	——	(1.005)	$(2.016)^c$	(0.170)	(0.882)	——
1969	0.516	8.939	-3.264	4.731	-1.197	0.031	0.772	0.445	-0.571	0.705	1.012	1.236	1.576	2.788	0.271	1.921	0.880	0.190	2.418
		$(49.938)^a$	$(2.531)^b$	$(1.986)^c$	(0.424)	(0.032)	$(2.029)^b$	$(1.307)^d$	$(5.426)^a$	(1.160)	(1.012)	$(1.413)^d$	$(1.829)^c$	$(2.682)^b$	(0.187)	$(2.010)^c$	(0.982)	(0.140)	$(2.265)^b$
1970	0.559	10.355	-3.590	5.234	-1.936	0.005	1.021	0.637	-0.516	1.559	-0.160	0.348	1.005	1.327	0.579	1.355	1.005	1.499	2.356
		$(54.788)^a$	$(3.152)^a$	$(2.264)^b$	(0.628)	(0.002)	$(1.686)^c$	(0.928)	$(5.169)^a$	(1.234)	(0.233)	(0.265)	(0.783)	(0.923)	(0.408)	(1.249)	(0.790)	$(1.760)^c$	$(2.664)^b$
1971	0.522	10.381	-3.769	5.149	-1.973	0.027	1.054	0.623	-0.521	——	0.711	0.563	1.346	2.600	0.290	0.874	1.009	1.201	1.807
		$(64.080)^a$	$(3.123)^a$	$(2.001)^c$	(0.619)	(0.025)	$(2.232)^b$	(0.824)	$(5.076)^a$	——	(0.347)	(0.431)	(1.039)	$(2.082)^b$	(0.311)	(0.631)	(0.751)	$(1.441)^d$	$(1.494)^d$
1972	0.573	9.381	-3.634	5.252	-1.636	0.021	0.870	0.529	-0.553	——	-0.422	0.924	0.467	0.869	0.290	0.253	1.283	1.059	0.126
		$(54.225)^a$	$(3.101)^a$	$(2.152)^b$	(0.561)	(0.019)	$(1.398)^d$	(0.760)	$(5.420)^a$	——	(0.380)	(1.052)	(0.532)	(0.884)	(0.311)	(0.279)	$(1.355)^d$	(1.088)	(0.084)

t = test values are shown in brackets a = Significant at the 0.01 level b = Significant at the 0.05 level
c = Significant at the 0.10 level d = Significant at the 0.20 level

TABLE (SA-75) $CPM X_o = a_o + a_1 \frac{V_D}{V_T} + a_2 \left[\frac{V_D}{V_T}\right]^2 + a_3 \frac{V_P}{V_T} + a_4 \left[\frac{V_P}{V_T}\right]^2 + a_5 R_N + a_6 R_N^2 + a_7 S + a_8 \cdots {}_{17} ID$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}	a_{16}	a_{17}
1967	0.609	9.426	-3.983	6.244	-1.486	0.023	1.067	0.623	-0.557	1.153	———	0.578	0.833	2.044	0.626	0.259	0.304	1.816	0.420
		(54.485)[a]	(2.019)[c]	(2.212)[b]	(0.463)	(0.021)	(1.521)[d]	(1.211)	(4.924)[a]	(1.127)	———	(0.584)	(0.746)	(1.733)[c]	(0.666)	(0.329)	(0.237)	(1.160)	(0.346)
1968	0.537	8.880	-3.280	4.955	-1.296	0.022	0.886	0.512	-0.609	1.180	0.502	1.122	0.744	———	1.167	2.200	1.036	-1.173	———
		(62.535)[a]	(2.320)[b]	(1.762)[c]	(0.448)	(0.019)	(1.686)[c]	(0.926)	(4.801)[a]	(1.054)	(0.343)	(1.096)	(0.587)	———	(0.934)	(2.157)[b]	(0.788)	(1.105)	———
1969	0.577	9.783	-4.043	5.616	-1.638	0.021	0.927	0.550	-0.548	1.229	0.843	1.412	1.253	2.322	1.237	2.826	1.318	0.837	2.489
		(57.210)[a]	(3.072)[a]	(2.020)[c]	(0.676)	(0.021)	(1.720)[c]	(0.950)	(4.818)[a]	(1.458)[d]	(0.535)	(1.857)[c]	(1.709)[c]	(2.397)[b]	(1.292)	(2.328)[b]	(1.717)[c]	(1.041)	(2.065)[b]
1970	0.511	10.518	-3.576	5.138	-2.296	0.001	1.077	0.632	-0.525	0.534	1.271	0.918	1.661	2.517	1.559	1.541	0.895	1.660	1.945
		(52.854)[a]	(2.504)[b]	(1.968)[c]	(0.711)	(0.000)	(1.542)[d]	(1.321)[d]	(4.625)[a]	(0.562)	(1.135)	(1.085)	(1.366)[d]	(2.100)[b]	(1.279)	(1.275)	(1.082)	(1.872)[c]	(2.023)[c]
1971	0.568	11.647	-4.898	6.841	-3.099	0.016	1.307	0.758	-0.578	———	1.504	0.264	1.117	2.604	0.923	1.181	0.946	-1.899	2.265
		(83.791)[a]	(3.112)[a]	(2.701)[b]	(1.083)	(0.018)	(1.653)[d]	(1.258)	(5.049)[a]	———	(1.191)	(0.353)	(1.663)[d]	(2.463)[b]	(1.504)[d]	(1.660)[d]	(1.121)	(1.469)[d]	(2.074)[b]
1972	0.517	10.406	-4.523	6.612	-2.257	0.006	1.044	0.618	-0.591	———	-1.097	1.250	1.359	1.541	0.740	0.908	0.881	0.759	0.746
		(98.169)[a]	(2.700)[b]	(2.430)[b]	(0.712)	(0.005)	(1.997)[c]	(1.014)	(5.382)[a]	———	(1.049)	(1.453)[d]	(0.878)	(1.889)[c]	(1.450)[d]	(1.567)[d]	(0.726)	(1.025)	(1.083)

t = test values are shown in brackets   a = Significant at the 0.01 level   b = Significant at the 0.05 level
c = Significant at the 0.10 level   d = Significant at the 0.20 level

TABLE (SA-76) $DYX_o = a_o + a_1 \frac{V_D}{V_T} + a_2 \left[\frac{V_D}{V_T}\right]^2 + a_3 \frac{V_P}{V_T} + a_4 \left[\frac{V_P}{V_T}\right]^2 + a_5 R_N \, a_6 \hat{R}_N^{\,2} + a_7 S + a_{8} \cdots {}_{17} ID$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}	a_{16}	a_{17}
1967	0.565	9.872	-3.395	5.621	-1.309	0.016	1.028	0.661	-0.698	——	-1.578	-0.918	-0.231	-2.265	-0.755	-0.680	-0.956	-1.733	-0.038
		(59.113)^a	(2.018)^c	(2.261)^b	(0.422)	(0.015)	(1.689)^c	(1.261)	(6.190)^a	——	(1.295)	(1.439)^d	(0.237)	(2.645)^b	(1.287)	(0.893)	(1.083)	(1.303)^d	(0.078)
1968	0.523	10.156	-3.270	5.344	-1.201	0.026	1.308	0.879	-0.533	——	1.679	0.600	0.744	2.174	1.671	2.176	0.845	0.863	1.647
		(94.037)^a	(2.001)^c	(2.198)^b	(0.436)	(0.025)	(2.050)^b	(0.940)	(5.574)^a	——	(1.225)	(0.502)	(0.650)	(2.599)^b	(1.219)	(1.906)^c	(0.773)	(1.230)	(1.990)^c
1969	0.537	10.418	-3.460	6.091	-1.326	0.018	1.512	0.972	-0.513	——	0.462	1.122	1.936	2.255	0.503	2.195	0.732	——	2.701
		(52.351)^a	(2.725)^a	(2.603)^b	(0.450)	(0.020)	(1.962)^c	(1.372)^d	(4.892)^a	——	(0.344)	(0.771)	(1.680)^d	(2.155)^b	(0.357)	(1.828)^c	(0.526)	——	(2.434)^b
1970	0.616	11.262	-3.203	5.021	-1.942	0.033	1.109	0.709	-0.598	——	0.811	1.342	0.590	2.243	0.796	2.126	0.528	0.444	2.430
		(78.208)^a	(2.155)^b	(2.150)^b	(0.699)	(0.031)	(1.747)^c	(1.023)	(5.403)^a	——	(0.676)	(0.573)	(0.530)	(2.234)^b	(0.541)	(1.800)^c	(0.913)	(0.518)	(2.387)^b
1971	0.521	12.215	-4.016	6.716	-2.025	0.017	1.647	1.053	-0.585	0.633	-0.720	-0.974	-0.328	2.720	-0.136	-0.581	-1.137	1.748	2.375
		(92.537)^a	(2.564)^b	(2.564)^b	(0.680)	(0.015)	(2.100)^b	(1.391)^d	(5.708)^a	(0.619)	(0.517)	(0.792)	(0.257)	(2.374)^b	(0.102)	(0.444)	(0.867)	(1.398)^d	(1.939)^c
1972	0.571	9.447	-2.885	4.992	-1.026	0.012	1.135	0.779	-0.535	0.302	1.531	-0.261	-0.073	-1.156	-0.618	-0.554	-0.081	0.577	-0.071
		(73.604)^a	(2.023)^b	(1.730)^c	(0.391)	(0.011)	(2.023)^b	(0.885)	(5.179)^a	(0.529)	(1.274)	(0.155)	(0.043)	(1.031)	(0.322)	(0.332)	(0.049)	(0.314)	(0.055)

t = test values are shown in brackets a = Significant at the 0.01 level b = Significant at the 0.05 level
c = Significant at the 0.10 level d = Significant at the 0.20 level

TABLE (SA-77) $LNX_o = a_o + a_1 \frac{V_D'}{V_T} + a_2 \left[\frac{V_D}{V_T}\right]^2 + a_3 \frac{V_P}{V_T} + a_4 \left[\frac{V_P}{V_T}\right]^2 + a_5 R_N + a_6 R_N^2 + a_7 S + a_{8 \cdots 17} ID$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}	a_{16}	a_{17}
1967	0.573	10.820	-4.062	6.771	-1.656	0.001	1.225	0.825	-0.762	———	-1.662	1.312	-1.610	2.359	1.134	0.129	-0.014	-0.291	-0.368
		(64.790)^a	(2.020)^c	(2.664)^b	(0.591)	(0.00[illegible])	(1.683)^d	(1.300)	(5.804)^a	———	(1.242)	(1.124)	(1.246)	(2.133)^b	(1.314)	(0.150)	(0.015)	(0.348)	(0.241)
1968	0.500	9.155	-2.744	4.234	-0.950	0.034	1.053	0.694	-0.644	———	1.182	1.147	1.772	1.682	1.126	2.747	1.887	1.899	1.734
		(61.442)^a	(2.078)^b	(1.757)^c	(0.360)	(0.031)	(2.164)^b	(1.379)^d	(4.255)^a	———	(1.387)^d	(1.071)	(1.403)^d	(1.802)^c	(0.926)	(2.438)^b	(1.485)^d	(1.749)^c	(1.229)
1969	0.544	9.395	-2.686	4.210	-0.912	0.030	1.226	0.783	-0.656	———	1.290	1.163	1.417	2.117	1.430	2.045	1.600	———	2.154
		(57.286)^a	(1.950)^c	(1.760)^c	(0.352)	(0.029)	(2.018)^c	(1.301)	(4.576)^a	———	(1.180)	(0.603)	(1.204)	(2.054)^b	(1.230)	(2.546)^b	(1.325)^d	———	(2.072)^b
1970	0.567	11.484	-3.513	6.142	-1.653	0.003	1.195	0.768	-0.615	———	0.571	1.151	1.055	2.310	0.967	1.597	1.743	2.190	2.214
		(73.146)^a	(2.588)^b	(2.571)^b	(0.581)	(0.001)	(1.950)^c	(1.303)^d	(3.746)^a	———	(0.574)	(1.077)	(0.637)	(2.243)^b	(1.494)^d	(1.808)^c	(1.120)	(2.262)^b	(2.253)^b
1971	0.559	10.791	-3.167	5.998	-1.644	0.007	1.173	0.775	-0.638	0.320	1.910	1.033	1.662	2.609	1.647	1.048	2.115	1.913	2.581
		(83.651)^a	(2.712)^a	(2.346)^b	(0.583)	(0.006)	(1.555)^c	(1.465)^d	(4.581)^a	(0.353)	(1.462)^d	(1.076)	(1.367)^d	(2.509)^b	(1.343)^d	(1.026)	(2.062)^b	(2.096)^b	(2.246)^b
1972	0.499	10.297	-3.259	5.677	-1.321	0.017	1.432	0.942	-0.666	1.303	0.933	0.498	0.560	1.146	1.056	0.906	0.930	0.795	0.867
		(74.079)^a	(2.346)^b	(2.078)^b	(0.680)	(0.018)	(2.560)^b	(1.500)^d	(4.692)^a	(1.628)^d	(1.016)	(0.607)	(0.618)	(1.599)^d	(1.370)^d	(1.364)^d	(0.787)	(1.022)	(0.667)

t = test values are shown in brackets a = Significant at the 0.01 level b = Significant at the 0.05 level
c = Significant at the 0.10 level d = Significant at the 0.20 level

TABLE (SA-78) $RIM^{K}o = a_o + a_1 \frac{V_D}{V_T} + a_2 \left[\frac{V_D}{V_T}\right]^2 + a_3 \frac{V_P}{V_T} + a_4 \left[\frac{V_P}{V_T}\right]^2 + a_5 R_N + a_6 R_N^2 + a_7 S + a_8 \cdots {}_{17} ID$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}	a_{16}	a_{17}
1967	0.576	11.063	-3.914	6.272	-1.607	0.013	1.591	1.081	-0.552	——	-0.599	-1.413	-1.349	-2.410	-0.946	-1.753	-0.926	-1.926	-1.042
		(73.753)[a]	(2.703)[b]	(2.513)[b]	(0.550)	(0.012)	(2.390)[b]	(1.368)[d]	(4.197)[a]	——	(0.387)	(1.806)[c]	(1.379)[d]	(1.746)[c]	(1.384)[d]	(1.975)[c]	(1.128)	(1.470)[d]	(1.148)
1968	0.539	8.992	-2.707	3.802	-0.853	0.002	0.947	0.628	-0.555	——	1.522	0.455	0.631	2.597	1.630	1.636	0.646	1.133	1.770
		(46.590)[a]	(2.710)[a]	(1.730)[c]	(0.662)	(0.000)	(2.083)[b]	(1.172)	(4.821)[a]	——	(1.203)	(0.313)	(0.588)	(2.276)[b]	(1.269)	(1.744)[c]	(0.636)	(1.541)[d]	(2.168)[b]
1969	0.545	9.575	-2.937	4.209	-1.012	0.020	0.994	0.637	-0.498	——	0.401	1.010	0.891	2.025	0.521	1.635	0.525	——	2.389
		(51.478)[a]	(2.019)[c]	(1.960)[c]	(0.331)	(0.022)	(2.163)[b]	(0.877)	(3.905)[a]	——	(0.397)	(0.745)	(0.616)	(2.016)[c]	(0.394)	(1.869)[c]	(0.685)	——	(2.587)[b]
1970	0.526	11.415	-3.458	4.776	-1.755	0.010	1.395	0.935	-0.502	——	1.264	0.641	0.933	1.437	1.186	1.389	0.610	1.024	2.015
		(97.564)[a]	(2.877)[a]	(2.025)[b]	(0.642)	(0.011)	(1.679)[d]	(1.101)	(4.005)[a]	——	(1.580)[d]	(0.748)	(1.291)	(1.891)[c]	(1.326)[d]	(1.558)[d]	(0.910)	(1.455)[d]	(2.578)[b]
1971	0.528	12.380	-4.035	5.468	-2.264	0.021	1.597	1.005	-0.514	1.207	-0.533	-0.749	-1.058	2.653	-1.099	-0.281	0.709	1.329	0.800
		(107.652)[a]	(3.101)[a]	(2.197)[b]	(0.781)	(0.023)	(1.683)[d]	(1.397)[d]	(4.354)[a]	(0.929)	(0.413)	(0.664)	(1.050)	(2.359)[b]	(1.081)	(0.235)	(0.852)	(1.571)[d]	(1.104)
1972	0.585	9.297	-2.772	3.982	-0.935	0.012	1.031	0.692	-0.552	1.352	0.760	1.253	0.493	1.124	-0.197	-0.158	1.268	0.542	0.391
		(78.126)[a]	(2.001)[c]	(1.786)[c]	(0.369)	(0.011)	(2.172)[b]	(0.980)	(4.260)[a]	(0.998)	(1.397)[d]	(1.167)	(0.317)	(1.068)	(0.113)	(0.103)	(1.177)	(0.901)	(0.225)

t = test values are shown in brackets a = Significant at the 0.01 level b = Significant at the 0.05 level
c = Significant at the 0.10 level d = Significant at the 0.20 level

TABLE (5A-79) $CPM^{X}_{o} = a_o + a_1 \frac{V_D}{V_T} + a_2 \left[\frac{V_D}{V_T}\right]^2 + a_3 \frac{V_P}{V_T} + a_4 \left[\frac{V_P}{V_T}\right]^2 + a_5 R_N + a_6 R_N^2 + a_7 S + a_8 \ldots_{17} ID$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}	a_{16}	a_{17}
1967	0.498	10.883	-3.894	5.677	-1.617	0.023	1.520	0.969	-0.596	——	-0.507	0.263	-0.479	2.722	0.159	0.487	0.235	-1.186	-0.175
		(73.533)[a]	(2.019)[c]	(2.565)[b]	(0.523)	(0.025)	(1.854)[c]	(1.161)	(4.742)[a]	——	(0.594)	(0.208)	(0.402)	(2.275)[b]	(0.138)	(0.495)	(0.294)	(1.429)[d]	(0.170)
1968	0.502	10.184	-3.638	5.398	-1.251	0.037	1.361	0.905	-0.565	——	0.937	0.886	1.800	2.337	1.143	1.429	1.820	1.626	1.450
		(76.000)[a]	(2.011)[c]	(2.145)[b]	(0.491)	(0.040)	(2.145)[b]	(1.376)[d]	(4.380)[a]	——	(1.344)[d]	(0.985)	(1.432)[d]	(1.694)[c]	(0.966)	(1.320)[d]	(1.468)[d]	(1.692)[c]	(1.158)
1969	0.572	10.421	-3.283	4.691	-1.406	0.023	1.269	0.797	-0.539	——	1.186	1.030	0.503	-2.207	1.506	2.021	1.604	——	2.233
		(67.232)[a]	(2.691)[b]	(1.989)[c]	(0.434)	(0.022)	(1.683)[d]	(0.972)	(3.535)[a]	——	(1.204)	(1.555)[d]	(0.454)	(2.092)[b]	(1.279)	(2.545)[b]	(1.338)[d]	——	(2.113)[b]
1970	0.577	11.295	-3.239	4.549	-1.925	0.005	1.364	0.879	-0.538	——	0.645	1.121	1.129	2.240	1.075	2.556	0.862	1.572	2.109
		(91.088)[a]	(2.709)[a]	(1.994)[c]	(0.697)	(0.004)	(1.730)[c]	(1.073)	(3.715)[a]	——	(0.481)	(1.829)[c]	(1.402)[d]	(2.031)[b]	(1.251)	(2.554)[b]	(0.836)	(1.153)	(1.910)[c]
1971	0.555	12.144	-3.952	5.812	-1.993	0.027	1.539	1.028	-0.553	0.459	-1.001	0.150	0.963	2.580	1.580	1.498	1.203	1.638	2.638
		(108.428)[a]	(2.697)[b]	(2.697)[b]	(0.684)	(0.025)	(2.294)[b]	(1.374)[d]	(3.845)[a]	(0.713)	(1.534)[d]	(0.091)	(0.568)	(2.618)[b]	(1.328)[d]	(1.287)	(1.116)	(1.047)	(2.047)[b]
1972	0.521	10.055	-3.097	4.437	-1.274	0.023	1.197	0.791	-0.528	0.927	1.673	0.917	1.025	1.415	1.201	0.717	1.054	0.812	1.124
		(80.440)[a]	(2.565)[b]	(1.892)[c]	(0.494)	(0.025)	(2.030)[b]	(0.960)	(3.456)[a]	(1.123)	(1.022)	(0.852)	(0.877)	(1.528)[d]	(1.463)[d]	(0.513)	(0.916)	(1.140)	(0.824)

t = test values are shown in brackets a = Significant at the 0.01 level b = Significant at the 0.05 level
c = Significant at the 0.10 level d = Significant at the 0.20 level

TABLE (5A-80) $DVM^{X}_{o} = a_o + a_1 \frac{V_D}{V_T} + a_2 \left[\frac{V_D}{V_T}\right]^2 + a_3 \frac{V_P}{V_T} + a_4 \left[\frac{V_P}{V_T}\right]^2 + a_5 R_N + a_6 R_N^2 + a_7 S + a_8 \cdots {}_{17} ID$

Year	$\bar{R}^2$	a_0	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}	a_{16}	a_{17}
1967	0.548	10.079	-2.808	5.827	-0.705	0.036	1.714	1.171	-0.737	3.663	0.632	-1.023	0.528	2.205	0.320	0.522	0.573	0.756	0.958
		$(86.887)^a$	$(1.683)^d$	$(2.349)^b$	(0.223)	(0.035)	$(2.715)^a$	$(1.824)^c$	$(4.624)^a$	(0.308)	(1.153)	(1.009)	(0.486)	$(2.300)^b$	(0.482)	(0.579)	(0.204)	(0.573)	(1.280)
1968	0.523	9.482	-2.410	4.547	-0.668	0.029	1.373	0.992	-0.604	0.852	1.184	1.095	0.547	2.566	0.906	2.699	1.887	1.299	1.278
		$(57.120)^a$	$(2.097)^b$	$(1.665)^d$	(0.391)	(0.028)	$(2.706)^a$	$(1.655)^d$	$(3.848)^a$	(0.563)	$(1.460)^d$	(0.960)	(0.848)	$(2.245)^b$	(0.975)	$(2.701)^b$	$(1.667)^d$	(0.831)	$(1.873)^c$
1969	0.514	9.392	-2.242	4.231	-0.543	0.025	1.318	0.995	-0.680	0.693	1.164	1.401	0.440	2.327	1.711	2.822	1.185	1.204	2.260
		$(83.857)^a$	$(1.995)^b$	$(1.642)^d$	(0.311)	(0.024)	$(2.712)^a$	$(1.687)^c$	$(3.918)^a$	(0.456)	$(1.690)^c$	(1.271)	(0.280)	$(1.941)^c$	$(1.344)^d$	$(2.632)^b$	(1.053)	(0.890)	$(2.008)^c$
1970	0.500	10.925	-2.456	4.652	-1.129	0.024	1.683	1.169	-0.562	-0.926	-1.467	-1.946	-1.397	-2.906	-1.995	-1.342	-2.066	-1.552	2.771
		$(63.888)^a$	$(2.076)^b$	$(1.754)^c$	(0.514)	(0.023)	$(2.360)^b$	$(1.754)^c$	$(3.483)^a$	(0.932)	$(1.677)^c$	$(1.364)^d$	(0.947)	$(2.535)^b$	$(1.618)^d$	(1.231)	$(1.704)^c$	(0.340)	$(2.423)^b$
1971	0.618	11.219	-2.904	5.131	-1.278	0.026	1.683	1.209	-0.558	-1.110	——	1.006	0.876	3.166	1.605	1.287	2.658	2.175	2.243
		$(83.723)^a$	$(2.018)^c$	$(2.306)^b$	(0.434)	(0.025)	$(2.017)^c$	(1.298)	$(3.668)^a$	(0.776)	——	$(1.571)^d$	(0.520)	$(2.622)^b$	$(1.342)^d$	$(1.756)^c$	$(2.366)^b$	$(1.638)^d$	$(2.527)^b$
1972	0.515	9.819	-2.670	5.540	-0.708	0.026	1.445	1.009	-0.696	-0.493	——	-1.708	-1.661	1.678	0.769	-1.410	-0.365	-0.385	-0.881
		$(74.954)^a$	$(2.164)^b$	$(2.331)^b$	(0.395)	(0.027)	$(2.710)^a$	(1.257)	$(3.974)^a$	(0.269)	——	(1.281)	$(1.462)^d$	(1.246)	(0.723)	(1.165)	(0.552)	(0.536)	(0.593)

t = test values are shown in brackets

a = Significant at the 0.01 level b = Significant at the 0.05 level

c = Significant at the 0.10 level d = Significant at the 0.20 level

TABLE (5A-81) $DWK_o = a_o + a_1 \frac{V_D}{V_T} + a_2 \left[\frac{V_D}{V_T}\right]^2 + a_3 \frac{V_P}{V_T} + a_4 \left[\frac{V_P}{V_T}\right]^2 + a_5 R_N + a_6 R_N^2 + a_7 S + a_8 \cdots {}_{17} ID$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8
1967	0.572	10.254	-3.063	5.867	-0.829	0.011	1.769	1.293	-0.654	1.071
		(60.674)[a]	(1.937)[c]	(2.705)[a]	(0.270)	(0.010)	(2.094)[b]	(1.345)[d]	(4.410)[a]	(1.260)
1968	0.548	10.361	-2.836	5.837	-0.832	0.027	1.682	1.143	-0.599	0.984
		(65.575)[a]	(1.723)[c]	(2.694)[b]	(0.302)	(0.025)	(2.001)[b]	(1.374)[d]	(3.995)[a]	(0.626)
1969	0.508	10.115	-2.695	5.433	-0.675	0.032	1.488	0.963	-0.625	0.263
		(55.883)[a]	(1.712)[c]	(2.705)[a]	(0.242)	(0.035)	(2.070)[b]	(1.689)[c]	(4.049)[a]	(0.130)
1970	0.613	12.485	-3.310	6.222	-1.312	0.011	2.132	1.710	-0.651	-0.992
		(75.666)[a]	(1.970)[c]	(2.637)[b]	(0.426)	(0.012)	(2.705)[d]	(1.527)[d]	(4.362)[a]	(1.051)
1971	0.487	13.472	-3.925	7.491	-1.832	0.017	2.407	1.563	-0.629	1.065
		(72.042)[a]	(2.498)[b]	(2.715)[a]	(0.602)	(0.015)	(2.670)[b]	(1.761)[c]	(4.052)[a]	(0.775)
1972	0.527	10.708	-3.043	5.809	-0.779	0.026	1.735	1.150	-0.622	1.283
		(55.481)[a]	(1.911)[c]	(2.681)[b]	(0.205)	(0.025)	(2.014)[b]	(1.703)[c]	(3.754)[a]	(1.065)

Year	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}	a_{16}	a_{17}
1967	1.117	0.417	0.433	2.822	0.407	1.271	0.808	0.381	0.299
	(1.328)[d]	(0.328)	(0.576)	(2.418)[b]	(0.678)	(1.667)[d]	(0.497)	(0.599)	(0.293)
1968	1.395	0.395	0.695	2.037	1.683	2.766	1.196	1.154	1.418
	(1.073)	(0.373)	(0.862)	(2.831)[a]	(1.370)[d]	(2.081)[b]	(1.655)[d]	(1.693)[c]	(1.455)[d]
1969	1.096	1.096	1.165	2.700	1.473	2.819	1.016	1.132	2.314
	(0.749)	(0.749)	(0.842)	(2.069)[b]	(1.465)[d]	(2.010)[c]	(0.680)	(1.025)	(2.807)[a]
1970	-1.187	-1.187	0.803	2.735	1.098	2.060	1.700	1.519	2.545
	(1.138)	(1.138)	(0.595)	(2.345)[b]	(1.506)[d]	(2.003)[c]	(1.343)[d]	(1.238)	(2.630)[a]
1971	———	1.375	1.025	2.954	1.042	1.540	1.563	1.681	2.221
	———	(0.926)	(0.825)	(2.743)[a]	(1.430)[d]	(1.025)	(1.598)[d]	(1.627)[d]	(2.688)[a]
1972	———	0.275	0.588	1.555	0.231	0.845	-0.604	-0.723	-0.582
	———	(0.273)	(0.456)	(1.502)[d]	(0.162)	(0.628)	(0.664)	(0.788)	(0.435)

t = test values are shown in brackets   a = Significant at the 0.01 level   b = Significant at the 0.05 level
c = Significant at the 0.10 level   d = Significant at the 0.20 level

TABLE (SA-82) $RIN^{K}_{o} = a_o + a_1 \frac{V_D'}{V_T} + a_2 \left[\frac{V_D}{V_T}\right]^2 + a_3 \frac{V_P}{V_T} + a_4 \left[\frac{V_P}{V_T}\right]^2 + a_5 R_K + a_6 R_K^2 + a_7 S + a_8 \cdots {}_{17} ID$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9
1967	0.549	11.644	-3.596	5.857	-1.196	0.033	1.853	1.343	-0.599	0.824	0.785
		(58.808)^a	(2.595)^b	(2.014)^c	(0.314)	(0.029)	(2.540)^b	(1.300)	(5.435)^a	(1.384)^d	(1.199)
1968	0.493	10.347	-2.807	4.215	-0.723	0.029	1.616	1.080	-0.566	0.527	1.228
		(69.442)^a	(2.101)^b	(2.487)^b	(0.284)	(0.030)	(2.715)^a	(1.340)^d	(5.291)^a	(0.494)	(1.108)
1969	0.540	9.378	-2.274	3.415	-0.596	0.038	1.459	1.033	-0.566	0.744	1.910
		(47.846)^a	(1.680)^d	(2.070)^b	(0.204)	(0.035)	(1.840)^c	(1.354)^d	(5.097)^a	(0.550)	(1.595)^d
1970	0.587	10.934	-2.602	4.091	-1.074	0.031	1.386	0.990	-0.503	0.340	-1.387
		(88.177)^a	(2.001)^c	(2.310)^b	(0.361)	(0.033)	(2.710)^a	(1.685)^c	(3.999)^a	(0.450)	(1.774)^c
1971	0.605	13.453	-4.181	7.184	-1.899	0.038	2.419	1.604	-0.565	0.534	——
		(77.316)^a	(2.700)^b	(2.611)^b	(0.680)	(0.036)	(2.703)^b	(1.705)^c	(5.166)^a	(0.797)	——
1972	0.551	9.671	-2.623	3.801	-0.648	0.002	1.594	1.068	-0.536	-0.491	——
		(51.169)^a	(2.030)^b	(2.261)^b	(0.210)	(0.000)	(1.937)^c	(1.052)	(4.372)^a	(0.495)	——

Year	$\bar{R}^2$	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}	a_{16}	a_{17}
1967	0.549	1.025	1.481	2.199	1.194	0.403	1.557	1.279	0.969
		(1.010)	(0.178)	(2.420)^b	(1.456)^d	(0.561)	(1.209)	(1.430)^d	(1.299)
1968	0.493	0.437	1.244	2.049	1.176	1.037	1.374	1.025	2.461
		(0.648)	(1.719)^c	(2.081)^b	(1.578)^d	(1.367)^d	(1.508)^d	(1.178)	(2.510)^b
1969	0.540	0.246	0.244	2.977	1.240	1.510	1.109	0.801	2.303
		(0.235)	(0.289)	(2.536)^b	(1.062)	(1.567)^d	(1.087)	(0.687)	(2.857)^a
1970	0.587	-0.763	-1.538	-1.747	-1.553	-1.355	-1.062	-1.573	2.342
		(0.502)	(1.221)	(1.538)^d	(1.139)	(1.289)	(0.845)	(1.423)^d	(2.223)^b
1971	0.605	0.432	1.405	2.136	1.511	0.632	1.100	0.776	1.178
		(0.304)	(1.295)	(2.329)^b	(1.957)^c	(0.451)	(1.068)	(0.510)	(1.263)
1972	0.551	-1.766	-1.552	1.684	0.539	-1.599	-1.203	-1.241	-1.676
		(1.333)^d	(1.241)	(1.279)	(0.683)	(1.270)	(1.526)^d	(1.525)^d	(1.570)^d

t = test values are shown in brackets a = Significant at the 0.01 level b = Significant at the 0.05 level
c = Significant at the 0.10 level d = Significant at the 0.20 level

<u>TABLE (5A-83)</u> $CPX^{X}_{o} = a_o + a_1 \frac{V_D}{V_T} + a_2 \left[\frac{V_D}{V_T}\right]^2 + a_3 \frac{V_P}{V_T} + a_4 \left[\frac{V_P}{V_T}\right]^2 + a_5 R_N + a_6 R_N^2 + a_7 S + a_8 \cdots {}_{17} ID$

Year	$\bar{R}^2$	a_o	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}	a_{16}	a_{17}
1967	0.572	11.461	-3.628	6.299	-1.048	0.004	1.762	1.255	-0.541	0.843	-1.096	-1.161	0.522	2.533	0.556	0.165	-0.825	0.684	-0.531
		(71.186)^a	(1.683)^d	(2.349)^b	(0.323)	(0.002)	(1.852)^c	(1.161)	(4.226)^a	(1.224)	(1.401)^d	(1.348)^d	(0.645)	(2.411)^b	(0.735)	(0.152)	(0.516)	(0.553)	(0.356)
1968	0.519	10.135	-2.684	4.473	-0.948	0.028	1.649	1.213	-0.591	1.748	0.843	1.731	1.018	2.300	1.900	2.448	1.571	0.914	1.542
		(70.381)^a	(2.306)^b	(1.909)^b	(0.387)	(0.025)	(1.798)^c	(1.697)^c	(5.126)^a	(1.605)^d	(1.385)^d	(1.828)^c	(1.675)^c	(2.621)^b	(1.050)	(2.512)^b	(1.462)^d	(1.169)	(1.130)
1969	0.487	9.990	-2.544	4.327	-0.866	0.005	1.663	1.175	-0.668	1.075	1.263	1.069	1.074	2.460	1.074	2.159	0.985	1.512	2.884
		(63.630)^a	(1.855)^c	(2.097)^a	(0.306)	(0.004)	(1.805)^c	(1.687)^c	(5.342)^a	(1.605)^d	(0.631)	(0.808)	(0.849)	(2.014)^c	(1.354)^d	(2.464)^b	(0.736)	(1.795)^c	(2.859)^a
1970	0.602	12.496	-3.450	5.391	-1.174	0.039	1.922	1.483	-0.589	-0.779	-0.522	-1.829	-1.477	2.542	0.479	1.099	-0.622	-0.399	2.162
		(121.320)^a	(2.662)^b	(2.019)^c	(0.414)	(0.040)	(2.754)^a	(1.630)^c	(4.926)^a	(1.271)	(0.627)	(1.150)	(1.865)^c	(2.288)^b	(0.801)	(1.059)	(0.735)	(0.217)	(2.561)^b
1971	0.571	13.215	-3.918	6.487	-1.392	0.007	2.378	1.564	-0.507	-1.150	——	0.259	1.093	2.407	0.707	1.505	1.489	1.648	2.545
		(129.558)^a	(2.019)^c	(2.366)^a	(0.434)	(0.005)	(2.015)^c	(1.704)^c	(3.987)^a	(0.762)	——	(0.604)	(0.544)	(2.446)^b	(1.170)	(1.732)^c	(1.226)	(1.290)	(2.418)^b
1972	0.560	10.560	-2.904	4.856	-1.071	0.008	1.918	1.398	-0.576	-0.057	——	-0.487	0.036	1.429	1.102	-0.117	-1.130	-0.210	-1.009
		(81.230)^a	(2.349)^b	(2.020)^a	(0.355)	(0.010)	(2.704)^a	(1.615)^c	(4.871)^a	(0.060)	——	(0.142)	(0.010)	(1.391)^d	(0.925)	(0.070)	(1.332)^d	(0.344)	(0.459)

t = test values are shown in brackets   a = Significant at the 0.01 level   b = Significant at the 0.05 level
c = Significant at the 0.10 level   d = Significant at the 0.20 level

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