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INTRINSIC VALUE AND ITS USE AS A DETERMINANT
OF COST OF CAPITAL: A TEST.**

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INTRINSIC VALUE AND ITS USE
AS A DETERMINANT OF
COST OF CAPITAL:
A TEST

DISSERTATION

Presented in Partial Fulfillment of the Requirements
for the Degree Doctor of Philosophy
in the Graduate School of
The Ohio State University

By

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* * * * *

The Ohio State University
1969

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CHAPTER I

INTRODUCTION

This paper deals with the question of the effect of the capital structure on the cost of capital to a firm. In recent years, financial theorists have addressed themselves to the task of developing useful measurements of the cost of capital.¹ As interest in long-range planning by management increases, the need for tools that will optimize resource allocation will also grow. One of those tools is an accurate measurement of the cost of capital. In spite of the amount of work done in this direction, a widely accepted measurement has not yet been developed.

¹M. Miller and F. Modigliani, "Some Estimates of the Cost of Capital to the Electric Utility Industry," American Economic Review, LVI (June, 1966), pp. 333-391; Randall Bennet Haydon, "An Analysis of the Cost of Capital," (unpublished Ph.D. dissertation, Graduate College, University of Illinois), 1962; Alexander Barges, "The Effect of Capital Structure on the Cost of Capital," (unpublished Ph.D. dissertation, Dept. of Finance, Northwestern University), 1962; David Durand "Comment: The Cost of Capital and the Theory of Investment," American Economic Review, XLIX (September, 1959) pp. 639-654; John Litner, "Cost of Capital and Optimal Financing of Corporate Growth," Journal of Finance, XVIII (May, 1963), pp. 292-310; M. Miller and F. Modigliani, "The Cost of Capital, Corporation Finance and the Theory of Investment," American Economic Review, XLVIII (June, 1958), pp. 261-297.

Professional opinion on the subject differs markedly as can be seen in articles that have appeared in recent financial literature. Upon review of these studies one becomes aware of the disagreement that exists concerning the computation and use of such a measurement.

A controversy over the relationship of cost of capital and leverage was precipitated by Franco Modigliani and Merton Miller in 1958² (hereafter M & M). They held, based on certain restrictive assumptions regarding capital markets, rational investors, equivalent risk classes and the effect of taxes, that real costs of debt, after taking into account increases in equity costs, are the same as the costs of equity and that the marginal cost of capital to the firm is equal to the average cost of capital. If this is actually the case, then the proposition advanced by M & M, that the average cost of a firm's capital is independent of the types of capital used, is valid. A corollary to this proposition is that the total market value of a firm is unaffected by the composition of the securities in its capital structure;³ that is to

²Franco Modigliani and Merton Miller, "The Cost of Capital, Corporation Finance and the Theory of Investment," American Economic Review, XLVIII (June, 1958), pp. 261-297.

³Alexander Barges, "The Effect of Capital Structure on the Cost of Capital: A Text and Evaluation of the Modigliani and Miller Proposition," (unpublished Ph.D. dissertation, Dept. of Finance, Northwestern University), 1962, p. 7.

say

"...the average cost of capital to any firm is completely independent of its capital structure and is equal to the capitalization rate of a pure equity stream."⁴

In another study, David Crary developed a normative model in an attempt to explain the cost of capital concept. This model dealt with the rates of return that should be demanded by the suppliers of capital when confronted with different levels of risk. He concludes that

"...Given the assumptions of the model, leverage does not affect a firm's cost of capital."⁵

This viewpoint was and is at odds with the traditional belief. In the opinion of Graham, Dodd, and Cottle, the advantages to stockholders from the appropriate proportion of corporate debt will extend beyond the indisputable tax savings and will increase the total market value of the company.⁶ Ezra Solomon concludes his analysis

⁴Modigliani and Miller, op. cit., pp. 268-269.

⁵David T. Crary, "An Analysis of the Inter-relationships of Leverage, Taxation, and the Cost of Capital," (unpublished Ph.D. dissertation, Dept. of Business Organization, The Ohio State University), 1966.

⁶Benjamin Graham, David L. Dodd, and Sidney Cottle, Security Analysis Principles and Technique, (4th ed.; New York: McGraw-Hill Book Co.), p. 542.

by stating

"...the thesis that a company's cost of capital is independent of its financial structure is not valid."⁷

The preceding examples of the arguments that exist on cost of capital illustrate the two broad theoretical points of view which presently exist. One group considers that, except for the tax factor, the composition of the capital structure used will have no affect on the aggregate market valuation of a company's securities. The other group holds that the proportion and type of funds used can affect the aggregate market valuation of a firm's securities even apart from the tax impact. In the first group, the cost of capital is thought not to change because of the composition of the capital structure, while in the second the average cost of capital is thought to change as a direct result of the type of capital structure used.

It is obvious that much disagreement exists in this area. Since the initial impact of the M & M propositions, the search has continued for evidence and measurements which will support one theory or the other. It is quite possible that neither group is right and that it will be necessary to develop a completely new theory.

⁷Solomon, Ezra, "Leverage and The Cost of Capital," The Journal of Finance, XVIII (May, 1963), p. 278.

Eight years after their initial monumental impact on finance and economic thinking M & M presented another article in which they (1) called for more effort in the area, (2) summed the nature of the measurements used to date, and (3) suggested a correct measure for the cost of capital in the Public Utility field.⁸

"In its simplest form, the central normative proposition of the micro theory of capital is that the firm should adjust its capital stock until the marginal rate or return on further investment (or disinvestment) is equal to the cost of capital. Under conditions of perfect certainty--which is the assumption on which most of classical theory has been developed--the concept of the cost of capital presents no particular difficulty. It is simply the market rate of interest. Since all securities must have the same yield in equilibrium under certainty there is only one such rate period, and it is, in principle, a directly observable magnitude. Under real-world conditions, however, we are confronted not with one, but with a bewildering variety of securities, with very different kinds and priorities of claims to portions of the (uncertain) future earnings of the firm. Since these securities will also, in general, have different anticipated yields, it is by no means clear which yield or combination of yields is the relevant cost of capital for rational investment planning, nor because it is based on anticipations, is the cost of capital any longer a directly observable magnitude. It must, rather, somehow be inferred from what is observable, namely, the market prices of the various kinds of claims represented by different securities.

⁸Miller, Merton H., Modigliani, F., "Some Estimates of the Cost of Capital to the Electric Utility Industry," American Economic Review, LVI (June, 1966), pp. 333-391.

Although most (but not all) recent studies of investment behavior have shown some awareness of these difficulties, a common approach in empirical work has been simply to ignore the problem and to use without comment or explicit justification some standard index of current, nominal yields on high-grade corporate bonds (or even government bonds) as a measure of the cost of capital. Other writers use both a current bond yield series to approximate the cost of debt capital and a current profit series to measure the "availability" and hence, presumably, also the "cost" of equity capital. Still others have tried indexes of share prices, current dividend yields, or current earnings yields alone or in various averages with bond yields along lines suggested in the standard texts on corporation finance. How much error is involved in the use of such measures is still unknown, though even a cursory survey of the underlying theory suggest many grounds for apprehension on this score. But we cannot be sure. Too little work has yet been done to permit even a rough calibration of these series as proxies for the cost of capital, let alone to provide acceptable alternative series."⁹

Indeed, too little work has been done in the determination of sound theories concerning the measurement of cost of capital. Therefore, this dissertation attempts to provide additional insight into the problem by testing the independence hypothesis put forth by M & M. A test different in nature than heretofore used is employed. Two industries were selected--retailing and cement--which appear to approximate the equivalent risk group indicated

⁹Ibid., pp. 333-334.

by M & M.¹⁰ A sample of firms from within the industries was made which exhibited necessary conditions for testing purposes.

The cost of capital derived from the issue of new common stock is by no means an easy concept to understand. It is a difficult concept and one about which little agreement exists. It appears, however, that the determination of the cost of capital represents essentially the same problem as the determination of the value of a security. If one can determine what the value of a security is, one can determine what the cost of raising funds by the issue or sale of that security. One might view the acquisition of funds much as he might a sales

¹⁰The framework in which M & M operate begins with the assumption of a perfectly competitive capital market, in which all investors act rationally and in which investors, including institutional investors are not circumscribed in their actions. From this, M & M indicate that firms can be divided into homogeneous classes such that the business risk of all firms in a given class will be identical. That is, firms are divided into risk classes and any income generated by a firm in that class would be subject to the same degree of uncertainty as income generated by any other firm in that class. It is not necessary that the firms be in the same industry to form a risk group.

It was thought by this author that at this stage of the development of cost of capital concepts, it would make the analysis easier and more reliable if firms within a given industry could represent an approximation of the equivalent risk grouping herein defined. The retailing and cement industries, at least through the test period, appear to satisfy the conditions.

transaction in some other business. A cost and benefit relationship is determined. That is, in the case of a firm acquiring funds from the sale of a security, that firm has given up a claim on its future earnings.¹¹

If one assumes, for example, that a security valued at \$20, that promises a projected yield per share of \$3.30 and assuming that flotation costs and underwriting costs are zero the cost assigned to that security is 16.5 per cent ($\$3.30/\20.00). This cost is determined, much like any other economic transaction, by comparing what the firm has given up to that which it has received.

In this study, the intrinsic value¹² of the common stock securities in the sample will be computed before

¹¹Randall Bennett Haydon, "An Analysis of the Cost of Capital" (unpublished Doctoral Thesis, The University of Illinois, 1962) p. 7.

¹²Graham, Dodd, and Cottle, op. cit., p. 28.

"A general definition of intrinsic value would be that value which is justified by the facts, e.g., assets, earnings, dividends, definite prospects, including the factor of management. The primary objective in using the adjective 'intrinsic' is to emphasize the distinction between value and current market price, but not to invest this 'value' with an aura of permanence. In truth, the computed intrinsic value is likely to change at least from year to year, as the various factors governing that value are modified. The most important single factor determining a stock's value is now held to be the indicated average future earning power, i.e., the estimated average earnings for a future span of years. Intrinsic value would then be found by first forecasting this earning power and then multiplying that prediction by an appropriate 'capitalization factor.'"

and after changes in the capital structure¹³ of the companies. It would appear that if after changes in the types of financing employed, the intrinsic value changes direction, then the cost of capital must evidence change.

An underlying assumption to this work is that the valuation of a security rests upon economic productivity and risks of the selected securities rather than the capricious whims of a naive investing public. If one agrees that an "investment operation"¹⁴ is one which is based upon thorough analysis; the use of reasonable intelligence; and the application of sound judgment, all of which can be supported and justified by both quantitative and qualitative factors, then it seems reasonable to suggest that an acceptably accurate "intrinsic value" for a security can be reached. If the logic of the foregoing is sound, it then should be possible to proceed on the premise that for this study such intrinsic values can be calculated for the sample firms within the selected industries.

Most authors investigating the area of cost of capital would agree on one point; the cost of capital probably

¹³The capital structure is defined and used here to mean "the sum of long-term notes payable, funded debt, preferred stocks, common stock and surpluses."

¹⁴Graham, Dodd, and Cottle, op. cit., p. 49.

is not a directly observable phenomenon, but rather is inferred from that which is observable. Rather than using market prices of securities and their changes as an indicator of the change in the value of a firm, and hence, its cost of capital, this study will rely on calculated intrinsic values for the sample firms and infer from their change whether the cost of capital has exhibited change.

Plan

A brief review of the cost of capital concepts presented in the literature is presented in Chapter II. Since the conclusions about the intrinsic value are affected by the multiplier, Chapter III contains a review of the multipliers that are used by investors. Since the study is empirical in character, Chapter IV describes the research methodology.

The Graham, Dodd, and Cottle evaluation of the data is presented in Chapter V, and the results are shown in comparative form.

In Chapter VI a brief summary of the findings and the conclusions of the study is presented.

Sources of Information

This investigation is not an attack on the various theories of cost of capital presented to date. Rather it

is a test of the M & M independence hypothesis. The yardstick used in the test is somewhat different from those used to date.¹⁵ The measuring techniques used by others will be discussed in more detail in Chapter II.

Financial Literature: A search of the existing literature was necessary in an effort to discover the present state of knowledge on the cost of capital and its use in the theory of financial management. Further it was necessary to justify, in the analyst's mind, the appropriateness of the "intrinsic value" approach and its use in security analysis. It was then necessary to determine whether or not there existed a direct relationship between value analysis and the cost of capital. It was also necessary to ascertain that sufficient information on the sample companies was readily available and sufficiently

¹⁵M. Miller and F. Modigliani, "Some Estimates of the Cost of Capital to the Electric Utility Industry," American Economic Review, LVI (June, 1966), pp. 333-391; Randall Bennet Haydon, "An Analysis of the Cost of Capital," (unpublished Ph.D. dissertation, Graduate College, University of Illinois), 1962; Alexander Barges, "The Effect of Capital Structure on the Cost of Capital," (unpublished Ph.D. dissertation, Dept. of Finance, Northwestern University), 1962; David Durand "Comment: The Cost of Capital and the Theory of Investment," American Economic Review, XLIX (September, 1959) pp. 639-654; John Litner, "Cost of Capital and Optimal Financing of Corporate Growth," Journal of Finance, XVIII (May, 1963), pp. 292-310; M. Miller and F. Modigliani, "The Cost of Capital, Corporation Finance and the Theory of Investment," American Economic Review, XLVIII (June, 1958), pp. 261-297.

complete to permit a reasonably accurate valuation of the security.

It is suggested by M & M that for arbitrage to be effective, the securities must be readily traded and sufficient information about stocks must be available to all possible investors.¹⁶ There is certainly no dearth of information on either of the two selected industries nor the selected firms within them. Indeed, the problem was more on how not to be overwhelmed by the abundance of data available.

Data about the companies and their operations are available in business periodicals and investment services as well as from governmental regulatory agencies. All of the companies in the sample are on listed exchanges (primarily the New York Stock Exchange). Moody's Manual; company annual reports; prospectuses; Standard and Poor's Investment Services, and the Value Line Investment Service were the principal quantitative data sources on the specific companies. The Securities and Exchange Commissions filing information was used where it was construed necessary to the accurate determination of the security value.

¹⁶Merton Miller, and F. Modigliani, "Some Estimates of the Cost of Capital to the Electric Utility Industry," American Economic Review, LVI (June, 1966), p. 338.

Literature of Related Disciplines: Many contributions from other disciplines were found to be useful to the study. Since major contributions to security analysis have been made with the aid of the computer, it was useful to review the literature on the use of computer facilities by the security analyst. Economics has contributed to the development of cost of capital and wealth maximization models.

Statistics has contributed useful tools, to this study, in the area of time series analysis, regression analysis and correlation techniques. In order to describe the flow of economic activity, whether it be of a firm, industry, or economic conditions in general and make judgments as to the relevancy of the set of factors selected and the predictiveness of the data, sets of observations were made (concerning economic activity)¹⁷ at different periods of time and correlation techniques applied to determine the closeness of the relationship between the selected variables which are thought to be causally related and also to determine the rate at which each is growing (or declining). Once the determination is made

¹⁷The selected economic activity to which these techniques will specifically applied are (1) earnings per share, (2) net profit to common, (3) net sales, (4) return to total capital, (5) dividends per share, (6) average market price, (7) book value per share, and (8) cash flow per share.

as to what the growth rate has been and the degree of confidence as to its reliability as a predictive tool ascertained, the results are used along with other adjusting criteria (See Chapter IV), to adjust the base multiplier. These basic quantitative tools are essential to this study. Without them the analyst would be left with a situation where decisions would be made using a very limited number of factors, applying intuition as to what the degree of change and its direction has been and using a very short time period for the analysis. If sound statistical techniques are consistently employed on acceptable data and the interpretation held within a disciplined framework, the probability of obtaining meaningful results is substantially increased. ✓

Contribution of the Study to the Field of Finance

The study seems justified on the grounds that the "intrinsic value" test has not been applied before in the determination of the cost of capital. In the search for useful measurements of the cost of capital, this research effort contributes a positive note. The effort does not solve all of the conceptual difficulties that exist. However, each plausible approach to the discovery of an accurate measurement of the cost of capital must be investigated and tested to determine if it might lead to a sound financial philosophy.

CHAPTER II

A SURVEY OF THE MOST SIGNIFICANT CONTRIBUTIONS TO THE COST OF CAPITAL

The preceding chapter briefly presents the two schools of thought concerning cost of capital and its measurement. In addition the question is asked as to whether there presently exists a general agreement on one reliable measure of the cost of capital to a firm. It appears, from the positions taken by the various authors that one reliable solution does not now exist.

The disagreements apparent in the literature on the cost of capital subject can be grouped into two basic schools of thought. One school holds that real costs of debt, after taking into account increases in the costs of equity, are the same as equity costs; hence, the marginal cost of capital to the firm is equal to its average cost of capital. In other words, the cost of capital should in theory be independent of the types of capital used. As a corollary the proposition is advanced that the total market value of a firm is unaffected by the composition of securities in its capital structure.

The second group, adherents to and professors of the traditional thought in finance, seeks to illustrate that

the average cost of capital can be affected by the nature of the capital structure.

The present study was undertaken to test the validity of the independence hypothesis by proceeding along somewhat different lines than those presented in the literature. The M & M independence hypothesis was selected as the focal point for the investigation. This was not done because the independence hypothesis is unique to these authors, but rather because they crystalized the positions taken in support of this hypothesis. Furthermore, they formulated their propositions in such a way that it lends itself to empirical investigation.

This work is another attempt at deriving such a measure. A summary of each of the more significant works on the subject of cost of capital is presented here. This has been done to enable the reader to more easily determine how this study fits into the work already done on the subject.

David Durand

The first of the works to be presented is that of David Durand.¹ In this work Durand suggests that the basic objective of the businessman must be to "maximize" his

¹David Durand, "The Cost of Debt and Equity Funds for Business; Trends and Problems of Measurement," Conference on Research in Business Finance (New York: National Bureau of Economic Research, Inc., 1952) pp. 215-61.

wealth. To Durand, maximizing wealth is maximizing the discounted value of his future income. Durand assumes that maximization of wealth is an acceptable objective and one that will provide a rational position from which to make investment decisions. Durand proceeds to develop a suggested method for the derivation of cost of capital which is to be used in making investment decisions. This model deals only with the costs incurred if one type of financing is used by the company. This obviously restricts the model's use. The cost of capital is identified as that rate of return that must be returned on every investment which at the very minimum must protect the total wealth position. The problem of risk arising from different income streams is considered and the "required rate" is adjusted for varying degrees of risk. He suggests that there is an "optimal" capital structure which will result in the best mixture of capital. The author's feelings on the effect of debt in the capital structure is that:

"Those who adhere strictly to this method contend: first, that conservative increases in bonded debt do not increase the risk borne by the common stockholder; second, that a package of securities containing a conservative proportion of bonds will justifiably command a higher market price than a package of common stock alone."²

Although an apparent advocate of the use of the present

²Ibid., p. 230.

value method for the determination of wealth, Durand uses some capitalization rate of earnings as its measurement. The discussion of which earnings figure should be capitalized received a major portion of his attention. Should it be net income before or after interest charges? He suggests that he tends to favor the net operating income approach (this is the capitalization of income before interest charges then subtracting the debts outstanding).

The position taken by Durand is essentially that found in the traditional literature. He concludes that:

"given a method of security appraisal, the cost of raising capital can be both defined and measured."³

The difficulty with this conclusion, as suggested by many analysts, is that there is no generally accepted technique for placing a value on a security. Durand, therefore, concludes that:

"there is at present no generally accepted system of appraisal; and hence there can be no generally accepted system of measuring costs."⁴

Consequently, without a system for measuring the value of a stock, Durand may suspect that cost of capital changes with varying mixtures of debt and equity in the capital structure, but ends without contributing a technique for

³Ibid., p. 246.

⁴Ibid.

substantiating his suspicion.

Benjamin Graham, David Dodd, and Sidney Cottle

These authors not only are among those who expound the traditional point of view, they are also major contributors to it. No difficulty exists between finance theorists as to accepting as fact the tax effect of using debt. As long as interest is deductible for income tax purposes, benefits to the user can arise. All theorists seem to agree on this. The significant question is whether or not the benefits accruing to the user of debt (and ultimately to the stockholder) are greater than just the tax savings. They imply that there is some optimal capital mixture with the suggestion that an acceptable bond component will raise the total market value of a firm.

"In our opinion the advantages to stockholders from the appropriate proportion of corporate debt will go beyond the indubitable tax savings ...The appropriate amount of debt is that which the company can safely borrow, which in turn is no more and very little less than investors may safely lend to it. The upper limits of such borrowing have been spelled out in our specific standard for bond investment...⁵

The authors compiled comparison of leverage and price-earnings ratios for some 30 major industries through

⁵Graham, Dodd, and Cottle, op. cit., p. 542. For another interesting position on the subject matter of limits on corporate debt see: Gordon Donaldson, Corporate Debt Capacity, Division of Research, Harvard Business School, Harvard University, (Boston, Mass. 1961).

1955-1959⁶ concluding:

"...we find nothing in our studies of actual experience which is seriously opposed to our thesis that companies with moderate debt are likely to have a larger enterprise value than the same type of company without debt."⁷

Modigliani and Miller

The work of Modigliani and Miller begins with the implicit hypothesis that the firm's objective should be one of maximizing the market value of its securities. They develop their proposition within the constraints of a world of perfect markets and rational investors concluding that two identical companies, i.e., two sets of assets offering net operating earnings of the same size and quality, must have the same total market value, regardless of the nature of the capital structure. The argument is based upon the premise that investors value a firm on the productivity of the firm's assets, identified as the present worth of an uncertain stream of earnings generated by these assets, with no significance assigned to the varying types of financing used to generate this income. This is stated in the Modigliani and Miller Proposition I.

"The market value of any firm is independent of its capital structure, and is given by capitalizing its expected return at the rate P_k

⁶Graham, Dodd, and Cottle, op. cit., p. 546.

⁷Ibid., p. 547.

appropriate to its class."⁸

This proposition can be stated in an equivalent way in terms of the firm's average cost of capital which the authors identify as the ratio of its expected return to the market value of all its outstanding securities. The proposition then becomes:

"...the average cost of capital to any firm is completely independent of its capital structure and is equal to the capitalization rate of a pure equity stream of its class."⁹

From Proposition I they derive Proposition II which concerns itself with the rate of return on common stock in companies whose capital structure includes some portion of debt. Proposition II

"...the expected yield of a share of stock is equal to the appropriate capitalization rate P_k 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 P_k and r ."¹⁰

Proposition III is espoused to be a simple rule for optimal investment policy by the firm. This optimal

⁸F. Modigliani, and M. H. Miller, "Cost of Capital, Corporation Finance and the Theory of Investment," American Economic Review, June, 1958, Vol. XLVIII, p. 268.

⁹Ibid., pp. 268-269.

¹⁰Ibid., p. 271. (P_k is regarded as the market rate of capitalization for the expected value of the uncertain stream of income from firms falling in a risk class and r is referred to as the rate of interest or, equivalently, as the capitalization rate for certain income streams.)

investment policy is one where the investment equates the marginal return on investment with an unchanging weighted average of cost of capital. Proposition III

"...the cut-off point for investment in the firm will in all cases be P_k and will be completely unaffected by the type of security used to finance the investment."¹¹

Modigliani and Miller's use of perfect markets, rational investors, homogeneous risk classes, fixed yields on bonds per unit of time, and the acceptance of personal leverage as a perfect substitute for corporate leverage led to the inescapable conclusion that financing policy was not a problem. It makes no difference how one finances the investment since the cost of capital remains the same regardless of type used.

Ezra Solomon

Ezra Solomon concludes, as a result of his investigation that the thesis postulated that a company's cost of capital is independent of its financial structure is not valid and that the cost of capital function has a shape substantially similar to the one postulated by the traditional point of view.¹²

The author separates his attack on the M & M position

¹¹Ibid., p. 288.

¹²Ezra Solomon, The Theory of Financial Management, Columbia University Press, 1963, p. 117.

by separating their thesis into two basic segments:

(1) an increase in borrowing (and hence in leverage), no matter how moderate or "judicious," can never lower a company's cost of capital, and (2) an increase in borrowing (and hence in leverage) no matter how immoderate or "excessive," can never raise a company's cost of capital.¹³

He indicates that most of the work done has been done in proving or disproving position number one. The proof offered by M & M is that personal arbitrage is a perfect substitute for business leverage and that this mechanism will keep the over-all capitalization rate for a more levered situation equal to the over-all capitalization rate for a less levered situation; hence, the type of financing used is not relevant to the determination of cost. For M & M this would be true regardless of whether it is judicious or excessive. Solomon does not center his attention on whether a judicious amount of leverage lowers the cost of capital. He states:

"Whether, in a tax-free world, the traditional view that k_0 does fall is correct or whether the Modigliani-Miller argument that k_0 does not fall is correct, in a world of taxable corporate incomes in which interest payments are tax-deductible, everybody agrees that up to a certain

¹³Ezra Solomon, "Leverage and the Cost of Capital," The Journal of Finance, Vol. XVIII, May 1963, No. 2, p. 275.

"judicious" limit of debt, k_0 declines as leverage is increased."¹⁴

Ezra Solomon does not explicitly state whether the value of a firm, in a taxable environment, can be enhanced by an amount greater than the undisputed tax savings.

On the second problem posed, Solomon is much more explicit and concludes that when leverage is considered to be employed excessively, the cost of capital will be affected as the suppliers of funds attempt to offset the added risk by receiving greater yield. While not being an advocate of the reasons behind the traditionalist position, he nevertheless lends support to their viewpoint. In summarizing his position he states:

"For moderate degrees of leverage (moderate with respect to capital market standards), the use of debt lowers a company's cost of capital. As leverage is increased, the tax benefits from debt are approximately offset by a rise both in k_d and k_e and the overall cost of capital changes little i.e., it has a horizontal segment, up to the point where the marginal rate of interest approaches the equity capitalization rate. Beyond this point, creditors are unlikely to permit further increases in leverage, but any company which insists on increasing its use of debt is likely to find that its cost of capital rises. There is an optimal range of leverage as far as the cost of capital consideration is concerned and at the upper end it is bounded by the point of leverage beyond which the marginal rate of interest demanded by the market exceeds the average cost of capital at that point. The

¹⁴Ibid., p. 276. k_0 is used here to mean the pre-tax overall capitalization rate or cost of capital.

location of this point is largely a function of standards held by lending institutions and is based on their evaluation of the business risks which the enterprise faces.¹⁵

Fred Weston

Fred Weston identifies cost of capital as the weighted average cost of capital (either at book value or market value).¹⁶ He sets about specifying how to identify the cost of each of the forms of financing. The cost of debt turns out to be the interest rate on debt (adjusted for taxes, issuance costs and discounts). Management must at minimum earn a yield on debt-financed investments which will keep unchanged the earnings available to common shareholders.¹⁷ He finds little or no difficulty with the specific identification of the cost of debt.

The cost of preferred financing is found to be substantially the same as debt.

"The definition of the cost of preferred stock is similar to that of the cost of debt--it is that rate of return which must be earned on preferred-stock-financed investments in order to keep unchanged the earnings available to common shareholders. This required rate of

¹⁵Ibid., p. 117. k_1 is the pretax debt capitalization rate or the cost of debt and k_e is the pretax equity capitalization rate or the cost of equity capital.

¹⁶F. J. Weston and E. F. Brigham, Managerial Finance, (2nd ed.; New York: Holt, Rinehart and Winston, 1966), pp. 285-286.

¹⁷Ibid., p. 282.

return turns out to be the preferred dividend (D_p) divided by the net price that the firm could realize from the sale of a new issue of preferred stock (P_m).¹⁸

The cost of equity financing presents more difficulty because the term value is used which tends to carry several different connotations. Fred Weston defines

"The cost of equity capital is defined as the minimum rate of return that must be earned on equity-financed investments to keep unchanged the value of the existing common equity."¹⁹

Weston proceeds to average in proportion to their usage the costs of internally generated equity and the costs of new outside equity, resulting in the weighted average cost of equity which is then further used in the calculation of the over-all average cost of capital.

The test Weston performs on the effect that differences in capital structure have on cost of capital and the analysis of the results lead him to take a position which reinforces traditional theory. He too used the M & M framework in testing cost of capital, but his results were somewhat different. Propositions I and III were found to be unacceptable:

"...in terms of establishing their underlying propositions, in my judgment they have essentially failed on Propositions I and III."²⁰

¹⁸Ibid., p. 283.

¹⁹Ibid., p. 284.

²⁰Ibid., p. 138.

It was suggested that Proposition II reinforced traditional theory rather than contravening it. In testing Proposition II, Weston used the M & M definition of leverage given in Proposition I (the ratio of debt to debt plus equity) and found that the regression relationship becomes curved upward as is suggested by traditional theory. The validity of Proposition II is not challenged by Weston.

Alexander Barges

The work of Alexander Barges can be separated into two parts the first of which concerns itself with the validity of the independence hypothesis as put forth by M & M.²¹ The second, was directed at the proposition that stock yields, or earnings/price ratios, are an increasing linear function of financial risk, as measured by the debt-to-equity ratio (market values).

The relationships put forth by M & M are empirically tested using three statistical samples consisting of 61 Class I railroads, 63 department store companies, and 34 cement companies. The test year selected was 1956. Barges tested each as a complete sample and one relatively homogeneous department store subsample. The test was made

²¹Alexander Barges, "The Effect of Capital Structure on the Cost of Capital: A Test and Evaluation of the Modigliani and Miller Proposition" (unpublished Ph. D. dissertation, Dept. of Finance, Northwestern University, 1962).

to determine whether earnings/price ratios increase significantly when the amounts of debt employed are moderate. The cement industry was also separated into two subsamples which compared the averages of the two subsamples. One of the subsamples consisted of firms using no debt, while the firms in the second subsample used debt. The test results obtained by Barges lends support to the traditional school of thought. Each of the tests suggests that the stock yields do not increase significantly when moderate amounts of debt are employed.

The railroad sample was tested using the entire sample and was also tested using five subsamples. He concluded, from his test that for the entire sample and for four of the five subsamples there seemed to be a significant correlation between the average cost and the financial structure. This would suggest that the cost of capital is not independent of the capital structure. The fifth subsample shows no significant correlation between average cost and capital structure but Barges concludes that a qualitative consideration of the observations suggest dependence.

Alexander Barges concludes by suggesting that the total market value of a firm is not independent of its book-value capitalization ratios, and as Graham, Dodd, and Cottle suggested in their writing, the value of a firm can be enhanced by using senior securities in the

capital structure.

Eli Schwartz and J. Richard Aronson

The object of the empirical test made by Eli Schwartz and J. Richard Aronson was to quantify statistically whether or not the average use of leverage by broad industrial groups tends to follow a consistent pattern over time.²² This would imply that the members of the industry believe there exists some optimal capital structure for the firm. If this is true it would further suggest that the cost of capital is not independent of the capital structure.

The study is essentially divided into two parts. In Part I the financial structures of the different industries selected (railroads, utilities electric and gas, mining and industrials) were examined at two points in time. The years selected for this test were 1928 and 1961. The statistical tests indicated that firms belonging to the same industry classification generally have similar financial structures whereas inter-industry difference in financial structures is more pronounced.²³

²²Eli Schwartz and J. R. Aronson, "Some Surrogate Evidence in Support of the Concept of Optimal Financial Structure," The Journal of Finance, Vol. XXII (March 1967).

²³Ibid., pp. 14-16.

Part II of the study was a test of the capital structures over a period of time. The same industry classifications were used. The time period selected for the test was 1923-1962. Although there were some alterations in the financial structures within given industries (such as the movement out of preferred stock and into bonds) the test results indicate that generally there has existed relative stability in financial structures despite changes in the level of taxes and the structure of the economy.

The statistics presented by Schwartz and Aronson indicate that the typical financial structure of a firm within a given broad classification differ significantly from the financial structure of a firm belonging to another class. These statistics lead Schwartz and Aronson to conclude:

"These statistics provide surrogate evidence for the hypothesis that the various classes of industries have developed optimum financial structures conditioned by the intensity of their operational risks and by the characteristic of the industry asset structure."²⁴

The authors suggest the only other alternative explanation for the consistency of financial structures.

"The alternative explanation for the consistency of financial structures is to ascribe them to the traditions and customs prevailing among corporate treasurers and the suppliers

²⁴Ibid., p. 17.

of capital."²⁵

The authors suggest that while this hypothesis is not untenable, it is not one which holds much appeal to the majority of economists. The reasons given for the existence of persistent custom and operational rules-of-thumb is that

"...they have developed as reasonable approximations to a theoretically ideal solution."²⁶

The tests applied by Eli Schwartz and J. Richard Aronson indicate that there are industrial differences in financial structures; industries in a given classification tend to have similar financial structures, and that over time the general tendency for the financial structures within a given class has been constant. The authors suggest that there is some optimal capital structure and hence conclude that the cost of capital cannot be independent of a firms capital structure.

Summary

From the review of these selected writings one can readily detect disagreement does exist on whether or not the cost of capital can be affected by the types of financing used. There are those who support the position that

²⁵Ibid., p. 17.

²⁶Ibid.

cost of capital is unaffected by the capital mixture, and those who support the traditional position that cost of capital is directly affected by the capital mixture. Most of the arguments reach their conclusions through the use of theoretical models and through the use of deductive reasoning. Still a few others strive for proofs based upon the use of empirical data. In any event, as was stated earlier by M & M:

"Too little work has yet been done to permit even a rough calibration of these series as proxies for the cost of capital."²⁷

There seems to exist sufficient room for another empirical test. This work is just such a study.

²⁷M. Miller and F. Modigliani, "Some Estimates of the Cost of Capital to the Electric Utility Industry," American Economic Review, LVI (June, 1966), p. 334.

CHAPTER III

THE MULTIPLIER

The multiplier concept is important to this study. Conceptually, the multiplier is a derived number which states a relationship between estimated earnings and price. It reflects the investor's evaluation of a company's security. For example, if it is estimated that the company's annual earnings will be \$3.30 per share, after taxes, and a desired rate of earnings on the stock is 16.5 per cent, the capitalized per share value of the stock is \$20. This is 6.06 times the estimated annual earnings. This "multiplier" is found by dividing the desired rate of return into 100. If, on the other hand, the desired rate of earnings on the stock were 10 per cent, the capitalized value of the stock would be 10 times \$3.30, or \$33.

Since the conclusions reached are affected by the selected multiplier, this chapter contains a review of the development of the multipliers that are used by investors. For the purpose of this study the author restricted himself to the search for intrinsic values and changes in them. Hence, the multiplier techniques have

been restricted to a few which attempt to ascertain the intrinsic value by applying to earnings, dividends or some combination of both, a multiple or its reciprocal, the capitalization rate.

Introduction

The multiplier concept as it has been applied to common stock valuation evolved somewhat gradually, gaining increasing momentum as stocks became recognized as possessing investment qualities. The selection of multipliers fall into two broad classifications. The first approach finds the multiplier being derived through the mathematics of present value. The second, and seemingly to some a less definitive approach, is the derivation of a normal market multiplier which is then adjusted to an individual security.

Development

While there is no real evidence when the intrinsic value approach was first used as applied to investments, an early reference to it is to be found in the publication of William Armstrong's pamphlet, in 1848, "Stocks and Stock Jobbing in Wall Street," which noted "intrinsic value" as a principal determinant in setting the market

prices of securities.¹ The basic postulation, in security analysis, that a stock has value apart from its market price, established a basis from which a valuation process, as distinct from price forecasting could develop.

The earliest of the major proponents of this theory of value was Charles Dow, whose editorials in the Wall Street Journal of the 1880-1900 period were destined to become the basis for much of the theory of investment that appeared in financial literature through 1920. From his writings it can be concluded that the market price is a function of three variables: the primary movement determined by intrinsic value; the secondary movement governed by manipulation, and the tertiary movement resulting from daily fluctuations precipitated by current events extraneous to the security itself.² The first movement governed by intrinsic values is considered most influential as a consequence of its having the most durable market effect.

This theory of a common stock's inherent worth became well entrenched, being expressed not only by Dow,

¹William Armstrong, "Stocks and Stock Jobbing in Wall Street," 1848, p. 12, cited by B. Graham, D. Dodd, and S. Cottle, Security Analysis: Principles and Techniques, 4th ed. (New York, 1962), p. 27.

²G. W. Bishop, Jr., Charles H. Dow and the Dow Theory, (New York, 1960), p. 226.

who instructed, "First of all, know value,"³ but also by other financial giants of the early twentieth century. Among these are the Rothchilds who "are said to have acted on the principle that it is well to buy a property of known value when others wanted to sell."⁴

As a result of the editorials by Dow, and broad interpretation of them by writers and investors of the period, a general theory of common stock investment and speculation arose focusing largely on forecasting price movements through the use of the Dow Jones Industrial and Rail Indexes. No writing of the period, however, including those of Dow, enunciated a theory or specific method of evaluating a security. The concept of value was described as

"determined by the margin of safety over dividends, the size and tendency of earnings, the soundness of the balance sheet and of operation methods, and general prospects for the future."⁵

This concept of value became a general tenet for "scientific speculation," thus making Dow a major contributor to the ultimate development of theories aimed at objectively determining a security's true worth.

³A. Bernhard, The Evaluation of Common Stocks, (New York, 1959). p. 34.

⁴S. A. Nelson, The ABC of Stock Speculation, (New York, 1903), p. 28.

⁵Ibid., p. 61.

The First Multipliers

The direct formulation of a multiplier of earnings or dividends concept, isolating investment decisions from the reigning chartist theories, was not expressly developed until the middle 1930's. Prior to World War I, the dominant valuation technique was based on the asset value of a firm, thus making intrinsic value a function of the book value. During this period par value was a meaningful term, being associated with the invested capital of the firm. Multipliers reflected the quality of the issue and were applied to par value plus accumulated surplus.

"One of the dependable signs of an investment issue was an average market price close to or exceeding the par value. Most of these stocks were understood to be backed by a real capital investment equal to their par value plus accumulated surplus."⁶

This primary dependence on asset value led to the development of a rigorous series of balance sheet investment tenets on which the safety of a security and its worth were judged.

As early as 1909, John Moody expressed the opinion that stocks should be bought to yield an adequate return without undue risk. For there is

"One thing...(an investor)...can properly count upon, viz., that he must expect to

⁶B. Graham, D. Dodd, and S. Cottle, op. cit., p. 405.

pay a fair price for a good security--one that will return him no more than a moderate interest."⁷

Moody by implication confined "moderate interest" within the range of 5 to 7 per cent the yield on secure bonds and preferred stocks for the period. This is not significantly different than the "Central-Value" approach used by Graham and Dodd, some 40 years subsequent.⁸ It was this concept of buying a stock at a price which provided for an adequate return that most likely resulted in the derivation of an earnings multiplier prior to World War I. Quality stocks of the era preceding the war were selling to yield 6 per cent. With an average dividend pay out of 60 per cent, this resulted in a "normal" multiplier of 10 times earnings--a multiple that was widely used as the basic criterion for estimating the value of a security.

The difference between the valuation technique using asset values in arriving at a value for a security and the valuation technique relying on earnings ratios is rather distinct in that the asset value approach was based on principles of "unquestionable validity and significance,"⁹

⁷Moody, Art of Wall Street Investing, (New York, 1909), p. 26.

⁸B. Graham, D. Dodd, and S. Cottle, op. cit., pp. 744-745.

⁹N. Molodovsky, "Stock Values and Stock Prices," Analysts Journal, (May, 1960), p. 12.

while reliance on the earnings ratios was more subjective, becoming largely a matter of opinion as to the definition of an adequate earnings multiplier. With the advent of the bull market of the twenties though, both "normal" price earnings multiple and the previous decades tenets of valuation became increasingly liberal and

"The carouse of the 1920's succeeded in mixing up speculative and investment viewpoints in inextricable fashion."¹⁰

Development of Present Value

One of the more influential writers of the 1920's was Edgar Lawrence Smith. He concluded that the trend of common stock prices were

"strongly reminiscent of a graph representing the effect of compound interest at some constant rate,"¹¹

thus laying the foundation for subsequent present value theories and the growth stock philosophy. It appears evident that with the publication of Smith's book in 1924, common stocks established an investment status, contrasting their previous stature as trading vehicles. This provided an opportunity for practical application of present value theory to security analysis.

¹⁰B. Graham, D. Dodd, and S. Cottle, op. cit., p. 409.

¹¹E. L. Smith, Common Stocks as Long-Term Investments, (New York, 1924), p. 77.

Smith deduced, in what appears to be among the first statements on growth stock philosophy, that price appreciation was the result of a corporation's "reinvestment of earnings in productive operation."¹² This conclusion induced Smith to formulate his "Law of Increasing Stock Values and Income Return" which was expected to govern the appreciation of common stocks. This law held that

"Over a period of years, the principal value of a well diversified holding of common stocks of representative corporations, in essential industries, tends to increase in accordance with the operation of compound interest."¹³

The limitations of the theory were frequently misunderstood or simply ignored. The theory seemed to become justification for the speculative enthusiasm that culminated with the crash in 1929.

The sobering effect of 1929 moved investors once again to search for a more rational basis upon which to govern their investment decisions. Robert Wiese attempted, in a 1930 article in Barrons to

"reconcile the panic and the common stock theory, point out the obvious limitations of the latter and measuring these limitations in light of current conditions."¹⁴

¹²Ibid., p. 77.

¹³Ibid., p. 15.

¹⁴R. G. Wiese, "Investing for True Values," Barrons, Sept. 8, 1930, p. 5.

Thus, by expounding upon the basic theory of Smith, Wiese formulates what may be considered the first expressed multiplier approach using theory of compound interest to derive present value; that which he suggests has become the fundamental thesis underlying all subsequent present value techniques. He states

"...the proper price of any security, whether a stock or bond, is the sum of all future income payments discounted in order to arrive at the present value."¹⁵

One of the other exponents of the present value approach to security valuation was J. B. Williams. In his detailed thesis of 1938, The Theory of Investment Value, he further developed and refined the concept helping to establish the present value approach as a basic technique of security valuation. In this work the author stated explicitly that which was largely implied by previous writers. Summarizing the technique, he states that,

"...a stock is worth the present value of its future dividends with future dividends dependent on future earnings. Value thus depends on the distribution rate for earnings, which rate is itself determined by the reinvestment needs of the business."¹⁶

¹⁵Ibid., p. 5.

¹⁶J. B. Williams, The Theory of Investment Value, cited by N. Molodovsky, "Valuation of Common Stocks," Analysts Journal, (Feb. 1959), p. 87.

Present value lay dormant as a valuation technique in the decade following William's book, possibly as a consequence of its almost complete emphasis on the future, which was not widely acceptable in the conservative market of the 1940's. Investors of this era were cautious, relying heavily on the history and asset value of the firm in ascertaining the merit of its securities. As a result of this general market sentiment, price earnings ratios tended to be historically low, and thus, their justification could largely be found on the basis of the firm's current earning power. The requirement was not so much that a specific growth be maintained for a given period, but rather that current earning power not decline. However, with the growing recognition and popularity of the growth stock in the latter part of the 1940's and the resulting necessity to rationalize the relatively high multipliers they commanded, investment techniques using present value once again found a following, and new methods began being formulated in the mid 1950's.

In the time span between the initial development and subsequent revival of present value, there were several multiplier approaches which sought to aid analysts in the objective determination of the investment worth of a security. These tended to be less mathematically rigorous than

the present value approaches taken by Smith, Wiese, and Williams. Among the first of these, originally published in 1937 by Arnold Bernhard, is the Value Line Survey.

Bernhard's proposed method, which has been increasingly refined since its inception, is based on the premise that

"...there are influences that shape the psychology of the average man over a period of time."¹⁷

Although its author considers the Value Line approach as an intrinsic value approach, its heavy dependence on market factors results essentially in a technique of price forecasting which integrates two separate multiplier approaches in concluding an investment decision.

The early technique consisted of deriving, at first by visual fit and then by application of multiple correlation, formulas denoting the relationship between the dependent variable of price and the independent variables of book value, earnings and dividends per share, and price lag. This was the basis of the valuations into the late 1950's. However, as a result of the inherent limitations of time series analysis, the method was revised. In an effort to overcome time series defects, a cross sectional

¹⁷A. Bernhard, op. cit., p. 21.

approach was implemented, where a single formula is derived for stocks of "like quality," and adjustments are made to fit the formula to an individual stock's price performance history. The derivation of group formulas represents the survey's primary multiplier approach and requires the initial development of quality grades to serve as a guide line for categorizing stocks.

The major problems incurred in the application of correlation techniques to individual securities lay in the inability to discriminate among other stocks in the market, and in the loss of representativeness resulting from the long time spans necessary for the development of a relevant trend.¹⁸

A secondary multiplier approach employed by the survey is directed at estimating the average price of the security over a projected three to five year period. This average price is determined by first forming a hypothesis of the economy over the projected time span which serves as a common denominator from which all securities of the survey can be analyzed.

"Even if this method failed to give an accurate forecast of the economic environment..it still had the virtue of providing a common background against which to project the potentiality of a great many stocks relative to one another.."19

¹⁸Ibid., p. 96.

¹⁹Ibid., p. 80.

The master index of this forecast is the estimated Gross National Product which is computed from projections of population, work force, productivity and average work-hours. Having this, the national income accounts are derived and a correlation is sought between the firm undergoing analysis and a specific income account. On the basis of this correlation, sales are then extrapolated from which the profit margin and ultimately the payout ratio is projected and applied to future earnings. A "normal" capitalizer is then sought to apply to the estimated dividends. Since the yield of a given security will fluctuate widely with price,

"...and the price of the individual stock will fluctuate to a degree, in sympathy with general market sentiment,"²⁰

an attempt is made to reduce this market sentiment factor by dividing the average yield of the individual stock by that of the market (as computed from an index of 45 stocks chosen for their persistent and high dividend policy). The probable yield of the individual security is then computed as this percentage of the projected market yield, and future dividends are capitalized at the resultant rate. The security is then ranked into one of the survey's five appreciation potential groups in accordance with the forecasted change in price.

²⁰Ibid., p. 70.

As with the survey's first approach this method of placing a value on a given security is not an intrinsic value, but a relative value approach. In attempting to hypothesize an economy, and in seeking a normal relation between the firm's capitalizer and that of the market, the analyst in reality concludes with the relative value of the security

"...in terms of the then existing level of stock prices and not...determining the fundamental worth of the stock."²¹

This method has merit in that it forces the analyst to formally integrate macro-economic analysis into the study of a company. The approach implies that expected average price would represent the discounted present value of an infinite series of dividends yielding the normal rate of return. This is not the expressed objective of the method, nor are the considerations adequately inclusive to be considered an acceptable value technique. It is a method of estimating the average market value of the stock over the coming 3 to 5 year period. This subjects it, as well as the preceding approach, to all the uncertainties of price forecasting, since,

"...the processes of the stock market are psychological more than arithmetical. This produces the well-known tendency of

²¹B. Graham, D. Dodd, and S. Cottle, op. cit., p. 27.

stock prices...to go to extremes in either direction, as optimism or pessimism holds sway."²²

The Graham, Dodd, and Cottle Approach

Since their initial publication of Security Analysis in 1934, Graham and Dodd (and now Cottle), have proposed what is essentially a discipline for the security analyst, contrasting distinctly the more rigorous, highly assertive methodology of Value Line and the mathematical exactness of present value. Except for the recent considerations of growth stocks in the 1962 edition, the authors have declined to give an express formulation for the derivation of a multiplier applicable to an individual firm. They do not want to imply a generalized objectivity that does not exist. Instead they develop a series of tenets and a basic format for undergoing an analysis of each prospective security on which to base a valuation consisting of both qualitative and quantitative factors.²³

The foundation upon which their discipline rests is historical, for

"...in seeking a guide to the future a prudent person always begins by consulting past experience."²⁴

²²Ibid., p. 513.

²³Ibid., pp. 85-97.

²⁴Ibid., p. 508.

Information is readily available to indicate that business and its development is substantially more evolutionary in nature than it is revolutionary, hence, the initial phase of analysis being historical is justified.

Although not specifically stated, their choice of multipliers for securities and in particular for those identified as "lower" and "middle" group securities (generally those of investment merit with earnings growth of less than 7.2%) consists of the summation of two elements:

"First, the analyst should establish for himself a basic capitalization rate which he will apply to common stocks generally--i.e., to a comprehensive group of companies, such as those in the Dow Jones Industrial average and in the Standard and Poor's Composite Index of 500 companies. Second, he will develop, for the individual issue, a multiplier which is related to this basic or overall rate but which also reflects his appraisal of the record, quality, and long-run prospects of the specific company."²⁵

It is the second adjustment which is left to the ingenuity of the analyst. This adjustment is such that it reflects the analyst's judgment on the qualitative factors which are in themselves expected to influence the long-term prospects. This exclusion of an explicit method for deriving what amounts to the most significant element of the valuation process can be viewed as evidence of the subjective nature of the valuation process.

²⁵Ibid., p. 507.

The Central Value Approach

Two interrelated techniques are suggested to determine the first element of the Graham, Dodd, and Cottle implied formula, consisting of a "base" or "normal" market multiplier. The "Central Value" approach is predicated on the hypothesis that the normal market capitalization rate for common stocks is a function of the general interest rate (or some multiple thereof) on high grade corporate bonds. Conceptually, in a "rational" market where the investor selects his investment from between bonds and stocks, according to yield differentials, such a relationship holds. Unfortunately, there exists no conclusive evidence that such is in reality, the case. Indeed,

"By one of these disconcerting coincidences, the five-year period of lowest bond yields happens to be the period of highest common stock yields."²⁶

The method has been criticized because it finds its justifications solely on the empirical fact that coincidentally, twice the reciprocal of the market interest rate on Moody's Aaa bonds, yields a multiplier which, when applied to the Dow Jones Index's 10 year average earnings, approximates that on the midpoints of successive market swings over some selected time period (in this case 1924-

²⁶Ibid., p. 510.

1955). If, as some suggest,²⁷ there is a moderation of the business cycle occurrence and its resulting effect on security yields, this method would yield incorrect conclusions. As shown in the appendix of their most recent edition²⁸ such an approach would have forecast a central value for the 1961 Dow Jones Average of 360, which was a significant 51 per cent under that year's high of 735.

As an adjustment to the old "central value" formula a correction was attempted for the apparent understatement of value. A reduced multiple of 1.33 is randomly (and without explicit justification) chosen and applied to the reciprocal of the three year Aaa bond yields. The authors do not attempt to adduce a rationale behind the selection of this 1.33 multiple, other than its production of a reasonable value for the then most current analysis of the averages. The fact that it is not objectively formulated on an "a priori" basis strongly suggests the authors' selection of a normal market level prior to making the adjustment, thus potentially raising the question of the propriety

²⁷Harry C. Sauvain, "Common Stock Prices in the Sixties," Business Horizons, Vol. 3, No. 3 (Fall, 1960), pp. 33-38, and Benjamin Graham, "Some Investment Aspects of Accumulation Through Equities," The Journal of Finance, Vol. XVII, No. 2 (May, 1962), pp. 203-214.

²⁸B. Graham, D. Dodd, and S. Cottle, op. cit., pp. 744-745.

of using a formula constructed to confirm a subjectively evolved value. The authors themselves indicate that the assumption should not be drawn that

"...the method employed is either theoretically sound or practically dependable under all circumstances. However...it...should have collateral utility as a check upon valuations based upon projected earnings."²⁹

Even as a supplementary method of valuation the utility of this method is questionable, considering the formula is based on a theoretical relation between stock and bond yield that may not exist and is unrelated to the potential earnings performance of the averages.

The Normal Market Multiplier Approach

The second technique employed by the authors as the primary determinant of the market multiplier relies on the historical mean price earnings ratio of the Cowles Commission - Standard and Poor's Composite series over the 85 years from 1871 to 1955.³⁰ This is found to result in the mean of the ten 20-year averages being 13.5 times or an earnings price ratio earnings yield of 7.4 per cent. This is intended to be representative of a normal relationship. However, it is held that liberalization of the historic mean is appropriate as a consequence of the added economic stability likely to result from the government's

²⁹Ibid., p. 744.

³⁰Ibid., p. 509.

active commitment to use monetary and fiscal tools to prevent the recurrence of another serious business depression. Thus, arbitrarily a multiple of 15, representing an 11 per cent increase over the former, is chosen as an adequate replacement.³¹ This multiplier is the assumed current market's normal price earnings ratio. Theoretically though, in accord with Graham, Dodd, and Cottle, one should seek a multiple to apply to future expected earnings, not current earnings, for then the earning power of the market will be reflected. To accomplish this, a process of reasoning is used which ends up circular in nature and ultimately yields the same conclusion that would have been reached by multiplying the normal ratio by current earnings.

This type of reasoning can be seen in Graham, Dodd, and Cottle's more recent valuation of the Dow Jones Industrial Averages. It is recommended here, as in all applications of a multiplier under their discipline, that it be applied to the average future seven years earnings. However, to prevent what they believe is

"counting the same trick twice--once in the estimate of larger earnings and again in using the capitalization rate which was anticipating the increase"³²

³¹Ibid., pp. 745-746.

³²Ibid., p. 513.

the multiplier is discounted by a rate equivalent to that at which earnings are projected. Thus for example, if the earnings of a firm were expected to grow at a rate of 3.5 per cent for the next seven years, the average of the seven years earnings will approximate 1.15 times current earnings. If one were to apply a multiplier which anticipated the earnings to the future earnings figure, which is the suggested technique prior to alteration by Graham, Dodd, and Cottle, one would surely be counting the same trick twice. To adjust for this over valuation the authors suggest a refinement to their valuation method. The analyst is offered the choice of discounting the multiplier downward by the anticipated growth rate or discounting the expected future earnings downward (keeping the multiplier unchanged) by the anticipated rate of growth.

To illustrate this technique, assume M is equal to a market multiplier of 15 which anticipates the growth rate; D is equal to a factor to remove the anticipated growth rate of $3\frac{1}{2}$ per cent from the market multiplier (the factor 1.15 is the result of a $3\frac{1}{2}$ per cent compound growth rate for four years); E represents the current earnings of \$10, and E' is \$11.50 which is the current earnings adjusted upward by the anticipated growth rate (at a compound growth rate of $3\frac{1}{2}$ per cent for seven years, the average earnings in the fourth year will be $1.15 \times \$10$, or \$11.50).

In the first situation the analyst applies the "refinement" and discounts the multiplier by the anticipated growth rate arriving at the value as shown below.

$$\begin{aligned}
 (1) \quad \text{Intrinsic Value} &= \frac{M}{D} (E') \\
 \text{Substituting} &= \frac{15}{1.15} (\$11.50) \\
 &= 13.043 \times \$11.50 \\
 \text{Intrinsic Value} &= \underline{\underline{\$150.00}}
 \end{aligned}$$

A second approach is possible which yields numerically the same answer. In this second situation the analyst includes the growth rate in the multiplier and uses current earnings (the multiplier of 15 is obtained from the use of a normal multiplier of 13 times 1.15 which is the adjustment for a $3\frac{1}{2}$ per cent compound growth rate to the fourth year.)

$$\begin{aligned}
 (2) \quad \text{Intrinsic Value} &= M (E) \\
 \text{Substituting} &= 15 \times \$10 \\
 \text{Intrinsic Value} &= \underline{\underline{\$150.00}}
 \end{aligned}$$

The author's refinement effectively returns the analyst to a valuation method in which the value is determined by multiplying the current earnings by a multiplier which includes an expected growth rate.

Apart from the inapplicability of their refinement, the general approach to a normal base multiplier is on a theoretically unsound base. The deficiency of any method

of valuation by a normal historical earnings multiple lies in the fact that it can only be representative of a group of firms with stable earnings, since it does not reflect changes in earning power. For the suggested method to result in a "true" valuation, there would have to exist a normal market relation between earnings and price, with the latter being the dependent variable subject to derivation by the analyst. As shown by Molodovsky, such a derivation is at minimum difficult, since there has been no significant correlation between high (low) prices and high (low) price earnings ratios. As illustrated in his study,

"During the early phase of the great bull market of 1921-1929, price-earnings ratios began to decline as prices started rising."³³

Thus, the ratio being a derivative of the price it is supposed to measure, restricts its use as an adequate market index and multiplier.

This approach is therefore subject to criticism, as are all attempts at deriving a normal multiplier, as a consequence of its largely subjective nature. The authors offer these two techniques as a possible means to approximate what is normal, but suggest their use only for lack of an apparently better method. Essentially what they are

³³N. Molodovsky, op. cit., p. 11.

stressing is not the express technique, but rather the need to define this normalcy as a frame of reference for adducing a multiplier that reasonably depicts the value of an individual firm.

The Dividend Correction Factor for the Earnings Multiplier

A multiplier derived by the use of the "Central-Value Approach," which as noted identifies the multiplier as a function of some selected interest rate, or the "normal market multiplier approach" which identifies the base multiplier with some historical mean price earnings ratio results in a capitalization of earnings and does not explicitly reflect varying corporate dividend policies (although they may be implicit in the multiplier itself). If it is not implied then it is deemed necessary to use a correction factor which results in weighting dividends and earnings in a manner consistent with the firm's rate of return on additional investment. Graham, Dodd, and Cottle are again reluctant to offer a formula applicable to the broad category of stocks, however, they do maintain that for below average industrial stocks (defined as those selling below 1.5 times book value), the formula $V = M (D + 1/3 E)$, where V is the intrinsic value, M is the multiplier, D is the dividend payout rate, and E is the earnings, is applicable. This effectively states that any payout less than the normal, which the approach assumes

to be $2/3$ of earnings, results in a reduction of the intrinsic value, while anything greater than $2/3$ results in an increase in the intrinsic value. Because of the low rate of return on investment retained by firms in this marginal category, the formula likewise gives dividends four times the weight of earnings in the ultimate valuation. This does not appear unreasonable if the rate of return on additional investment is less than the stockholder can anticipate earning on securities of similar risk by reinvestment of the dividends; for in such a case, the greater the payout, the more valuable the firm relative to the stockholder.

A formula has not been introduced for that wide range of firms in the middle group which have opportunities for profitable reinvestment of earnings, yet are not likely to grow at the 7.2 per cent rate that the authors consider minimal to be classified as a growth company (in which case dividends are not considered in the valuation). Methods, however, have evolved which attempt to place a value on retained earnings dependent upon a firm's rate of return on incremental investment.³⁴

³⁴J. E. Walter, "Dividend Policies and Common Stock Prices," The Journal of Finance, Vol. XI, No. 1 (March, 1956), pp. 29-41; J. Lintner, "Distribution of Incomes of Corporations among Dividends, Retained Earnings and Taxes," American Economic Review, XLVI, May, 1956, pp. 97-113;

These methods are not inconsistent with the preceding, in that they require the development of an initial multiplier (or a capitalization rate which is its reciprocal), reflecting the normal price-earnings ratio for the firm. This "normal" ratio, in the long-run, is assumed to reflect the firm's true value and can therefore be derived through the Graham, Dodd, and Cottle approach.

Summary and Conclusions

This chapter traces the development of representative multipliers and their weaknesses and strengths. It is readily perceived that no method is completely adequate for the determination of a multiplier. It was shown that the concept of the multiplier evolved gradually subsequent to the recognition of common stocks' intrinsic worth. Rudimentary multiplier approaches appearing prior to 1930 were concerned with the price to book value and price to earnings relationship. Following the crash of 1929, more refined techniques were sought to determine a stock's investment worth. Present value theories arose from which

J. Lintner, "Dividends, Earnings, Leverage, Stock Prices and the Study of Capital to Corporations," Review of Economics and Statistics, XLIV, August, 1962, pp. 243-270; Myron J. Gordon, "Dividends, Earnings, and Stock Prices," Review of Economics and Statistics, XLI (May, 1959), J. E. Walter, "Dividend Policy: Its Influence on the Value of the Enterprise," The Journal of Finance, XVIII (May, 1963), pp. 280-291.

a wide variety of methods have been developed. In the latter 1930's, two approaches distinct from present value, yet proposing the same objective, were introduced; these were the Value Line and the Graham and Dodd methods.

All formulas considered within this study profess the derivation of intrinsic value as the principal objective, though none lay claim to be definitive or completely representative tools. They do, however, offer tentative regressions of these variables which the respective authors deem important in measuring value, and thus, investment worth. The factors used (or not used) and the assumptions made regarding these factors vary widely illustrating the subjective nature of the valuation process. This work avoids most of the serious problems resulting from such differences in judgment.

It is not thought necessary to this work that a base or "normal" multiplier be selected which would satisfy all analysts. It is sufficient to this work that the author select a base multiplier falling within the Graham, Dodd, and Cottle suggested range of 7-20. The multiplier selected will be used as a beginning reference point both before and after changes in the capital structures. Other analysts might disagree with the reference point, and hence the resulting intrinsic value, but because the test

holds the base multiplier constant before and after capital structure changes there should result no disagreement as to the direction of the change in value.

The significant aspect of this work is the identification of the direction of value change and is not the identification of a specific dollar value of the security upon which all would agree. It will be sufficient to the work if movements in intrinsic value do result, and direction identified in order to ascertain whether Modigliani and Miller are correct when they conclude that cost of capital is independent of the types of finances used.

Graham, Dodd, and Cottle are perhaps the most realistic proponents of an acceptable approach to security valuation, declining to submit the derivation of a multiplier to a single formula (except possibly in their recent consideration of the growth stock category). Instead, they elect to stress what is indeed the most difficult aspect of the valuation process, the rigorous discipline of analysis. In emphasizing this discipline they are among the major contributors to multiplier theory, for regardless of the technique valuations are only as accurate as the assumptions entering into their determination. In determining the ultimate multiplier the authors submit a range of conservative multiples and accent an awareness of historical norms, from which the analyst derives his own price earnings multiple.

CHAPTER IV

RESEARCH METHODOLOGY

Before presenting in detail the specific methodology it seems useful to identify the general nature of the methodology that is used in this study.

The research proposed does not lead to a new theoretical model. The empirical test lends itself to the development of the relationships between observed data. These relationships will be noted and will be expressed in a specific manner or in a generalized statement of tendency.

When the assumptions are stated and clarified these expressed relationships can be restated in the form of principles. These principles then express conclusions which are logically consistent. In this approach, the normative and the descriptive approaches to financial management become one.¹ If the course of behavior that should

¹Normative refers to a theoretically correct mode(s) of behavior. It might be expressed "a principle of right action binding upon the members of a group and serves to guide, control, or regulate proper and acceptable behavior." Descriptive refers to "a representation or discourse intended to give a mental image of something experienced or observed." A normative model as used in this work will be one which is conceptually sound in all of its aspects. A descriptive model would represent action or behavior which is presently applied toward the attainment of some goal.

be, can be made the course of behavior that is, applied financial management's repertoire of tools will be enhanced. This will increase the probability of success of the firm of maximizing whatever it is attempting to maximize.

Selection of the Industries

Two distinct industries were selected for the test: (1) the cement industry and (2) the retailing industry.² Both of these industries were chosen to approximate the Modigliani and Miller concept of an equivalent risk class.³

This concept of risk class is a sensitive point in this work. As Professor F. Weston points out, the M & M identification of a risk class with an industry does suffer from problems of non-homogeneity in many cases. He suggests that the defects are aggravated in the risk class concept because the dependent variables which M & M seek to explain are particularly sensitive to differences in characteristics between firms conventionally grouped in a given "industry" by governmental agencies or inde-

²The cement industry needs little comment. It is an industry with all firms producing substantially the same product, and having basically the same operational problems. The retailing industry, however, is represented by 10 department stores. The ten selected companies have the same basic operational problems, and these companies together, as is true with the cement companies, represent a close approximation of an equivalent risk group.

³Modigliani and Miller, op. cit., (1966) p. 337.

pendent financial agencies.⁴

On the other hand, Graham, Dodd, and Cottle associate industry and risk class. They are aware that risk groupings identified with industry classifications are not without some weaknesses, but suggest that valuable contributions to security analysis can be made if the investigation is performed in sufficient depth so as to reveal the anatomy of the industry. Further, they recognize, that since World War II, companies have widened their product diversification so as to cause the development of a multi-industry classification. This without doubt causes the analysis and use of industrial classification to be fraught with more difficult problems for the analysts to solve. It is suggested by these authors that most industries of primary consequence have at their base a "hard core" of companies which, from the investment standpoint, are significantly comparable. Graham, Dodd, and Cottle suggest that the analyst use industrial data as broad indicators of the financial patterns of industries and not rigid, exact measurements.⁵

The sample companies selected for this study are to a certain extent heterogeneous. As with the selection of

⁴J. Fred Weston, Southern Economic Journal, "A Test of Cost of Capital Propositions," Vol. 30 (October, 1963) p.p. 105-12.

⁵Graham, Dodd, and Cottle, op. cit., p. 87.

any group of companies there will be differences among such factors as financial size, the market served, earning power, type of management et. al. That there are differences goes without challenge, but the reader should also be reminded that these are a matter of degree. The selection of the companies for this study was carefully done so that those heterogeneous factors are relatively few and those that did exist and appeared to influence the computations were given special attention. Adjustments were made to take them into account. The companies selected are sufficiently homogeneous to be of service. For this work it appears that an identification of risk class with an industry grouping is conceptually sound.

The Cement Industry

The cement industry as a result of a cautious attitude about expanding capital facilities found itself unable to meet the rising demand for cement in the early 1950's. The industry embarked upon a capital expansion program and by the end of 1962 had completed the program.⁶ Indeed, signs of over-capacity became evident in the early 60's. It appears that it will not be until the late 60's before the effect of this overexpansion and the problems inherent in it are eased somewhat.

⁶Standard & Poor's Industry Surveys, Building, June 30, 1966.

Significant to the study and to the selection of the sample firms was evidence of changes in capital structures. The companies within the industry, almost uniformly, exhibited such changes.

The problems existent in the cement industry are substantially the same problems for each of its members. The quality of portland cement is standardized and no manufacturer can gain any distinct advantage in this respect. Competition among the members of the industry is based upon price and service. The homogeneous nature of the products and the limited number of products produced makes for a more comparable analysis which in turn facilitates the formulation of more reliable industrial standards to be used by the analyst in the determination of average, above average, or below average performance of individual companies in the cement industry.

The indigeneous nature of the raw materials used in the production of cement coupled with high per unit freight costs makes the industry almost solely domestic and subject only to the effects of local economic forces. More than 90 per cent of all portland cement sold moves less than 160 miles to its destination.⁷ While the number

⁷Economic Report On Mergers & Vertical Integration In The Cement Industry, A Staff Report to the Federal Trade Commission (April, 1966), p. 18.

of prime producers of cement approximates fifty, the significant production is vested largely in the seven firms selected for study. These firms approximate in volume some 45 per cent of domestic production and 35 per cent of theoretical capacity. It was thought appropriate to exclude the forty smaller companies and concentrate effort on the significant economic entities.

In summary, the cement industry exhibited all or substantially all of the following characteristics:

1. All cement companies use basically the same techniques for producing cement and are in substantially the same technological position.
2. There is little diversification of products with all of the firms producing the same product.
3. The relevant sphere of competition for the cement industry is almost totally domestic in nature.
4. Each company is affected by substantially the same economic forces.
5. All companies exhibited significant changes in their capital structures during the period of the study.
6. There is an abundance of required financial data on all companies.
7. There is a concentration of production in but a few companies, which facilitates ease of handling the analysis.
8. The firms in the industry sample are individual entities and are free to make operating decisions without the influence of parent companies. They are not subsidiaries of some other economic unit.

9. The industry was in existence throughout the entire test period.

It is useful and helpful to comment on items 3 and 4 above. Even though competition is almost totally domestic and basically the same economic forces exert an influence on the selected companies, these factors vary from company to company as to the degree of influence they have on the results of the past and the potential for the future. As noted earlier, these heterogenous factors are adjusted. The Graham, Dodd, and Cottle approach would demand that an analysis of all the economic factors that would influence a company's results be done and some projection of what is anticipated for the future be made. In reference to 3 and 4 above, this would indicate that a thorough local and regional analysis be made. This author finds no quarrel with this approach. This study avoids reaching out into the uncertain future by not having to predict what the future holds for each of the companies in the sample. The data used was taken from various financial publications for a ten year time period. The data used was of known quantity. There was no need for the analyst to assign subjective probabilities to future events. The factors and events affecting the company's financial position are known and are reflected in the data used.

One might question the selection of the cement industry for inclusion in this study. This question obviously arises because it is not one of the so called glamour industries, glowing with high growth potential. However, an industry which is either romantically or otherwise glowing in nature would not meet the criteria for investment grade securities as defined in the model to be used. The securities of this type industry, being inherently speculative in nature, do not admit of a soundly ascertained value.

The Retailing Industry (Department Stores)

While many of the factors or characteristics of the cement industry and the retailing industry are similar there are obvious differences between the two. None of the differences is significant enough to cause insurmountable problems. The more complex nature of the accounting system of the department store operation, the tendency toward diversification of product sold, and the use of foreign subsidiaries tend to require more adjustments to the data of this industry than to that of the relatively simple data presentations of the cement industry. In each case, it appears possible to arrive at an accurate earnings figure and an appropriate capitalization rate. Some of the fundamental differences between these two industries are;

1. The number of products sold are many and diversified. There are tens-of-thousands of products sold.
2. The sample retailing firms are diversified geographically while the cement industry is local in character.
3. Because the department store industry is a differentiated oligopoly, competition may be on a basis other than price and service. The cement industry has but one undifferentiated product.
4. The department store industry is not totally domestic in its operations. Its relevant sphere of effective competition extends beyond the borders of the United States into other nations. The cement industry is domestic.
5. In retailing, retail sales are not concentrated in the operations of a few companies. Retail sales are made by widely divergent types of businesses. The department store industry controlled less than 10 per cent of all retail sales during the test period.⁸ By comparison to the high concentration of sales of portland cement producers (50-70 per cent) this percentage seems rather minute. Upon further inspection of the retail sales data it becomes apparent that some of the sales included in this category are for products in which department stores do not compete. As a share of department store sales, the selected firms represent a significant proportion of the total volume. During the test period the per cent of total department stores sales ranged from 57 per cent to 68 per cent. This apparent concentration is to some extent misleading. When one recognizes that stores other than department stores sell many of the same or substantially similar products, concentration diminishes markedly.

⁸U. S. Bureau of the Census, Statistical Abstract of the United States: 1966 (87th edition) Washington, D.C., table No. 1203, p. 811.

The ten department stores were selected with the intent to minimize any factors which might militate against the compatibility of the members of the sample. Further, these companies exhibited the necessary operational factors for the test. The companies in the industry, in large measure, do face the same economic pressures and basic operational problems. While it may be true that the percent of total sales of the industry accounted for by the selected companies does not represent as large a percentage as the companies selected for the cement industry, the department store companies nevertheless do represent significant economic units. There is no evidence that any significant differences would result in the findings of the study as a consequence of concentration or non-concentration of sales in the industry. The products sold by department stores number in the thousands, as opposed to the singular product of cement companies, but the sample firms handle, substantially, the same ones.

The department store industry exhibits the following characteristics:

1. There is for the industry an abundance of "good" data.
2. The companies in the industry are affected by the same general economic conditions and react to them in a substantially similar manner.

3. The companies in the industry are affected by and have substantially the same operational problems. They react to the problems in a substantially similar manner.
4. The industry was in existence throughout the entire test period.
5. The companies within the industry operate substantially in the same manner and sell basically the same mixture of products.

Criteria For Selection

The following is a list of the criteria used in selecting the companies within each industry.

1. The companies selected in both industries are of substantial economic size.
2. All of the companies within the sample have had and do have experienced management. There has been little change in the basic philosophy of the companies.
3. None of the selected companies is a subsidiary of another firm.
4. All of the companies in the sample are listed on exchanges (primarily the New York Stock Exchange), or information is otherwise available and of good quality.
5. Information about the selected companies is readily and promptly available in business periodicals and investment services as well as from governmental regulatory agencies.
6. Except for geographic differences, the impact of economic forces are felt in substantially similar degrees by each company chosen.
7. All sample companies exhibited changes in their capital structures during the period of the study.
8. The sample companies were in existence prior to the test period, during the test period, and after the test period.

Time Periods Selected For The Test

The sample companies are tested before and after changes in the composition of capital structure. The test is applied one year before and one year after the evident change. Testing one year before change should minimize the affects of any anticipatory nature on the reported results. Testing one year after provides sufficient time for the full affect of the change to take place.

The test period spans the time period beginning with 1954 and ending with 1963. This meets the Graham, Dodd, and Cottle requirement of a representative time period.⁹ It is suggested that a sufficient time period be used to allow a "normal" operational pattern to develop. This tends to eliminate any unusual or non-recurring occurrences which might bias the results. Significant, also, is the fact that during the test period changes occurred in the capital structures of the sample companies. The time period selected will also avoid any unnecessary difficulties arising from the use of multiple depreciation and depletion methods. By the end of 1954, and certainly throughout most of the test period the companies had recognized the value of taking the accelerated depreciation and depletion for income tax purposes and had integrated this method into

⁹Graham, Dodd, and Cottle, op. cit., p. 435.

their financial management programs. The test period chosen also facilitates ease in the analysts' handling of the income tax problem. The tax rate was constant throughout the period, not changing until the tax act of 1964. Further, there were no changes in the laws governing the depletion allowance and no special tax laws applicable to these two industries.

Finally, the time period avoids periods in which the United States was involved in armed conflict. The Korean conflict was over and the Viet Nam situation had not yet become of major economic significance to the United States. The operations of the sampled companies are more normal without the potentially disrupting economic influences that intensive war effort causes. The test should be unaffected by these atypical events.

Factors Analyzed In The Intrinsic Value Approach

Wilfred May, in his defense of the value approach to investment decisions, concludes that

"one's entire approach in the making of investment decisions should be concentrated on evaluating individual issues instead of trying to time market movements."¹⁰

¹⁰A. Wilfred May, The Commercial and Financial Chronicle, "Value Approaches To Investing Decisions", Vol. 186, No. 5686 (Thursday, October 31, 1957), p. 5.

Further, he summarizes neatly and completely an assessment of the worth of the value approach to security analysis when he states:

"Of course, I would be the first to admit that the value approach, that is, thorough appraisals, also contains imponderables and other 'bugs'. But, from long experience I can tell you that the 'bugs,' imponderables and the difficulties concerned with making appraisals are less harsh and destructive than those that are involved in market forecasting--which means trying to time movements of the market rather than the buying of individual stocks."¹¹

The value of a specific security must be a value determined and justified by thorough analysis of the facts, e.g., earnings, assets, dividends, and economic prospects. This is precisely the approach taken in this study. The financial data of the sampled firms was taken for a ten year period of time. The interpretation of the financial data proceeded along a logical course with the first step being the adjustment to the income statements. This action yields a true operating earnings figure for the period under investigation. Examinations of the balance sheets were made and relationships between various factors determined to yield information about liquidity, profitability, capital structure, price and payout, and the efficiency of the sampled firms. Growth rates for selected factors such

¹¹Ibid.

as earnings per share, net profit to common, return to total capital, dividends per share, etc., were computed and the correlation coefficient indicating the goodness of fit between the regression line and time determined. Most of the problems facing the typical analyst in attempting to project the future were avoided here. Subjective factors, such as management and economic projections are, for the most part unnecessary to the study except as they find their way into the operating results. As mentioned earlier in this chapter, the data used is historical and the impact of these factors are already fully reflected in the data. In this work it is this study of the known "facts" that will shed light on the company's over-all performance. With the actual performance determined, the analysts can make rational judgments on the attractiveness of the securities. The determination of the intrinsic value seems to logically follow from these judgments.

CHAPTER V

THE TEST

In calculating a value for a security one must use an already existing measuring device or develop one of his own. Adhering rigorously to the intrinsic value approach, as already identified, this author developed a formula containing all "necessary" elements as suggested by Graham, Dodd, and Cottle.

The suggested formula to be used in this study is as follows:

$$IV = \left[M \begin{matrix} (1+G_{EPS}) & (1+G_{NTC}) & (1+G_{RTC}) & (1+G_{DPS}) \\ \sum W_r W_R (D) \end{matrix} \right] E, \text{ where } -1 \leq D_i \leq 1$$

and where,

IV = Intrinsic Value

M = The Base Multiplier

$1+G_{EPS}$ = Growth in Earnings Per Share

$1+G_{NTC}$ = Growth Rate in Return of Net Profit to Common

$1+G_{RTC}$ = Growth Rate in Return to Total Capital

$1+G_{DPS}$ = Growth Rate in Dividends Per Share

W_r = Value Weight assigned each Element in the Ratio Group

W_R = Value Weight assigned each of the Ratio Groups

D = Weight associated with each Ratio and based on the Ratio of the Observed Observation to the Standard Deviation Subject to the Constraint that $-1 \leq D \leq 1$ (For the ratio's the various D's represent, See Table 1.)

E = The Earnings per year during each of the Test Years.

The formula is applied to data one year before the change in capital structure and one year after the change (as identified earlier in a previous chapter). Analysis of the results should tend to confirm or deny the hypothesis that a firm's value is independent of the capital structure.

The test assumes normal distribution of industry data. This should be the case because of the homogeneous nature of the firms within the industry sample and the representative time period used for the test. The reader will find that the formula, in notative form, is the basic Graham, Dodd, and Cottle approach to security valuation. Hence, the IV is equivalent to their "intrinsic value". The M is a base multiplier selected as a starting point. For convenience the multiplier of ten is used here. Whether this multiplier is high or low is of little consequence to the results of this study. The direction of change, if any, is the important factor. The determination of what "the" multiplier should be can be the subject of future studies.

The base multiplier is adjusted by $1+G_{NTC}$; $1+G_{RTC}$; $1+G_{EPS}$; and $1+G_{DPS}$ which are the calculated growth rates

TABLE 1

THE RATIOS ASSIGNED TO THE D FOUND IN THE FORMULA		
D ₁	=	Current Ratio
D ₂	=	Quick Ratio
D ₃	=	Receivables Turnover
D ₄	=	Coverage of Fixed Charges
D ₅	=	Inventory Turnover
D ₆	=	Return on Capital (after depreciation)
D ₇	=	Return on Common Stock Equity
D ₈	=	Return to Common on Total Assets
D ₉	=	Return to Common to Net Sales
D ₁₀	=	Price Earnings Ratio
D ₁₁	=	Dividend Yield
D ₁₂	=	Payout Ratio
D ₁₃	=	Funded Debt as a Per Cent of Total Capital
D ₁₄	=	Common Stock as a Per Cent of Total Capital
D ₁₅	=	Current Liabilities as a Per Cent of Total Assets
D ₁₆	=	Operating Asset Turnover
D ₁₇	=	Total Asset Turnover

for these selected factors. These growth rates are ranked, according to importance to the author as follows:

<u>GROWTH RATE</u>	<u>RANK</u>
Return to Total Capital	1
Net Profit to Common	2
Earnings Per Share	3
Dividends Per Share	4

The growth rates are weighted according to their ranking arriving at:

$$(1+G_{RTC}) \quad (1+G_{NTC})^{1/2} \quad (1+G_{EPS})^{1/3} \quad (1+G_{DPS})^{1/4}$$

which when multiplied will yield a factor used in adjusting the base multiplier for growth rates, upward or downward.

$$M \left[(1+G_{RTC}) + (1+G_{NTC})^{1/2} (1+G_{EPS})^{1/3} (1+G_{DPS})^{1/4} \right]$$

Graham, Dodd, and Cottle identify a core of financial ratios¹ which they suggest are important in the valuation process. They do not, however, suggest a method of ranking these ratios according to the importance of each. In this work, groups of ratios were developed by which the author could measure a firm's liquidity, profitability, capital structure, efficiency, and payout positions. The ranking of the ratios according to importance, is left to the ingenuity of the individual investor. Each of the ratios within the group were given a separate weight as to their

¹Graham, Dodd, and Cottle, op. cit., pp. 225-249.

ranked importance to the author. The W_r in the formula represents the weights given to the ratios within the separate groupings. (See Table 2.)

At an earlier point in this analysis, the method used in selecting the sample firms was presented. Because of the homogeneous nature of the sample, it was to be expected that the data for various items selected would, when plotted over a representative time period be normally distributed. This normalcy is useful in that the measurement away from the suspected normalcy is possible. The ratios for this test were plotted on a frequency graph by industry for a ten year period of time. This is thought by Graham, Dodd, and Cottle to be a representative time period. After using a statistical technique which equated the quartile ranking method with standard deviation measure,² the author

²The data for each firm in the sample was plotted on a frequency graph for the time period 1954-1963 for each ratio. The Quartile Range was determined based on the plotted data represented by $Q_1 - Q_3$, where Q_1 and Q_3 are the first and third quartiles respectively. The semi-inter quartile range was determined as follows: $Q_3 - Q_1/2$. This value was either subtracted from Q_3 to yield the mean value or added to Q_1 to yield the mean value. The two middle quartiles Q_2 and Q_3 remaining after eliminating Q_1 and Q_4 represent 50 per cent of the data. Fifty per cent of the data is equal to .6745 of one standard deviation on either side of the mean. One might arrive at the same point another way. One standard deviation on either side of the mean is equal to 1.4826 times the value found for the inter-quartile range. Two standard deviations would be twice the value determined, etc.

TABLE 2

RANKING OF RATIOS ACCORDING TO THE
IMPORTANCE TO THE INVESTOR

	Ratios	Ranking
Liquidity Ratios	Current Ratio	2
	Quick Ratio	1
	Receivables Turnover	4.5
	Coverage of Fixed or Senior Charges	3
	Inventory Turnover	4.5
Profitability Ratios	Return on Capital (after depreciation)	3
	Return on Common Stock Equity	2
	Return to Common on Total Assets	1
	Return to Common to Net Sales	4
Price & Payout Ratios	Price Earnings Ratios	1.5
	Dividend Yield	1.5
	Percent of Earnings Paid on Common	3
Capital Structure Ratios	Funded Debt as a Percent of Total Capital	1.5
	Common Stock as a Percent of Total Capital	1.5
	Current Liabilities as a Percent of Total Assets	3
Efficiency Ratios	Operating Asset Turnover	1.5
	Total Asset Turnover	1.5

divided the plotted data into three standard deviations on each side of the mean.

Figure 1
THE NORMAL CURVE

If a firm's data were to consistently fall within the first standard deviation, no adjustment to the base multiplier was made. The value of a + or - 1 standard deviation from

$$\begin{aligned} \text{Quartile Range} &= Q_1 \text{ through } Q_3 \\ \text{Inter Quartile Range} &= \frac{Q_3 - Q_1}{2} \end{aligned}$$

Since 1σ was equal to 1.4826 of the value determined for the Inter Quartile Range the equivalent standard deviation was determined by the following:

$$1\sigma = \text{Value for Inter Quartile Range} \times 1.4826$$

the mean has a zero value. If, however, the firm's data exhibited tendencies toward abnormality on the up or down side of the industry norm, an adjustment to the base multiplier seems warranted and was made. The value of a + or - 2 standard deviations from the mean was weighted .5 times the value of $W_R W_R$. If the firm's data exhibited a + or - 3 standard deviations from the mean value, the maximum adjustment of + or - 1 times the $W_R W_R$ was made.³

The sum of all the W_R 's in each of the W_R 's is derived yielding the value for that W_R . The sum of all the individual W_R 's yields a factor which is used in adjusting the beginning base multiplier of ten.

It was further determined that all the groups mentioned

³There are at least two systematic methods for obtaining the values used to adjust the base multiplier. In the first, the analyst determines the W_R values. He then determines the values for W_R . The W_R values are then divided into units of value D, this number of units depending upon the range that D exhibited. (In this study there are six units of value for each ratio derived from a plus and minus 3 standard deviations.) The values found for D are then multiplied by W_R to yield the values by which the base multiplier is adjusted either upward or downward.

The second technique was the easier of the two. As in the first case the W_R and W_R values had to be determined. The W_R varies with each ratio while the W_R remains constant. Rather than dividing each W_R into six values and then multiplying by W_R to get the value of D, the author multiplied all W_R 's in the W_R group by W_R . It was much more rapid, and without loss of accuracy, to find the adjustment value D by working with plus and minus 1 or .5 than with the technique described immediately above. In either case the quantitative results are the same.

were not of equal importance in the investment decision and hence had to be ranked and weighted as to their significance. (See Table 3.)

It was thought useful, but not necessary, to constrain the possible upward and downward adjustment of the base multiplier to a maximum of ± 10 . It was noted at an earlier point in this chapter that a maximum adjustment to the multiplier of 10 would be used. It is possible, but highly unlikely, a firm could exhibit behavior patterns in all of the measured factors which were atypical to that of the industry. In that case it would receive a plus 10 added to its beginning multiplier yielding an adjusted multiplier of 20, or that firm would have a minus 10 deducted from the base multiplier yielding a zero adjusted multiplier. It was suspected that neither of these events would indeed be the case for any firm. The study substantiated that all firms would have both plus and minus adjustments to their base multiplier. Each of the ratio groups W_R were ranked according to importance and the proportion of 10 for each W_R determined.

The maximum adjustment to the base multiplier for the various W_R 's is shown in Table 4 below. Column A of that table indicates the ranked importance of that group. Column B is the significance weight and is determined as follows:

TABLE 3
RANKING OF THE GROUPS OF RATIOS
ACCORDING TO THE IMPORTANCE
TO THE INVESTOR

	Ratios	Ranking
Groups of Ratios	Liquidity Ratios	2
	Profitability Ratios	1
	Price & Payout Ratios	5
	Capital Structure Ratios	4
	Efficiency Ratios	3

$$\text{Significance Weight} = \frac{15}{2} + \frac{15}{1} + \frac{15}{5} + \frac{15}{4} + \frac{15}{3}$$

$$\text{Reduces to} \quad 7.5 + 15 + 3 + 3.75 + 5$$

Because it is desired that maximum adjustment to the base multiplier be constrained to 10 the sum total of the values in Column B is set equal to 10 and yields the weight factor found in Column C. This is determined as follows:

$$10 = 7.5X + 15X + 3X + 3.75X + 5X$$

$$10 = 34.25X$$

$$\frac{10}{34.25} = X$$

$$\underline{\underline{.292}} = X$$

The maximum adjustment to the multiplier for each W_R is shown in Column D and was derived by multiplying Columns B times C. The sum of Column D is equal to 10. In Table 4 below, a summary of the calculations for the Ratio Group is presented.

TABLE 4

SUMMARY OF THE RANKING, WEIGHTING AND MAXIMUM
ADJUSTMENT TO THE BASE MULTIPLIER FOR THE
FIVE GROUPS OF RATIO'S IN THE TEST

W_R	<u>A</u> Rank	<u>B</u> Signifi- cance Weight	<u>C</u> X	<u>D</u> Maximum Upward or Downward Adjustment B X C
Liquidity Ratios	2	7.5	.292	2.190
Profitability Ratios	1	15.0	.292	4.380
Price and Payout Ratios	5	3.0	.292	.876
Capital Structure Ratios	4	3.75	.292	1.095
Efficiency Ratios	<u>3</u>	<u>5.00</u>	.292	1.460
	15	34.25		

The values for the W_R 's in the W_R grouping will be calculated in the same manner with one minor modification. The individual values in Column D will be divided by the sum of the values in D to yield the maximum per cent that each of the W_R 's can represent of the W_R value for that group. For example, the maximum possible adjustment to the multiplier for liquidity ratios is 2.190 times (Refer to Table 4). Of this number the current ratio can represent a maximum of .2190 per cent; the quick ratio .4380 per cent, etc. Tables 5 through 9 are all handled in the same manner as first noted.

In Table 5 below a summary of the calculation for the Liquidity Ratios is presented.

The values for Columns B and C in Table 5 are determined as follows:

$$\text{Significance Weights} = \frac{15}{2} + \frac{15}{1} + \frac{15}{4.5} + \frac{15}{3} + \frac{15}{4.5}$$

$$\text{Reduces to} \quad 7.5 + 15 + 3.33 + 5 + 3.33$$

Setting the sum of these elements equal to 10:

$$10 = 7.5X + 15X + 3.33X + 5X + 3.33X$$

$$10 = 34.16X$$

$$\frac{10}{34.16} = X$$

$$\underline{\underline{.292}} = X$$

TABLE 5
LIQUIDITY RATIOS

SUMMARY OF THE RANKING, WEIGHTING AND MAXIMUM
ADJUSTMENT TO THE BASE MULTIPLIER OF TEN
FOR THE FIVE SELECTED LIQUIDITY RATIOS

Liquidity Ratios W_r	<u>A</u> Rank	<u>B</u> Signifi- cance Weight	<u>C</u> X	<u>D</u> Maximum Upward or Downward Adjustment B X C
Current Ratio	2	7.5	.292	2.190/10
Quick Ratio	1	15.0	.292	4.380/10
Receivables Turnover	4.5	3.33	.292	0.972/10
Coverage of Fixed or Series Charges	3	5.0	.292	1.460/10
Inventory Turnover	$\frac{4.5}{15}$	$\frac{3.33}{34.16}$	.292	$\frac{0.972/10}{9.974}$

In Table 6 below a summary of the calculations for the Profitability Ratios is presented. The values for Columns B and C in Table 6 are determined as follows:

$$\text{Significance Weight} = \frac{10}{3} + \frac{10}{2} + \frac{10}{1} + \frac{10}{4}$$

$$\text{Reduces to} \quad 3.33 + 5 + 10 + 2.5$$

Setting the sum of these elements equal to 10:

$$10 = 3.33X + 5X + 10X + 2.5X$$

$$10 = 20.83X$$

$$\frac{10}{20.83} + X$$

$$\underline{\underline{.480}} = X$$

TABLE 6

PROFITABILITY RATIOS

SUMMARY OF THE RANKING, WEIGHTING, AND MAXIMUM
ADJUSTMENT TO THE BASE MULTIPLIER OF TEN
FOR THE FOUR PROFITABILITY RATIOS

Profitability Ratios W_r	<u>A</u> Rank	<u>B</u> Signifi- cance Weight	<u>C</u> X	<u>D</u> Maximum Upward or Downward Adjustment B X C
Return on Capital (after depreciation)	3	3.33	.480	1.598/10
Return on Common Stock Equity	2	5.00	.480	2.400/10
Return to Common on Total Assets	1	10.00	.480	4.800/10
Return to Common to Net Sales	$\frac{4}{10}$	$\frac{2.50}{20.83}$	.480	$\frac{1.200/10}{9.998}$

In Table 7 below a summary of the calculations for the Price and Payout Ratios is presented. The values for Columns B and C in Table 7 are determined as follows:

$$\text{Significance Weights} = \frac{6}{1.5} + \frac{6}{1.5} + \frac{6}{3}$$

$$\text{Reduces to} \quad 4 + 4 + 2$$

Setting the sum of these elements equal to 10:

$$10 = 4X + 4X + 2X$$

$$10 = 10X$$

$$\frac{10}{10} = X$$

$$\underline{\underline{1}} = X$$

TABLE 7

PRICE AND PAYOUT RATIOS

SUMMARY OF THE RANKING, WEIGHTING AND MAXIMUM
ADJUSTMENT TO THE BASE MULTIPLIER OF TEN
FOR THE THREE SELECTED PRICE
AND PAYOUT RATIOS

Price and Payout Ratios W_r	<u>A</u> Rank	<u>B</u> Signifi- cance Weight	<u>C</u> X	<u>D</u> Maximum Upward or Downward Adjustment B X C
Price Earnings Ratio	1.5	4	1.00	4.00/10
Dividend Yield	1.5	4	1.00	4.00/10
Payout Ratio	$\frac{3}{6}$	$\frac{2}{10}$	1.00	$\frac{2.00/10}{10.00}$

In Table 8 below a summary of the calculations for the Capital Structure Ratios is presented. The values for Columns B and C in Table 8 are determined as follows:

$$\text{Significance Weights} = \frac{6}{1.5} + \frac{6}{1.5} + \frac{6}{3}$$

$$\text{Reduces to} \quad 4 + 4 + 2$$

Setting the sum of these elements equal to 10:

$$10 = 4X + 4X + 2X$$

$$10 = 10X$$

$$\frac{10}{10} = X$$

$$\underline{\underline{1}} = X$$

TABLE 8

CAPITAL STRUCTURE RATIOS
SUMMARY OF THE RANKING, WEIGHTING AND MAXIMUM
ADJUSTMENT TO THE BASE MULTIPLIER OF TEN
FOR THE THREE SELECTED CAPITAL
STRUCTURE RATIOS

Capital Structure Ratios W_r	<u>A</u> Rank	<u>B</u> Signifi- cance Weight	<u>C</u> X	<u>D</u> Maximum Upward or Downward Adjustment B X C
Funded Debt as a Per Cent of Total Capital	1.5	4	1.00	4.00/10
Common Stock as a Per Cent of Total Capital	1.5	4	1.00	4.00/10
Current Liabilities as a Per Cent of Total Assets	$\frac{3}{6}$	$\frac{2}{10}$	1.00	$\frac{2.00/10}{10.00}$

In Table 9 below a summary of the calculations for the Efficiency Ratios is presented. The values for Columns B and C in Table 9 are determined as follows:

$$\text{Significance Weights} = \frac{3}{1.5} + \frac{3}{1.5}$$

$$\text{Reduces to} \quad 2 + 2$$

Setting the sum of these elements equal to 10:

$$10 = 2X + 2X$$

$$10 = 4X$$

$$\frac{10}{4} = X$$

$$\underline{\underline{2.5}} = X$$

TABLE 9

EFFICIENCY RATIOS

SUMMARY OF THE RANKING, WEIGHTING AND MAXIMUM
ADJUSTMENT TO THE BASE MULTIPLIER OF TEN
FOR THE TWO SELECTED EFFICIENCY RATIOS

Efficiency Ratios W_r	<u>A</u> Rank	<u>B</u> Signifi- cance Weight	<u>C</u> X	<u>D</u> Maximum Upward or Downward Adjustment B X C
Operating Asset Turnover	1.5	2	2.500	5.000/10
Total Asset Turnover	$\frac{1.5}{3}$	$\frac{2}{4}$	2.500	$\frac{5.000/10}{10.000}$

In Tables 4 through 9, the data is presented necessary to the test. The formula presented on the first page of this chapter is now presented with values included. The remainder of this chapter deals with the results of the

actual test as applied to the individual firms within the test and as to the industry as a whole.

$$\begin{aligned}
 IV = & \left[M(1 + G_{RTC}) (1 + G_{NTC})^{1/2} (1 + G_{EPS})^{1/3} (1 + G_{DPS})^{1/4} + \right. \\
 & .4814 (D_1) + .9625 (D_2) + .2137 (D_3) + .3197 (D_4) + \\
 & .2137 (D_5) + .7000 (D_6) + 1.0512 (D_7) + \\
 & 2.1024 (D_8) + .5256 (D_9) + .3504 (D_{10}) + \\
 & .3504 (D_{11}) + .1752 (D_{12}) + .4380 (D_{13}) + \\
 & \left. .4380 (D_{14}) + .2190 (D_{15}) + .7300 (D_{16}) + .7300 (D_{17}) \right] E,
 \end{aligned}$$

where, $-1 \geq D_1 \geq 1$

What is to be Established

If there exists a relationship between leverage and intrinsic value, and hence, cost of capital, application of the approach suggested above should yield such evidence.

If we are to test this relationship it must be realized that within an industry there will not be significant differences between the intrinsic values of the stocks as far as the multipliers are concerned. There will be some differences, however, over a period of time. These differences will arise because the investor's analysis leads him to believe that a company is deviating from some norm that has been determined by looking at the make up of

the industry. It would seem apparent that one of the things that should be evidenced is a movement in the multiplier of a given company, and hence, the intrinsic value, if that company has not maintained the investors expectation of what the "mythical" company in that industry should look like.

As was mentioned earlier in summarizing the two basic schools of thought on cost of capital, one school hypothesized that we might expect the value of a security to decline after a change in the capital structure. The traditional school, to which Graham, Dodd, and Cottle belong, would suggest that the value of an enterprise should rise as a company incurred moderate levels of debt in its capital structure. The firm with moderate levels of debt, it is suggested, should have a larger enterprise value than the same firm without debt. These changes would mirror themselves in changes in the multiplier applied to earnings.

Application of the Test

The Cement Industry

In Table 10 the multipliers for the firms in the cement industry are presented for the year before the change in capital structure and the year after the change with the related per cent changes noted. The multiplier found in column D of Table 10 was determined by adding to or sub-

TABLE 10
CEMENT INDUSTRY
PER CENT CHANGES IN THE MULTIPLIERS DURING TEST PERIOD*
AND
PER CENT CHANGES IN DOLLAR INTRINSIC VALUE DURING THE TEST PERIOD⁺

Company Name	<u>A</u> IV ₁ Year Before Change	<u>B</u> IV ₂ Year After Change	<u>C</u> Per Cent Change in IV	<u>D</u> Multiplier 1, Year Before Change	<u>E</u> Multiplier 2, Year After Change	Per Cent Change in Multiplier
Alpha Portland	\$45.33	\$26.72	-41.05	12.5563	9.9714	-20.58
General Portland	\$31.40	\$19.62	-37.51	13.7134	9.2107	-32.83
Ideal Cement	\$20.74	\$16.25	-21.64	14.4004	9.9095	-31.18
Lehigh Cement	\$22.97	\$ 9.14	-60.20	8.1460	5.5416	-31.97
Lone Star Cement	\$25.02	\$15.39	-38.48	12.2630	8.5957	-29.90
Medusa Portland	\$34.79	\$22.80	-34.46	14.0831	9.6214	-31.68
Penn-Dixie Cement	\$34.72	\$34.89	+ .48	11.6506	11.3632	- 2.46

*The above Table is a summary of the data found in the supporting charts in the Appendix. See Tables 14 through 20 for this information.

⁺The Dollar Intrinsic Values found in Columns A and B above were determined by multiplying the earnings per share for the test years, (see Table 14, Column J) by their respective multipliers shown in Column D and E above.

tracting from the base multiplier adjusted for growth, shown in column D of Table 14, the values found in columns E through I of Table 13 of the appendix. The multiplier shown in column E of Table 10 was derived in the same manner, except that the values added to or subtracted from the adjusted base multiplier were values determined after the changes in the capital structure. In column F of Table 10, the per cent change in multipliers is shown.

A summary of the dollar intrinsic values are also presented in Table 10. The multipliers in columns D and E were multiplied by the earnings for each of the respective years. The dollar intrinsic values are shown for the year before capital structure change as presented in column A and the year after such change as shown in column B. The per cent changes in the intrinsic values is shown in column C of this table.

By reference to Table 10, column C, it becomes readily apparent that the dollar intrinsic value change was in all cases, other than Penn-Dixie, negative in direction. To avoid possible bias to the intrinsic values because of earnings movement, it was thought that more meaningful results would be obtained if only changes in the multipliers were noted. By reference to Table 10, column F, it can be seen that the multiplier changes were negative for all the

firms within the sample. The value of the securities and hence the enterprize value is less after the incorporation of debt into the capital structure, than before.

Alpha Portland Cement exhibited a marked decline in the multiplier after the change. The downward change was 20.05 per cent which approximated closely the increase in debt used in the capital structure of 23.33 per cent.

General Portland's decline in the multiplier was even more substantial, decreasing by 32.83 per cent of its before change value. The decline exceeded by some 7 per cent the 25.75 per cent increased debt usage.

Ideal Cement Company showed a similar movement in its multiplier. The multiplier declined some 31.18 per cent. The change was preceded by a 20.01 per cent increase in debt usage.

Lehigh Cement Company's decline in the multiplier is even more pronounced than the preceding companies when related to the per cent increase debt usage. The multiplier declined some 31.97 per cent after a change of 10.97 per cent increase in debt.

Lone Star Cement evidenced a decline in its multiplier of 29.90 per cent preceded by an increase in debt usage of 20.10 per cent.

Medusa Cement Company is the last company in the cement industry sample which evidenced a substantial change

in its capital structure, exhibited a decline in its multiplier of 31.68 per cent. This change approximated twice the increase use of debt of 15.58 per cent.

Penn-Dixie Cement Company acted uniquely, in the make-up of its capital structure when compared to others in the industry. It had all the characteristics that the other members of the sample exhibited except one. Throughout the entire test period Penn-Dixie financed its expansion either through the use of internally generated funds or common stock financing. Neither long-term notes payable or bonds were used to finance their needs. There were no significant changes in current liabilities during the test period by which Penn-Dixie may have improperly financed long-term needs.

Penn-Dixie was incorporated into this work to yield a very limited control sample. The test period for this company was chosen rather arbitrarily based on the years that most of the other companies in the sample exhibited change. If the test was a sound one, the analyst would expect to find no significant change in the multiplier of Penn-Dixie Cement. Since there was no change in debt usage, there should be no reaction. The multiplier change was approximately that which was expected. The change was minor and declined by 2.46 per cent. This result tended to confirm the results obtained from applying the test to

the other companies which did evidence changes in the capital structure. The multipliers of the companies in the cement industry seemed to respond negatively when the firms employed a different mixture of debt and equity.

During the test period, no sampled company had greater than 31 per cent of its capital structure in the form of debt. By Graham, Dodd, and Cottle standards⁴ this may not be construed to be moderate in amount, but by those same standards it could not be construed to be excessive. According to Graham, Dodd, and Cottle the multipliers and hence the intrinsic values should have increased after the companies altered their capital structures by increasing debt usage. Uniformly, throughout the cement industry, the multipliers of those who added debt to their capital structures declined.

After the application of the formula developed for this test, which exhibits the characteristics deemed essential by the above authors to the derivation of intrinsic value, it appears that evidence supports the conclusion that for the cement industry the enterprise value is downward in direction after adding debt to the capital structure. The enterprise value failed to be enhanced by

⁴Graham, Dodd, and Cottle, op. cit., p. 348.

moderate increases in debt as was suggested would be the case by the M & M theory.

The multipliers of six of the companies sampled which exhibited such changes fell equal to or substantially in excess of the actual per cent change in the capital structure. The seventh, Penn-Dixie, exhibited no change in its 100 per cent common stock capital structure during the test period. Penn-Dixie exhibited no marked change in its multiplier and tended to confirm the results found for the previous six companies.

The Department Store Industry

In Tables 11, 12, and 13, below, the multipliers for the firms in the Department Store Industry are shown in Columns D and E for the year before the change in capital structure and the year after such changes. The related per cent changes are also shown. The multiplier found in Column D of each of these tables was determined by adding to or subtracting from the base multiplier, adjusted for growth as shown in Column D of Table 21, the values found in Columns E through I of the same Table. The multiplier shown in Column E of Tables 11, 12, and 13 was derived in the same manner except that the values added to or subtracted from the adjusted base multiplier were values determined after changes in the capital structure. In Column

F of Tables 11, 12, and 13, the related per cent changes in the multipliers are noted.

A summary of the dollar intrinsic values is also shown in these same Tables. The same approach was used to determine the dollar intrinsic values as was used to determine the multipliers. The dollar intrinsic value changes are shown for the year before debt changes, as presented in Column A, and for the year after such changes, as shown in Column B. The related per cent change in the intrinsic values is shown in Column C of these same tables.

The firms in the sample were separated into three basic groups. The first group were those who exhibited debt increases during the test period and included Allied Stores, Associated Dry Goods, and Sears, Roebuck. (See Table 11.) The second group consisted of those which exhibited debt decreases during the test period and included Federated Department Stores, Gimbel Brothers, R. H. Macy, Marshall Field, and May Department Stores. (See Table 12.) The third and final group was a limited control group. This group exhibited no changes in capital structure. The reason for using this control group will be further explained later. The firms in this group were Montgomery Ward and J. C. Penney. (See Table 13.)

TABLE 11
DEPARTMENT STORE INDUSTRY
PER CENT CHANGES IN THE MULTIPLIERS DURING TEST PERIOD*
AND
PER CENT CHANGES IN DOLLAR INTRINSIC VALUE DURING TEST PERIOD⁺

Company Name	<u>A</u> IV ₁ Year Before Change	<u>B</u> IV ₂ Year After Change	<u>C</u> Per Cent Change in IV	<u>D</u> Multiplier Year Before Change	<u>E</u> Multiplier Year After Change	<u>F</u> Per Cent Change in Multiplier
Allied Stores	\$35.96	\$38.08	+ 5.90	9.6925	9.4980	-2.01
Associated Dry Goods	\$29.11	\$22.89	-21.36	11.0278	11.0057	- .20
Sears Roebuck	\$23.78	\$28.44	+19.60	11.0602	10.7716	-2.60

*The above Table is a summary of the data found in the supporting Tables in the Appendix. See Tables 21 through 27 for this information.

⁺The Dollar Intrinsic Values found in Columns A and B above were determined by multiplying the earnings per share for the test years, (see Table 21, Column J) by their respective multipliers shown in Column D and E above.

TABLE 12
DEPARTMENT STORE INDUSTRY
PER CENT CHANGES IN THE MULTIPLIERS DURING TEST PERIOD*
AND
PER CENT CHANGES IN DOLLAR INTRINSIC VALUE DURING THE TEST PERIOD†

Company Name	<u>A</u> IV ₁ Year Before Change	<u>B</u> IV ₂ Year After Change	<u>C</u> Per Cent Change in IV	<u>D</u> Multiplier Year Before Change	<u>E</u> Multiplier Year After Change	<u>F</u> Per Cent Change in Multiplier
Federated Department	\$17.72	\$24.74	+39.62	10.7419	12.4935	+16.30
Gimbel Brothers	\$30.72	\$29.30	- 4.62	11.3364	11.5335	+ 1.74
R. H. Macy	\$33.19	\$36.90	+11.18	9.6494	9.8131	+ 1.70
Marshall Field	\$22.73	\$32.51	+43.03	10.2400	11.2897	+10.25
May	\$35.44	\$32.35	- 8.72	10.8042	10.1091	- 6.43

* The above Table is a summary of the data found in the supporting Tables in the Appendix. See Tables 21 through 27 for this information.

† The Dollar Intrinsic Values found in Columns A and B above were determined by multiplying the earnings per share for the test years, (see Table 21, Column J) by their respective multipliers shown in Column D and E above.

TABLE 13
DEPARTMENT STORE INDUSTRY
PER CENT CHANGES IN THE MULTIPLIERS DURING TEST PERIOD*
AND
PER CENT CHANGES IN DOLLAR INTRINSIC VALUE DURING THE TEST PERIOD⁺

Company Name	<u>A</u> IV ₁ Year Before Change	<u>B</u> IV ₂ Year After Change	<u>C</u> Per Cent Change in IV	<u>D</u> Multiplier Year Before Change	<u>E</u> Multiplier Year After Change	<u>F</u> Per Cent Change in Multiplier
Montgomery Ward	\$19.49	\$ 6.33	-67.52	8.5501	5.5018	-35.65
J. C. Penney	\$26.73	\$24.17	- 9.57	12.7263	10.8889	-14.43

*The above Table is a summary of the data found in the supporting Tables in the Appendix. See Tables 21 through 27 for this information.

⁺The Dollar Intrinsic Values found in Columns A and B above were determined by multiplying the earnings per share for the test years, (see Table 21, Column J) by their respective multipliers shown in Column D and E above.

The multipliers for the first group might be expected, by those followers of the traditional thought on cost of capital, to increase after moderate additions of debt. The value of the enterprise, according to those in this group should be enhanced. It seems naturally to follow, that if this is accurate then the multipliers should decline if the firm decreases its use of debt since it is now less attractive, so long as the debt level was moderate to begin with. Thus, the test herein developed can be applied to either a situation where a firm increases its use of debt or in the other situation where the firm decreases its use of debt.

The third group mentioned earlier exhibited no use of debt in their capital structures during the ten year test period. The two companies of Montgomery Ward and J. C. Penney were used in the test as a limited control group, the same as was Penn-Dixie was used in the Cement Industry test. In all factors used in selecting the companies for the test, other than changes in the use of debt, these two firms were very similar to the others in the sample. Because they exhibited no change in the use of debt the control group was expected to exhibit, after the application of the test, no change in their respective multipliers. The test years for these two firms were selected, not on the basis of their change in debt usage, since there was

none, but rather on the basis of the test years used in testing the other firms. The test years for these two companies were the years during which most of the others in the sample were exhibiting change and to which the test was applied.

The first group to which the test was applied, were those who incurred debt increases. This group in total exhibited a negative trend in their multiplier, as is shown in Table 11. There appeared, however, to be no linear relationship between the per cent increase in debt and the per cent decline in the multiplier. Nevertheless, the multipliers of all three sample firms did decline after increases in debt.

Allied Stores evidenced a reduction in its multiplier of 2.01 per cent after increasing debt in the capital structure by some 7 per cent. (See Table 11, Column F, for the per cent changes in each of the multipliers in this group.)

Associated Dry Goods exhibited a minor decline in its multiplier of .20 per cent. This was preceded by an increase in debt usage by Associated of some 14 per cent.

The final company in this first group is Sears, Roebuck. This company increased its debt use by 21 per cent. This per cent increase was promptly followed by a decline in the multiplier of Sears of 2.60 per cent.

The second group to which the test was applied were those firms within the sample who exhibited decreases in debt use in their capital structure. This group is identified in Table 12. Four of these firms evidenced increases in their multipliers after decreases in debt use. The four companies which had improved their multipliers after a decline in debt use were: Federated Department Stores, Gimbel Brothers, R. H. Macy, and Marshall Field. (See Table 12, Column F, for all per cent changes in the multipliers for this second group.) The single variant company in this group was May Company. The multiplier for May declined 6.43 per cent, notwithstanding a decrease of 8 per cent in debt usage in its capital structure. A review of the data available yielded no explanation for this behavior.

Federated Department Stores evidenced an increase in its multiplier of some 16.30 per cent. This increase in the multiplier was preceded by a decrease in debt usage of 4 per cent.

Gimbel Brothers exhibited a small increase in its multiplier of 1.74 per cent. This increase was preceded by a 5 per cent decrease in debt used.

R. H. Macy evidenced a similar increase in the multiplier to that of Gimbel Brothers increasing their multiplier by 1.70 per cent. The decrease in debt used by Macy

was 2 per cent.

Marshall Field was the last company in this group that exhibited a positive change in its multiplier after decreasing debt use. This firm's multiplier increased by 10.25 per cent. This change came after a reduction in debt use of 2 per cent.

In four of five cases where companies in the sample decreased the use of debt the multipliers increased. One member of the group acted in an unexplainable manner. The findings would suggest that the enterprize value of a firm in this group is more attractive with less debt in the capital structure. The same conclusion was reached after the application of the test to the first group in the department store sample. The two sets of findings tend to confirm each other. Firms with less debt in their capital structure appear to illicit a more favorable reaction in the enterprize value.

The final group in the sample is that of the limited control group. This group consisted of Montgomery Ward and J. C. Penney. It was expected, firms having no debt in their capital structures should evidence no changes (or at least no significant changes) in their multipliers between any sets of years during the test period. Hence, the enterprize value of these firms should remain unchanged.

This was not what actually did occur. One immediately sees, by a review of Table 13, Column F, that the multipliers of each of these two firms declined. Montgomery Ward had a decrease in its multiplier of 35.65 per cent and J. C. Penney exhibited a decrease in its multiplier of 14.43 per cent. Once again, a review of the data available revealed no explanation of this apparently random behavior.

The results of the test as applied to the department stores in the test sample appear to confirm the results determined for those in the cement industry. Seven out of eight of the companies in the department store sample that evidenced changes in their capital structure also had as a consequence of such change alterations in their multipliers. Three of the multipliers decreased after increasing debt usage and four others experienced increases in their multipliers after decreasing debt usage. As a result of such movement one tends to conclude that the enterprize value of those in this sample is not enhanced through the use of debt. On the contrary, the enterprize value in most cases is less for those who use debt and increases as debt use declines.

Conclusion

The results of the test herein described lend support to those who hypothesize that the enterprize value does

not increase with debt usage, moderate or otherwise. The direction of the enterprise value, as evidenced by the adjusted multipliers for each thirteen of the fourteen companies which evidence change in their capital structures, was negative at higher debt levels. A total of three firms in the sample, one in the cement industry and two in the department store industry had no debt in their capital structures. This was a limited control group used in an attempt to more fully confirm the other results determined in the test. Penn-Dixie in the cement industry appeared to act as one might expect and exhibited almost no change in its multiplier. The behavior of the other two companies in the sample is unexplainable.

The evidence presented in this chapter leads one to the conclusion that the enterprise value falls with the incorporation of debt into the capital structure. The test applied to the sample firms was in approach substantially similar if not identical with that suggested by Graham, Dodd, and Cottle. The conclusions reached, however, are not the same ones suggested by Graham, Dodd, and Cottle. Rather than the value of the enterprise being enhanced with usage of "moderate" debt levels, the evidence suggests that the intrinsic value falls as a result of debt use.

The author cannot, as a result of this study, state with high degree of certainty, the degree of change in

value. Direction of change, however, is clearly identifiable. If the intrinsic value falls greater than the benefits received, from what has heretofore been identified as judicious mixtures of debt and equity (as certainly appears to be the case in the cement industry), the saucer shape cost of capital curve for the cement industry is, indeed, fallacious. Because of the rather marginal changes in the multipliers of the companies in the department store industry, it is really not very practical to speculate, here, as to whether or not the cost of capital curve for the department store sample is saucer shaped or flat.

A Note On Growth Rates Used In The Test

The ranking used in the test was obviously the author's preference sequence. Others might disagree with this ranking order. In order to insure that the conclusions of this test were not substantially affected by the ranking of the growth rates in some different order two other sequences were tested to determine if significant differences in the conclusions would arise.

In the first sequence the ranking was done in the following order: (1) Earnings Per Share, (2) Dividends Per Share, (3) Return To Total Capital, and (4) Net Profit To Common. (See Tables 31 and 36.) No significant differences in the multiplier value occurred when compared with the original values determined from the use of this sequence.

(See Tables 28 and 33, Column B.)

The second sequence ordered the growth rates as follows: (1) Dividends Per Share, (2) Earnings Per Share, (3) Return To Total Capital, and (4) Net Profit To Common. (See Tables 32 and 37.) Once again, no significant differences in the multiplier value occurred when compared with the original values determined from the use of this sequence. (See Tables 28 and 33, Column C.)

Tables 28 and 33 summarize the per cent changes in the multiplier before and after capital structure changes using three ranking methods for growth rates. In Column A of each table is found the original per cent change used in the test. In Column B, is presented the change in the multiplier using earnings per share as the number one weight, etc. In Column C of each table is presented the change in the multiplier using dividends per share as the number one weight, etc. A review of these tables leads one to the conclusion that for this study, no significant differences would have occurred from the ranking of the growth rates in an order other than that which was used by the author.

CHAPTER VI

SUMMARY AND CONCLUSIONS

Summary

The purpose of this paper has been to test the independence hypothesis put forth by Modigliani and Miller and to develop a sound theory concerning the cost of capital.

In Chapter I, justification was given for doing this study based on the desire to add supporting evidence to either the traditional viewpoint on cost of capital or that of the Modigliani and Miller hypothesis. Briefly, the traditional viewpoint in the argument has been one which suggests that the weighted average cost of capital can be lowered with conservative increases in the proportions of debt used in the capital structure. The authors whose approach was used herein to test cost of capital conclude from the traditionalists viewpoint that

"...we find nothing in our studies of actual experience which is seriously opposed to our thesis that companies with moderate debt are likely to have larger enterprise value than the same type company without debt."¹

Leading the opposition to the traditionalist viewpoint is the team of Modigliani and Miller whose

¹Ibid., p. 547. Graham, Dodd, and Cottle.

hypothesis that the cost of capital was not dependent upon the mix of debt and equity jolted the finance world. They suggested that one could not hope to lower the weighted average cost of capital by the techniques of adding additional debt to their capital structure, modest or otherwise.

The writing and publication of M & M galvanized the finance world into action.² Tests have since been made to determine which school of thought is most valid. Most of the tests employed reach their conclusions through the use of theoretical models and through the use of deductive reasoning. Others strive for proofs based upon the use of empirical data. This is just such a study.

In this work, an approach used by Graham, Dodd, and Cottle was used to determine the intrinsic value of a security. Empirical evidence in the form of financial data was gathered on ten major department stores and seven of the largest cement producers. Care was taken to insure that each industry exhibited a high degree of homogeneity within itself. The financial data were gathered for the test period of 1954-1963. The suggested adjustments by Graham, Dodd, and Cottle to the balance

²F. Modigliani and Merton Miller, "The Cost of Capital, Corporation Finance and the Theory of Investment," American Economic Review XLVIII (1958), pp. 261-297.

sheet and income statements were made for each year and the adjusted data compiled upon computer coding forms for later transfer to punched card inputs. A basic computer program was written that would process the financial data, make the necessary computations and present in comparable form the ratios used by Graham, Dodd, and Cottle.³ Additional ratios were also computed as test checks on the companies' actions. Growth rates for earnings per share; dividends per share; net profit to common, and return to total capital, as well as others, were computed for a ten year span of time and correlated with time to test the fit of the growth trend. The growth rates were used in the test to adjust the base multiplier.

The ratios for each industry were plotted on a frequency graph for a ten year span of time to determine what pattern existed for each. The distributions were segmented into standard deviations from the mean of the observed data and values were assigned for each of the + and - standard deviations.

An equation was developed which included the factors thought necessary to intrinsic value determination. Weights were assigned to each of the individual ratios " W_r " as well as the groups of ratios " W_R ". Individual

³Graham, Dodd, and Cottle, op. cit., pp. 240-241.

values for each of the ratios was determined by multiplying the W_r 's by the range value (D) assigned the standard deviation. All of the resulting W_r 's were summed yielding the value of W_R for that group. The beginning multiplier of 10 then was adjusted either upward or downward by the values found for the growth and ratio groups. The result was an adjusted multiplier, which after taking into account all the suggested important factors, exhibited a direction tendency.

The cement industry exhibited marked reaction in the multipliers as a result of the change in debt usage. Of the seven firms tested, all seven exhibited negative reactions to debt changes. The adjusted multipliers of six of the seven companies declined substantially greater than the increase in debt usage. The seventh, Penn-Dixie, exhibited almost no change marked by no change in capital structure. This was to be expected.

The department store industry was separated into three basic groups. The first group consisting of Allied Stores, Associated Dry Goods, and Sears, Roebuck exhibited increases of the use of debt in their capital structures. All three of these companies exhibited negative reactions to additional debt usage. The adjusted multipliers for these firms declined. The enterprise value of these firms was not enhanced through the use of debt in the capital structure.

The second group consists of Federated Department Stores, Gimbel Brothers, R. H. Macy, Marshall Field, and May Company. This group was tested after decreases in the use of debt. The debt decreases were more significant than the debt increases during the test period. Four of five of these firms exhibited increases in their multipliers after decreases in debt in the capital structures. May Company was the one company that deviated from the pattern of the group. Unexplainably, May exhibited a decrease in its adjusted multiplier even though it decreased its use of debt.

The third group, a limited control group, consists of Montgomery Ward and J. C. Penney. These firms used no debt in their capital structure. It was expected they, as was the case with Penn-Dixie in the cement industry, would exhibit no significant change in intrinsic values as evidenced by their adjusted multipliers upon application of the test. Quite the contrary occurred. The multipliers of both these firms reacted even more violently than did the multipliers of any of the other members of the industry. No explanation can be given for what appears to be random behavior.

Conclusions:

The study provides some interesting results, most of which tend to lend support to the M & M school of thought

on cost of capital.

1. The adjusted multiplier of six of the seven companies in the cement industry began to react immediately, in negative manner, to even "modest" debt levels. The intrinsic value falls sharply downward appearing to at very minimum offset any gains accruing from the use of leverage. The degree of downward movement probably more than offsets the lower costs of debt. The enterprise value did not increase after positive increases in debt. (Refer to Chapter V, Table 10.)
2. Seven of the ten companies in the department store industry reacted negatively to increased mixtures of debt in their capital structure. The changes were more moderate in degree than those in the cement industry but nevertheless exhibited the same negative tendency. The difficulty here resides in the measurement of the degree of change. It was judged not within the scope of this study, as set forth at the outset, to determine whether the magnitude of the downward adjustment in value just offset or more than offset the gains incurred by the added use of debt. It is suspected that the enterprise value of these firms did not increase after the addition of more debt. (Refer to Chapter V, Tables

11,12, 13.)

3. The study suggests that an investor rates the enterprise value of a firm higher if that management in the application of its financing policy uses only equity financing in its capital structure, notwithstanding the abundance of financial literature on the positive benefits of leverage.
4. It appears possible to quantify the intrinsic value approach to security analysis on a reasonable basis. This leads one to predict that a much more sound base may be derived from which to make judgments as to the values of various enterprises. If one can incorporate most of the significant factors in security analysis into the body of the model, rather than operating on a weakly supported intuitive basis, one surely will be able to make more rational decisions. The formula in Chapter V, page 76 used in the study incorporates all of these factors into a useable model. In Tables 14 through 27 in the Appendix a summary of the test as it was applied to the companies is presented.
5. The use of the computer for the processing and the storage of data appears a must for the security analyst of tomorrow. One will be able to

analyze vast amounts of data in but a few moments facilitating the making of decisions based upon many of the significant factors rather than just the few that the human mind can manipulate at any one time.

6. In Chapter V data is presented on the cement industry and the department store industry which tend to weaken the position of the traditionalists. It appears that the cost of capital does not decline with moderate amounts of debt in the capital structure for the firms within the sample.
7. Obviously, no one, all inclusive test has been designed, that will yield conclusive evidence as to the effect of capital structure on the cost of capital. This test applied to equivalent risk firms within two selected industries yields a partial answer to the question. Other industries, such as the conglomerates, will probably not test well with the use of this test. These entities are extensively diversified and in such heterogeneous operations that there is no known method for identifying a norm, from which measurement can be made. There exists little, if any, comparable data upon which to make a judgment.

This study does not solve all the problems surrounding the measurement of the cost of capital to a firm. Additional tests are necessary. As the results of these tests become known we may one day be able to settle the existing dispute between those who believe the cost of capital is independent of the capital structure and those who feel certain that the cost of capital can be affected by the types of capital used. The financial world will have to await these further developments before a final verdict can be rendered. It is hoped that this work moves the thinking forward toward that end.

APPENDIX A

TABLES FOR THE CEMENT INDUSTRY INDICATING WEIGHTS
AND ADJUSTMENTS APPLIED TO THE DATA
AND A SUMMARY OF ADJUSTED FACTORS
AND DETERMINATION OF
INTRINSIC VALUES

TABLE 14
CEMENT INDUSTRY BASE MULTIPLIER
ADJUSTED FOR ALL FACTORS AND
INTRINSIC VALUE DETERMINED

Company Name	Test Year	A IV =	B Base Multiplier 10X	C Growth Rate Adjustment	D Base Multiplier Adjusted for Growth		E Liquidity W _r	F Profit W _r	G Price/ Payout W _r	H Capital Structure W _r	I Efficiency W _r	J Per Share Earnings
Alpha Portland	1956	\$45.33	10X	.8637	8.6370	+	.9340	2.1896	.1752	-.1095	.7300	3.61
	1958	26.72	10X	.8637	8.6370	+	1.4439	.0000	.0000	-.1095	.0000	2.68
General Portland	1956	31.40	10X	.9007	9.0070	+	.0790	4.1164	.0000	-.2190	.7300	2.29
	1958	19.62	10X	.9007	9.0070	+	.1599	.2628	.0000	-.2190	.0000	2.13
Ideal Cement	1956	20.74	10X	.9433	9.4330	+	.1060	3.7664	.0000	.0000	1.0950	1.44
	1958	16.25	10X	.9433	9.4330	+	.2137	.2628	.0000	.0000	.0000	1.64
Lehigh Cement	1956	22.97	10X	.8322	8.3220	+	-.4023	.0000	-.6132	.1095	.7300	2.82
	1958	9.14	10X	.8322	8.3220	+	-.4813	2.1896	.0000	-.1095	.0000	1.65
Lone Star Cement	1955	25.02	10X	.9177	9.1770	+	.3197	1.9268	.0000	.1095	.7300	2.04
	1957	15.39	10X	.9177	9.1770	+	-.4813	.0000	.0000	.0000	.0000	1.77
Medusa Cement	1955	34.79	10X	.9490	9.4900	+	1.4691	1.9268	-.2628	.0000	1.4600	2.47
	1957	22.80	10X	.9490	9.4900	+	.0000	.0000	-.0876	.2190	.0000	2.37
Penn-Dixie Cement	1956	34.72	10X	.8548	8.5480	+	.5334	1.9268	-.0876	.0000	.7300	2.98
	1958	34.89	10X	.8548	8.5480	+	.8010	1.8390	.1752	.0000	.0000	3.07

TABLE 15
CEMENT INDUSTRY GROWTH RATE ADJUSTMENT
TO BASE MULTIPLIER

Company Name	$\frac{A}{\text{Growth Rate of Earnings Per Share}} [1+G_{EPS}]^{1/3}$	$\frac{B}{\text{Growth Rate of Net Profit to Common}} [1+G_{NTC}]^{1/2}$	$\frac{C}{\text{Growth Rate in Return to Total Capital}} [1+G_{RTC}]$	$\frac{D}{\text{Growth Rate in Dividends Per Share}} [1+G_{DPS}]^{1/4}$	$\frac{E}{\sum [ABCD]}$
Alpha Portland	-6.52 = .9783	-6.71 = .9664	-11.40 = .8860	-0.08 = 1.0000	.8637
General Portland	-2.64 = .9912	1.14 = 1.0057	-10.49 = .8951	3.80 = 1.0095	.9007
Ideal Cement	2.19 = 1.0073	3.41 = 1.0171	-9.46 = .9054	6.78 = 1.0169	.9433
Lehigh Portland	-9.35 = .9688	-8.07 = .9596	-11.55 = .8845	4.79 = 1.0121	.8322
Lone Star Cement	-2.24 = .9925	-0.16 = .9984	-7.35 = .9265	0.14 = 1.0000	.9181
Medusa Portland	0.78 = 1.0026	1.03 = 1.0052	-7.36 = .9264	6.60 = 1.0165	.9490
Penn-Dixie Cement	-6.65 = .9778	-5.75 = .9712	-11.06 = .8894	4.83 = 1.0121	.8548

TABLE 16
CEMENT INDUSTRY ADJUSTMENT
TO BASE MULTIPLIER
FOR LIQUIDITY
RATIOS

Company Name	Test Year	Current Ratio		Quick Ratio		Rec. T/Over		Cov. Fix. Chge.		Inv. T/Over		WR
		σ Value	.4814 σW_r	σ Value	.9625 σW_r	σ Value	.2137 σW_r	σ Value	.3197 σW_r	σ Value	.2137	
Alpha Portland	1956	+.5	.2407	+.5	.4813	+.5	.1069	+ 1	.3197	- 1	-.2137	.9340
	1958	+.1	.4814	+.1	.9625	0	0	0	0	0	0	1.4439
General Portland	1956	-.5	-.2407	0	0	0	0	+ 1	.3197	0	0	.0790
	1958	0	0	0	0	0	0	+.5	.1599	0	0	.1599
Ideal Cement	1956	0	0	0	0	0	0	+ 1	.3197	- 1	-.2137	.1060
	1958	0	0	0	0	0	0	0	0	+ 1	.2137	.2137
Lehigh Cement	1956	-.5	-.2407	-.5	-.4813	0	0	+ 1	.3197	0	0	-.4023
	1958	0	0	-.5	-.4813	0	0	0	0	0	0	-.4813
Lone Star Cement	1955	0	0	0	0	0	0	+ 1	.3197	0	0	.3197
	1957	0	0	-.5	-.4813	0	0	0	0	0	0	-.4813
Medusa Cement	1955	+.5	+.2407	+.5	-.4813	+ 1	.2137	+ 1	.3197	+ 1	.2137	1.4691
	1957	0	0	0	0	0	0	0	0	0	0	0
Penn-Dixie Cement	1956	0	0	0	0	+ 1	.2137	+ 1	.3197	0	0	.5334
	1958	0	0	+.5	.4813	+.5	.1069	+ 1	.3197	-.5	-.1069	.8010

TABLE 17
CEMENT INDUSTRY ADJUSTMENT
TO BASE MULTIPLIER FOR
PROFITABILITY RATIOS

Company Name	Test Year	Return on Capital		Return on Common Stock Equity		Return to C.S. on Total Assets		Return to C.S. on Net Sales		W_R
		σ Value	.7000 σW_r	σ Value	1.0512 σW_r	σ Value	2.1024 σW_r	σ Value	.5256 σW_r	ΣW_r 's
Alpha Portland	1956 1958	+.5 0	.3500 0	+.5 0	.5256 0	+.5 0	1.0512 0	+.5 0	.2628 0	2.1896 0
General Portland	1956 1958	+ 1 0	.7000 0	+ 1 0	1.0512 0	+ 1 0	2.1024 0	+.5 +.5	.2628 .2628	4.1164 .2628
Ideal Cement	1956 1958	+.5 0	.3500 0	+ 1 0	1.0512 0	+ 1 0	2.1024 0	+.5 +.5	.2628 .2628	3.7664 .2628
Lehigh Cement	1956 1958	0 -.5	0 -.3500	0 -.5	0 -.5256	0 -.5	0 -1.0512	0 -.5	0 -.2628	0 -2.1896
Lone Star Cement	1955 1957	+.5 0	.3500 0	+.5 0	.5256 0	+.5 0	1.0512 0	0 0	0 0	1.9268 0
Medusa Cement	1955 1957	+.5 0	.3500 0	+.5 0	.5256 0	+.5 0	1.0512 0	0 0	0 0	1.9268 0
Penn-Dixie Cement	1956 1958	+.5 0	.3500 0	+.5 +.5	.5256 .5256	+.5 +.5	1.0512 1.0512	0 +.5	0 .2628	1.9268 1.8396

TABLE 18
CEMENT INDUSTRY ADJUSTMENT TO BASE MULTIPLIER
FOR PRICE AND PAYOUT
RATIOS

Company Name	Test Year	Price/Earnings Ratio		Dividend Yield		Payout Ratio		W_R
		σ Value	$.3504 \sigma W_R$	σ Value	$.3504 \sigma W_R$	σ Value	$.1752 \sigma W_R$	ΣW_R 's
Alpha Portland	1956 1958	+ .5 0	.1752 0	0 0	0 0	0 0	0 0	.1752 0
General Portland	1956 1958	0 0	0 0	0 0	0 0	0 0	0 0	0 0
Ideal Cement	1956 1958	0 0	0 0	0 0	0 0	0 0	0 0	0 0
Lehigh Cement	1956 1958	- 1 0	-.3504 0	-.5 0	-.1752 0	-.5 0	-.0876 0	-.6132 0
Lone Star Cement	1955 1957	0 0	0 0	0 0	0 0	0 0	0 0	0 0
Medusa Cement	1955 1957	0 0	0 0	-.5 0	-.1752 0	-.5 -.5	-.0876 -.0876	-.2628 -.0876
Penn-Dixie Cement	1956 1958	0 +.5	0 .1752	0 0	0 0	-.5 0	-.0876 0	-.0876 .1752

TABLE 19
CEMENT INDUSTRY ADJUSTMENT TO BASE MULTIPLIER
FOR CAPITAL STRUCTURE
RATIOS

Company Name	Test Year	Funded Debt as Per Cent of Total Capital		Common Stock as Per Cent of Total Capital		Current Liabilities as Per Cent of Total Assets		W_R
		σ Value	$.4380$ σW_R	σ Value	$.4380$ σW_R	σ Value	$.2190$ σW_R	ΣW_R 's
Alpha Portland	1956	0	0	0	0	-.5	-.1095	-.1095
	1958	0	0	0	0	-.5	-.1095	-.1095
General Portland	1956	0	0	0	0	- 1	-.2190	-.2190
	1958	0	0	0	0	- 1	-.2190	-.2190
Ideal Cement	1956	0	0	0	0	0	0	0
	1958	+.5	.2190	0	0	0	0	0
Lehigh Cement	1956	0	0	0	0	+.5	.1095	.1095
	1958	0	0	0	0	-.5	-.1095	-.1095
Lone Star Cement	1955	0	0	0	0	+.5	.1095	.1095
	1957	0	0	0	0	0	0	0
Medusa Cement	1955	0	0	0	0	0	0	0
	1957	+.5	.2190	0	0	0	0	.2190
Penn-Dixie Cement	1956	0	0	0	0	0	0	0
	1958	0	0	0	0	0	0	0

TABLE 20
CEMENT INDUSTRY ADJUSTMENT
TO BASE MULTIPLIER FOR
EFFICIENCY RATIOS

Company Name	Test Year	Operating Asset Turnover		Total Asset Turnover		W_R
		σ Value	$.7300$ σW_r	σ Value	$.7300$ σW_r	ΣW_r 's
Alpha Portland	1956 1958	+ .5 0	.3650 0	+ .5 0	.3650 0	.7300 0
General Portland	1956 1958	+ .5 0	.3650 0	+ .5 0	.3650 0	.7300 0
Ideal Cement	1956 1958	+ 1 0	.7300 0	+ .5 0	.3650 0	1.0950 0
Lehigh Cement	1956 1958	+ .5 0	.3650 0	0 0	.3650 0	.7300 0
Lone Star Cement	1955 1957	+ .5 0	.3650 0	+ .5 0	.3650 0	.7300 0
Medusa Cement	1955 1957	+ 1 0	.7300 0	+ 1 0	.7300 0	1.4600 0
Penn-Dixie Cement	1956 1958	+ .5 0	.3650 0	+ .5 0	.3650 0	.7300 0

APPENDIX B

TABLES FOR THE DEPARTMENT STORE INDUSTRY INDICATING
WEIGHTS AND ADJUSTMENTS APPLIED TO THE DATA
AND A SUMMARY OF ADJUSTED FACTORS
AND DETERMINATION OF
INTRINSIC VALUES

TABLE 21

DEPARTMENT STORE INDUSTRY BASE MULTIPLIER
ADJUSTED FOR ALL FACTORS AND
INTRINSIC VALUE DETERMINED

Company Name	Test Year	A IV=	B Base Multiplier 10X	C Growth Rate Adjustment	D Base Multiplier Adjusted for Growth	+	E Liquidity W_R	F Profit W_R	G Price/ Payout W_R	H Capital Structure W_R	I Efficiency W_R	J Per Share Earnings
Allied Stores	1961	\$35.96	10X	.9498	9.498	+	.1069	.0000	.0876	.0000	.0000	3.71
	1963	38.08	10X	.9498	9.498	+	.0000	.0000	.0000	.0000	.0000	4.01
Associated	1957	29.11	10X	1.0765	10.765	+	.0000	.0000	.2628	.0000	.0000	2.64
	1959	22.89	10X	1.0765	10.765	+	.2407	.0000	.0000	.0000	.0000	2.08
Federated Dept.	1958	17.72	10X	1.0635	10.635	+	.1069	.0000	.0000	.0000	.0000	1.65
	1960	24.74	10X	1.0635	10.635	+	.1069	1.9268	-.1752	.0000	.0000	1.98
Gimbel Brothers	1962	30.72	10X	1.1205	11.205	+	.0000	.0000	-.0876	.2190	.0000	2.71
	1964	29.30	10X	1.1205	11.205	+	.0000	.0000	.0000	.3285	.0000	2.54
R. H. Macy	1957	33.19	10X	1.0915	10.915	+	-.8276	-.2628	-.1752	.0000	.0000	3.44
	1959	36.90	10X	1.0915	10.915	+	-1.0143	.0000	-.0876	.0000	.0000	3.76
Marshall Field	1962	22.73	10X	1.0970	10.970	+	.0000	.0000	.0000	.0000	-.7300	2.22
	1964	32.51	10X	1.0970	10.970	+	.3197	.0000	.0000	.0000	.0000	2.88
May	1960	35.44	10X	1.0216	10.216	+	.5882	.0000	.0000	.0000	.0000	3.28
	1962	32.35	10X	1.0216	10.216	+	-.1069	.0000	.0000	.0000	.0000	3.20
Montgomery Ward	1960	19.49	10X	.8171	8.171	+	1.1233	-.3500	-.1752	-.2190	.0000	2.28
	1962	6.33	10X	.8171	8.171	+	.3745	-2.1896	-.5256	-.3285	.0000	1.15
J. C. Penney	1962	26.73	10X	.9794	9.794	+	-.6950	2.2768	.0000	-.1095	1.4600	2.10
	1964	24.17	10X	.9794	9.794	+	-.7220	1.2256	-.1752	-.3285	1.0950	2.22
Sears, Roebuck	1958	23.78	10X	.9962	9.962	+	.4266	.5256	.0000	-.2190	.3650	2.15
	1960	28.44	10X	.9962	9.962	+	.7220	.2628	-.1752	.0000	.0000	2.64

TABLE 22
DEPARTMENT STORE INDUSTRY
GROWTH RATE ADJUSTMENT
TO BASE MULTIPLIER

Company Name	<u>A</u> Growth Rate of Earnings Per Share $[1+G_{EPS}]^{1/3}$	<u>B</u> Growth Rate of Net Profit to Common $[1+G_{NTC}]^{1/2}$	<u>C</u> Growth Rate in Return to Total Capital $[1+G_{RTC}]$	<u>D</u> Growth Rate in Dividends Per Share $[1+G_{DPS}]^{1/4}$	<u>E</u> $\sum$ $[ABCD]$
Allied Stores	-2.55 = .9915	-0.49 = .9975	-3.94 = .9606	-0.08 = .9998	.9498
Associated Dry Goods	5.44 = 1.0181	11.10 = 1.0555	-1.45 = .9855	6.59 = 1.0165	1.0765
Federated Dept.	2.62 = 1.0087	9.17 = 1.0459	-0.18 = .9982	3.86 = 1.0099	1.0635
Gimbel Brothers	7.62 = 1.0254	8.49 = 1.0425	1.93 = 1.0193	11.38 = 1.0284	1.1205
R. H. Macy	4.87 = 1.0162	8.04 = 1.0402	2.56 = 1.0256	2.68 = 1.0067	1.0915
Marshall Field	6.19 = 1.0206	6.65 = 1.0333	2.83 = 1.0283	4.63 = 1.0116	1.0970
May	2.85 = 1.0095	5.35 = 1.0248	-1.68 = .9832	1.76 = 1.0044	1.0216
Montgomery Ward	-8.52 = .9716	8.91 = .9555	-9.77 = .9023	-9.86 = .9754	.8171
J. C. Penney	3.18 = 1.0106	3.31 = 1.0166	-4.97 = .9503	1.30 = 1.0032	.9794
Sears, Roebuck	6.12 = 1.0204	6.49 = 1.0325	-2.95 = .9705	7.29 = 1.0182	.9962

TABLE 23
DEPARTMENT STORE INDUSTRY ADJUSTMENT
TO BASE MULTIPLIER FOR
LIQUIDITY RATIOS

Company Name	Test Year	Current Ratio		Quick Ratio		Rec. T/Over		Cov. Fix. Chge.		Inv. T/Over		ΣW_R 's
		σ Value	.4814 σW_R	σ Value	.9625 σW_R	σ Value	.2137 σW_R	σ Value	.3197 σW_R	σ Value	.2137 σW_R	
Allied Stores	1961	0	0	0	0	+.5	.1069	0	0	0	0	.1069
	1963	0	0	0	0	0	0	0	0	0	0	.0000
Associated	1957	0	0	0	0	0	0	0	0	0	0	.0000
	1959	+.5	.2407	0	0	0	0	0	0	0	0	.2407
Federated Dept.	1958	0	0	0	0	0	0	0	0	+.5	.1069	.1069
	1960	0	0	0	0	0	0	0	0	+.5	.1069	.1069
Gimbel Bros.	1962	0	0	0	0	0	0	0	0	0	0	.0000
	1964	0	0	0	0	0	0	0	0	0	0	.0000
R. H. Macy	1957	-.5	-.2407	-.5	-.4813	+ 1	.2137	-.5	-.1599	0	0	-.8276
	1959	0	0	-.5	-.4813	- 1	-.2137	-.5	-.1599	0	0	-1.0143
Marshall Field	1962	0	0	0	0	0	0	0	0	0	0	.0000
	1964	0	0	0	0	0	0	+ 1	.3197	0	0	.3197
May	1960	0	0	+.5	.4813	0	0	0	0	+.5	.1069	.5882
	1962	0	0	0	0	-.5	-.1069	0	0	0	0	-.1069
Montgomery Ward	1960	+ 1	.4814	+ 1	.9625	-.5	-.1069	0	0	- 1	-.2137	1.1233
	1962	+ 1	.4814	0	0	0	0	0	0	-.5	-.1169	.3745
J. C. Penney	1962	0	0	-.5	-.4813	- 1	-.2137	0	0	0	0	-.5950
	1964	-.5	-.2407	-.5	-.4813	0	0	0	0	0	0	-.7220
Sears, Roebuck	1958	0	0	0	0	+.5	.1069	+ 1	.3197	0	0	.4266
	1960	+.5	.2407	+.5	.4813	0	0	0	0	0	0	.7220

TABLE 24
DEPARTMENT STORE INDUSTRY ADJUSTMENT
TO BASE MULTIPLIER FOR
PROFITABILITY RATIOS

Company Name	Test Year	Return on Capital		Return on Common Stock Equity		Return to C.S. on Total Assets		Return to C.S. on Net Sales		W_R
		σ Value	.7000 σW_F	σ Value	1.0512 σW_F	σ Value	2.1024 σW_F	σ Value	.5256 σW_F	ΣW_F 's
Allied Stores	1961	0	0	0	0	0	0	0	0	.0000
	1963	0	0	0	0	0	0	0	0	.0000
Associated	1957	0	0	0	0	0	0	0	0	.0000
	1959	0	0	0	0	0	0	0	0	.0000
Federated Dept.	1958	0	0	0	0	0	0	0	0	.0000
	1960	+ .5	.3500	+ .5	.5256	+ .5	1.0512	0	0	1.9268
Gimbel Brothers	1962	0	0	0	0	0	0	0	0	.0000
	1964	0	0	0	0	0	0	0	0	.0000
R. H. Macy	1957	0	0	0	0	0	0	- .5	-.2628	-.2628
	1959	0	0	0	0	0	0	0	0	.0000
Marshall Field	1962	0	0	0	0	0	0	0	0	.0000
	1964	0	0	0	0	0	0	0	0	.0000
May	1960	0	0	0	0	0	0	0	0	.0000
	1962	0	0	0	0	0	0	0	0	.0000
Montgomery Ward	1960	- .5	-.3500	0	0	0	0	0	0	-.3500
	1962	- .5	-.3500	- .5	-.5256	- .5	-1.0512	- .5	-.2628	-2.1896
J. C. Penney	1962	+ 1	.7000	+ .5	.5256	+ .5	1.0512	0	0	2.2768
	1964	+ 1	.7000	+ .5	.5256	0	0	0	0	1.2256
Sears, Roebuck	1958	0	0	+ .5	.5256	0	0	0	0	.5256
	1960	0	0	0	0	0	0	+ .5	.2628	.2628

TABLE 25
DEPARTMENT STORE INDUSTRY ADJUSTMENT TO BASE MULTIPLIER
FOR PRICE AND PAYOUT
RATIOS

Company Name	Test Year	Price/Earnings Ratios		Dividend Yield		Payout Ratio		W_R
		σ Value	$.3504 \sigma W_P$	σ Value	$.3504 \sigma W_P$	σ Value	$.1752 \sigma W_P$	ΣW_P 's
Allied Stores	1961	0	0	0	0	+.5	.0876	.0876
	1963	0	0	0	0	0	0	.0000
Associated	1957	+.5	.1752	+.5	.1752	-.5	-.0876	.2628
	1959	0	0	0	0	0	0	.0000
Federated Dept.	1958	0	0	0	0	0	0	.0000
	1960	-.5	-.1752	0	0	0	0	-.1752
Gimbel Brothers	1962	0	0	0	0	-.5	-.0876	-.0876
	1964	0	0	0	0	0	0	.0000
R. H. Macy	1957	+.5	.1752	- 1	-.3504	0	0	-.1752
	1959	0	0	0	0	-.5	-.0876	-.0876
Marshall Field	1962	0	0	0	0	0	0	.0000
	1964	0	0	0	0	0	0	.0000
May	1960	0	0	0	0	0	0	.0000
	1962	0	0	0	0	0	0	.0000
Montgomery Ward	1960	0	0	0	0	- 1	-.1752	-.1752
	1962	- 1	.3504	0	0	- 1	-.1752	-.5256
J. C. Penney	1962	0	0	0	0	0	0	.0000
	1964	-.5	-.1752	0	0	0	0	-.1752
Sears, Roebuck	1958	0	0	0	0	0	0	.0000
	1960	0	0	-.5	-.1752	0	0	-.1752

TABLE 26
DEPARTMENT STORE INDUSTRY ADJUSTMENT TO BASE MULTIPLIER
FOR CAPITAL STRUCTURE
RATIOS

Company Name	Test Year	Funded Debt as Per Cent of Total Capital		Common Stock as Per Cent of Total Capital		Current Liabilities as Per Cent of Total Assets		W_R
		σ Value	.4380 σW_F	σ Value	.4380 σW_F	σ Value	.2190 σW_F	ΣW_F 's
Allied Stores	1961	0	0	0	0	0	0	.0000
	1963	0	0	0	0	0	0	.0000
Associated	1957	0	0	0	0	0	0	.0000
	1959	0	0	0	0	0	0	.0000
Federated Dept.	1958	0	0	0	0	0	0	.0000
	1960	0	0	0	0	0	0	.0000
Gimbel Brothers	1962	+.5	.2190	0	0	0	0	.2190
	1964	+.5	.2190	0	0	+.5	.1095	.3285
R. H. Macy	1957	+.5	.2190	-.5	-.2190	0	0	.0000
	1959	+.5	.2190	-.5	-.2190	0	0	.0000
Marshall Field	1962	0	0	0	0	0	0	.0000
	1964	0	0	0	0	0	0	.0000
May	1960	0	0	0	0	0	0	.0000
	1962	0	0	0	0	0	0	.0000
Montgomery Ward	1960	-.5	-.2190	0	0	0	0	-.2190
	1962	-.5	-.2190	0	0	-.5	-.1095	-.3285
J. C. Penney	1962	-.5	-.2190	0	0	+ 1	.1095	-.1095
	1964	-.5	-.2190	0	0	- 1	-.1095	-.3285
Sears, Roebuck	1958	-.5	-.2190	0	0	0	0	-.2190
	1960	0	0	0	0	0	0	.0000

TABLE 27
DEPARTMENT STORE INDUSTRY ADJUSTMENT
TO BASE MULTIPLIER FOR
EFFICIENCY RATIOS

Company Name	Test Year	Operating Asset Turnover		Total Asset Turnover		W_R
		σ Value	$.7300 \sigma W_R$	σ Value	$.7300 \sigma W_R$	ΣW_R 's
Allied Stores	1961	0	0	0	0	.0000
	1963	0	0	0	0	.0000
Associated	1957	0	0	0	0	.0000
	1959	0	0	0	0	.0000
Federated Dept.	1958	0	0	0	0	.0000
	1960	0	0	0	0	.0000
Gimbel Brothers	1962	0	0	0	0	.0000
	1964	0	0	0	0	.0000
R. H. Macy	1957	0	0	0	0	.0000
	1959	0	0	0	0	.0000
Marshall Field	1962	-.5	-.3650	-.5	-.3650	-.7300
	1964	0	0	0	0	.0000
May	1960	0	0	0	0	.0000
	1962	0	0	0	0	.0000
Montgomery Ward	1960	0	0	0	0	.0000
	1962	0	0	0	0	.0000
J. C. Penney	1962	+1	.7300	+1	.7300	1.4600
	1964	+.5	.3650	+1	.7300	1.0950
Sears, Roebuck	1958	+.5	.3650	0	0	.3650
	1960	0	0	0	0	.0000

APPENDIX C

TABLES PRESENTING A COMPARISON OF THE CHANGES IN
MULTIPLIERS BY VARYING THE WEIGHTS USED
FOR THE GROWTH ADJUSTMENT

TABLE 28
CEMENT INDUSTRY
THIS TABLE SUMMARIZES THE PER CENT CHANGES
IN THE MULTIPLIER USING DIFFERENT
WEIGHTS FOR GROWTH RATES

Company Name	<u>A</u> Per Cent Change Using Original Weights	<u>B</u> Per Cent Change in Multiplier using $[1+G_{EPS}]$ as #1 Weight	<u>C</u> Per Cent Change in Multiplier using $[1+G_{DPS}]$ as #1 Weight
Alpha Portland	-20.58	-20.25	-19.62
General Portland	-32.83	-31.47	-30.79
Ideal Cement	-31.18	-29.37	-28.93
Lehigh Cement	-31.97	-30.40	-28.21
Lone Star Cement	-29.90	-29.06	-28.81
Medusa Cement	-31.68	-30.19	-29.62
Penn-Dixie	-2.46	-2.36	-2.27

The Figures in Column A are shown in Table 10, Column F.
The Figures in Columns B and C are shown in Table 29, Columns C and F.

TABLE 29
CEMENT INDUSTRY
SUMMARY OF MULTIPLIER CHANGES AND RELATED PER CENT CHANGE USING
1 + GROWTH IN EARNINGS PER SHARE AS NO. 1 WEIGHT

Company Name	<u>A</u> Multiplier before Capital Structure Change	<u>B</u> Multiplier after Capital Structure Change	<u>C</u> Per Cent Change
Alpha Portland	12.7613	10.1764	-20.25
General Portland	14.3074	9.8047	-31.47
Ideal Cement	15.2864	10.7955	-29.37
Lehigh Portland	8.5650	5.9606	-30.40
Lone Star Cement	12.6180	8.9507	-29.06
Medusa Portland	14.7741	10.3124	-30.19
Penn-Dixie Cement	12.1776	11.8902	- 2.36

The Multipliers in Columns A and B were arrived at by substituting the growth rate adjustment in Table 31, Column E, into Table 14, Column C.

TABLE 30
CEMENT INDUSTRY
SUMMARY OF MULTIPLIER CHANGES AND RELATED PER CENT CHANGE USING
+ GROWTH IN DIVIDENDS PER SHARE AS NO. 1 WEIGHT

Company Name	<u>A</u> Multiplier before Capital Structure Change	<u>B</u> Multiplier after Capital Structure Change	<u>C</u> Per Cent Change
Alpha Portland	13.1723	10.5874	-19.62
General Portland	14.6204	10.1177	-30.79
Ideal Cement	15.5224	11.0315	-28.93
Lehigh Portland	9.2320	6.6276	-28.21
Lone Star Cement	12.7280	9.0607	-28.81
Medusa Portland	15.0591	10.5974	-29.62
Penn-Dixie Cement	12.7216	12.4332	- 2.27

The Multipliers in Columns A and B were arrived at by substituting the growth rate adjustment in Table 32, Column E, into Table 14, Column C.

TABLE 31
CEMENT INDUSTRY
GROWTH RATE ADJUSTMENT
TO BASE MULTIPLIER

Company Name	$\frac{A}{\text{Growth Rate of Earnings Per Share}} \frac{1}{1+G_{EPS}}$	$\frac{B}{\text{Growth Rate of Net Profit to Common}} \frac{1}{1+G_{NTC}} \frac{1}{4}$	$\frac{C}{\text{Growth Rate in Return to Total Capital}} \frac{1}{1+G_{RTC}} \frac{1}{3}$	$\frac{D}{\text{Growth Rate in Dividends Per Share}} \frac{1}{1+G_{DPS}} \frac{1}{2}$	$\frac{E}{[ABCD]}$
Alpha Portland	-6.52 = .9348	-6.71 = .9832	-11.40 = .9620	-0.08 = 1.0000	.8842
General Portland	-2.64 = .9736	1.14 = 1.0029	-10.49 = .9650	3.80 = 1.0190	.9601
Ideal Cement	-2.19 = 1.0219	3.41 = 1.0085	- 9.46 = .9685	6.78 = 1.0339	1.0319
Lehigh Portland	-9.39 = .9061	-8.07 = .9798	-11.55 = .9615	4.79 = 1.0240	.8741
Lone Star Cement	-2.24 = .9776	-0.16 = 1.0000	- 7.35 = .9755	0.14 = 1.0000	.9536
Medusa Portland	0.78 = 1.0078	1.03 = 1.0026	- 7.36 = .9755	6.60 = 1.0330	1.0181
Penn-Dixie Cement	-6.65 = .9335	-5.75 = .9856	-11.06 = .9631	4.83 = 1.0242	.9075

TABLE 32
CEMENT INDUSTRY
GROWTH RATE ADJUSTMENT
TO BASE MULTIPLIER

Company Name	<u>A</u> Growth Rate of Earnings Per Share $\frac{1+G_{EPS}}{1/2}$	<u>B</u> Growth Rate of Net Profit to Common $\frac{1+G_{NTC}}{1/4}$	<u>C</u> Growth Rate in Return to Total Capital $\frac{1+G_{RTC}}{1/3}$	<u>D</u> Growth Rate in Dividends Per Share $\frac{1+G_{DPS}}{1/3}$	<u>E</u> $\frac{E}{ABCD}$
Alpha Portland	-6.52 = .9783	-6.71 = .9832	-11.40 = .9620	-0.08 = 1.0000	.9253
General Portland	-2.64 = .9868	1.14 = 1.0029	-10.49 = .9650	3.80 = 1.0380	.9914
Ideal Cement	2.19 = 1.0120	3.41 = 1.0085	- 9.46 = .9685	6.78 = 1.0678	1.0555
Lehigh Portland	-9.39 = .9530	-8.07 = .9798	-11.55 = .9615	4.79 = 1.0479	.9408
Lone Star Cement	-2.24 = .9888	-0.16 = 1.0000	- 7.35 = .9755	0.14 = 1.0000	.9646
Medusa Portland	0.78 = 1.0039	1.03 = 1.0026	- 7.36 = .9755	6.60 = 1.0660	1.0466
Penn-Dixie Cement	-6.65 = .9667	-5.75 = .9856	-11.06 = .9631	4.83 = 1.0483	.9619

TABLE 33
DEPARTMENT STORES
THE TABLE SUMMARIZES THE PER CENT CHANGES
IN THE MULTIPLIER USING DIFFERENT
WEIGHTS FOR GROWTH RATES

Company Name	<u>A</u> Per Cent Change Using Original Weights	<u>B</u> Per Cent Change in Multiplier using $[1+G_{EPS}]$ as # 1 Weight	<u>C</u> Per Cent Change in Multiplier using $[1+G_{DPS}]$ as #1 Weight
Allied	- 2.01	- 0.90	- 1.95
Associated	- 0.20	- 0.19	- 0.19
Federated	+16.30	+16.21	+15.99
Gimbel	+ 1.74	+ 1.67	+ 1.63
R. H. Macy	+ 1.70	+ 1.71	+ 1.70
Marshall Field	+10.25	+10.07	+10.06
May	- 6.43	- 6.29	- 6.29
Montgomery Ward	-35.65	-33.94	-33.68
J. C. Penney	-14.43	-13.88	-13.62
Sears, Roebuck	- 2.60	- 2.37	- 2.34

The Figures in Column A are from Tables 11, 12, and 13, Column F.
The Figures in Columns B and C are from Table 34, Columns C and F.

TABLE 34
DEPARTMENT STORES
SUMMARY OF MULTIPLIER CHANGES AND RELATED PER CENT CHANGE USING
1 + GROWTH IN EARNINGS PER SHARE AS NO. 1 WEIGHT

Company Name	<u>A</u> Multiplier before Capital Structure Change	<u>B</u> Multiplier after Capital Structure Change	<u>C</u> Per Cent Change
Allied Stores	9.6925	9.6050	- 0.90
Associated Dry Goods	11.4038	11.3817	- 0.19
Federated Dept.	10.7999	12.5515	+ 16.21
Gimbel Brothers	11.8204	12.0175	+ 1.67
R. H. Macy	9.5754	9.7391	+ 1.71
Marshall Field	10.4190	11.4687	+ 10.07
May	11.0442	10.3491	- 6.29
Montgomery Ward	8.9801	5.9318	- 33.94
J. C. Penney	13.2303	11.3929	- 13.88
Sears, Roebuck	12.1682	11.8796	- 2.37

The Multipliers in Columns A and B were arrived at by substituting the growth rate adjustment in Table 36, Column E, into Table 21, Column C.

TABLE 35
DEPARTMENT STORES
SUMMARY OF MULTIPLIER CHANGES AND RELATED PER CENT CHANGE USING
+ GROWTH IN DIVIDENDS PER SHARE AS NO. 1 WEIGHT

Company Name	<u>A</u> Multiplier before Capital Structure Change	<u>B</u> Multiplier after Capital Structure Change	<u>C</u> Per Cent Change
Allied Stores	9.9525	9.7580	- 1.95
Associated Dry Goods	11.5758	11.5537	- 0.19
Federated Dept.	10.9529	12.7045	+ 15.99
Gimbel Brothers	12.0784	12.2755	+ 1.63
R. H. Macy	9.6044	9.7681	+ 1.70
Marshall Field	10.4290	11.4787	+ 10.06
May	11.0502	10.3551	- 6.29
Montgomery Ward	9.0481	5.9998	- 33.68
J. C. Penney	13.1663	11.3289	- 13.62
Sears, Roebuck	12.3112	12.0226	- 2.34

The Multipliers in Columns A and B were arrived at by substituting the growth rate adjustment in Table 37, Column E, into Table 21, Column C.

TABLE 36
DEPARTMENT STORE INDUSTRY
GROWTH RATE ADJUSTMENT
TO BASE MULTIPLIER

Company Name	$\frac{A}{\text{Growth Rate of Earnings Per Share}} \left[\frac{1+G_{EPS}}{1} \right]$	$\frac{B}{\text{Growth Rate of Net Profit to Common}} \left[\frac{1+G_{NTC}}{1} \right]^{1/4}$	$\frac{C}{\text{Growth Rate in Return to Total Capital}} \left[\frac{1+G_{RTC}}{1} \right]^{1/3}$	$\frac{D}{\text{Growth Rate in Dividends Per Share}} \left[\frac{1+G_{DPS}}{1} \right]^{1/2}$	$\frac{E}{M} \left[\frac{ABCD}{1} \right]$
Allied Stores	-2.55 = .9745	-0.49 = .9988	-3.94 = .9869	-0.08 = 1.000	.9605
Associated Dry Goods	5.44 = 1.0544	11.10 = 1.0278	-1.45 = .9952	6.59 = 1.0330	1.1141
Federated Dept.	2.62 = 1.0262	9.17 = 1.0229	-0.18 = .9994	3.86 = 1.0193	1.0693
Gimbel Brothers	7.62 = 1.0762	8.49 = 1.0212	1.93 = 1.0064	11.38 = 1.0569	1.1689
R. H. Macy	4.87 = 1.0487	8.04 = 1.0201	2.56 = 1.0085	2.68 = 1.0134	1.0841
Marshall Field	6.19 = 1.0619	6.65 = 1.0166	2.83 = 1.0094	4.63 = 1.0232	1.1149
May	2.85 = 1.0285	5.35 = 1.0134	-1.68 = .9944	1.76 = 1.0088	1.0456
Montgomery Ward	-8.52 = .9148	8.91 = 1.0223	-9.77 = .9674	-9.86 = .9507	.8601
J. C. Penney	3.18 = 1.0318	3.31 = 1.0083	-4.97 = .9834	1.30 = 1.0065	1.0298
Sears, Roebuck	6.12 = 1.0612	6.49 = 1.0162	-2.95 = .9902	7.29 = 1.0365	1.1070

TABLE 37
DEPARTMENT STORE INDUSTRY
GROWTH RATE ADJUSTMENT
TO BASE MULTIPLIER

Company Name	$\frac{A}{\text{Growth Rate of Earnings Per Share}} \left[\frac{1+G_{EPS}}{1/2} \right]$	$\frac{B}{\text{Growth Rate of Net Profit to Common}} \left[\frac{1+G_{NTC}}{1/3} \right]$	$\frac{C}{\text{Growth Rate in Return to Total Capital}} \left[\frac{1+G_{RTC}}{1/4} \right]$	$\frac{D}{\text{Growth Rate in Dividends Per Share}} \left[\frac{1+G_{DPS}}{1/4} \right]$	$\frac{E}{[ABCD]}$
Allied Stores	-2.55 = .9872	-0.49 = .9984	-3.94 = .9901	-0.08 = 1.0000	.9758
Associated Dry Goods	5.44 = 1.0272	11.10 = 1.0370	-1.45 = .9964	6.59 = 1.0659	1.1313
Federated Dept.	2.62 = 1.0131	9.17 = 1.0308	-0.18 = 1.0000	3.86 = 1.0386	1.0846
Gimbel Brothers	7.62 = 1.0381	8.49 = 1.0283	1.93 = 1.0048	11.38 = 1.1138	1.1947
R. H. Macy	4.87 = 1.0244	8.04 = 1.0268	2.56 = 1.0064	2.68 = 1.0268	1.0870
Marshall Field	6.19 = 1.0310	6.65 = 1.0222	2.83 = 1.0071	4.63 = 1.0463	1.1159
May	2.85 = 1.0143	5.35 = 1.0178	-1.68 = .9958	1.76 = 1.0176	1.0462
Montgomery Ward	-8.52 = .9574	8.91 = 1.0297	-9.77 = .9756	-9.86 = .9014	.8669
J. C. Penney	3.18 = 1.0159	3.31 = 1.0110	-4.97 = .9836	1.30 = 1.0130	1.0234
Sears, Roebuck	6.12 = 1.0306	6.49 = 1.0216	-2.95 = .9926	7.29 = 1.0729	1.1213

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