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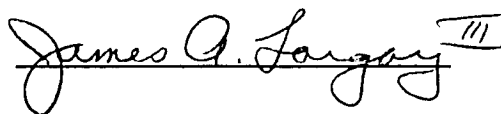
BY

JOHN KELLY

A THESIS SUBMITTED
IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE OF

DOCTOR OF PHILOSOPHY

Thesis Director's Signature:

A handwritten signature in cursive script, reading "James A. Lutz III". The signature is written in dark ink and is positioned above a horizontal line.

Houston, Texas

May, 1974

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CHAPTER I

INTRODUCTION

A. Economics and the Theory of Financial Management

From the point of view of an economist, the theory of financial management may be considered as an extension of the theory of the firm. In microeconomics, quite frequently the emphasis is placed upon the relationship between the volume of output and the profitability of the firm, with the amount of capital input taken as fixed. For the financial manager, however, this relationship between profitability and the volume of capital is of primary concern.

Nevertheless, the economist does state that, in order to maximize profits, a firm should employ capital up to the point where the marginal revenue product¹ of the last unit of input equals the price paid for that unit of capital. In stating this rule of microeconomic theory for the optimal employment of inputs, the economist, for the most part, abstracts from uncertainty and the existence of different types of capital funds.

On the other hand, in the theory of financial management, this same basic concept about the relationship between the volume of capital and profitability has been broken down into three major decisions for the firm: the investment decision, the financing decision, and the dividend decision. Furthermore, the theory of financial management is specifically interested in the phenomenon of many types of capital funds and the

¹The marginal revenue product resulting from the addition of one unit of capital input in the production of good "x" equals the marginal physical product of the capital input times the marginal revenue of the added output of good "x" resulting from the increase in the capital input by one unit.

interaction between the mix of financing and the evaluation of uncertain investments.

These three major decisions of the firm can be explained as follows. The investment decision determines the total amount of assets held by the firm, the composition of these assets, and the business risk complexion of the firm.² The financing decision is concerned with the determination of the best financial mix or capital structure of the firm. The dividend decision involves primarily the determination of the percentage of earnings to be paid to stockholders each year and the stability of this percentage over time.

B. The Primary Goal of the Firm and Its Role in the Theory of Financial Management

Correct decision making by the firm in each of the three major decision areas is dependent upon one primary prerequisite. None of the above decisions can be made without the establishment of an explicit goal toward which financial management is directed. In this thesis, as in most analysis of financial management decisions, it is assumed that the primary goal of the firm is to maximize the value of the firm to its stockholders.

From the owners' point of view, the choice of such a goal has obviously acceptable implications. From society's point of view, the choice of this goal by the firm also has good implications. Use of

²By business risk, I mean the relative dispersion of the net operating income of the firm; that is, the risk of the firm separate from the financing decision.

stockholder wealth maximization as an operating objective for business investment and financial policy also maximizes the value of economic output available for a given level of inputs, measured at prices prevailing in the market. Thus, this choice of stockholder wealth maximization as the primary goal of the firm, and as the basis on which decisions in the three major areas are to be made, is also a necessary condition for the maximization of economic welfare as a whole.

Nevertheless, one could question the realism of assuming stockholder wealth maximization as the overriding goal of the firm. Obviously the managers of a firm have a wider sphere of concern than just the relentless pursuit of wealth for shareholders. The manager strives to maintain a balance among the various groups which are directly or indirectly interested in the firm. These groups include stockholders, employees, customers, creditors, suppliers, government, and the public at large. The attempt to maintain the balance among these groups could lead to the pursuit of other goals in addition to shareholder wealth maximization. These could include such goals as survival, personal satisfaction of managers, growth or sales maximization, maintenance or increase in market share, or the attainment of satisfactory profits in combination with one or more of the previously mentioned goals.

Unfortunately, these pursuits do not result in operationally useful goals upon which an entire theory of financial management can be based. Only the assumption that stockholder wealth maximization is the primary goal of the firm results in the abundance of conclusions concerning firm behavior within its major decision areas.

Nevertheless, being forced to make an assumption which is admittedly an abstraction from the modern corporate world may not have the adverse results that some critics imply.³ It is not really a question whether a firm maximizes shareholder wealth or not. It is not even a question whether a firm strives to do so or not. What is of major importance is whether the assumption that a firm strives to maximize shareholder wealth allows one to reach realistic conclusions about the behavior of the firm within the theory of financial management.

Thus, the point to be made here is that the strength of the theory of financial management, as with all of economic theory, is not in the realism of the assumptions, but in the realism of the conclusions based upon these assumptions. Viewed in this light, the assumption that firms strive to maximize shareholder wealth serves the purposes of this thesis well.

C. The Dividend Decision

The primary concern of this thesis is with the third of the three big decision areas of the firm. The effect of a firm's dividend policy upon the valuation of the firm is of considerable importance. It is not only of importance to the managers of the firm who set the policy, but also to investors planning portfolios to allocate their consumption over time, and, thus, maximize their utility.⁴ Moreover, dividend policy is

³For a discussion of some of the drawbacks of this assumption, see R. N. Anthony[1].

⁴For a discussion of this concept of utility maximization in which the problem is viewed as the optimal allocation of consumption over time, see J. Hirshleifer [28].

important to economists striving to understand the function of capital markets and the role they play in allocating scarce resources within our economy.

This thesis will not treat specifically the factors which determine the inducement to invest, the amount of investment, or the demand for funds. These are accepted as givens in the analysis. Rather, the foremost concern of this thesis emphasizes upon both a theoretical and empirical level the factors that lead management to adopt one method instead of others in obtaining funds for investment. Upon a theoretical level, the thesis deals with the rationale behind the dividend decision of the firm; that is, the determination of the percentage of earnings to be paid to stockholders each year. The empirical part of the thesis primarily assesses the effects of these decisions upon the valuation of the firm.

D. Outline of the Thesis

The thesis is divided into seven chapters in addition to this introductory chapter. Chapter II contains a review of the literature in which the many facets and interpretations of dividend policy are presented. The discussion summarizes several past articles relating dividend policy to share price, the growth of the firm, external financing, and risk. These presentations are based upon both the assumption of perfect capital markets and upon assumptions conforming more closely to the modern investment world. Through this discussion of previous theoretical and empirical works and their shortcomings, the motivation for this thesis is explained.

In chapters III-VI, the two major aspects of dividend policy which are treated by this thesis are discussed. These two aspects involve primarily an empirical test for net dividend preference by investors and a test for a Modigliani-Miller clientele effect within a given industry.⁵ The two hypotheses which serve as the basis for these tests are presented in Part 1 of Chapter III and Part 2 of Chapter V. Chapters III and IV contain the theory from which the cross-sectional regression model used to test hypothesis 1 is derived. Part 1 of Chapter V provides part of the theoretical background for the test of the second hypothesis. Part 1 of Chapter VI discusses the exact specification of the dependent and independent variables in the cross-sectional model used to test hypothesis 1. Part 2 of Chapter VI discusses the design of the test and the computation of the variables used in testing hypothesis 2.

In Chapter VII, the results of the empirical tests are presented and discussed. Chapter VIII contains a summary of the conclusions which are reached upon the basis of the results.

⁵The Modigliani-Miller clientele theory is discussed in detail in Chapter II.

CHAPTER II

REVIEW OF THE LITERATURE

As was stated in the introduction, dividend policy must be evaluated in light of the objective of the firm; that is, the firm must choose a policy that will maximize the value of the firm to its shareholders. The exact nature of the role that dividend policy plays in maximizing this value has been the subject of longstanding debate. This chapter will focus upon this debate by reviewing the various theoretical discussions of dividend policy and how it relates to share price, the rate of growth of the firm, external financing, risk, and the question concerning what investors really capitalize when they determine an equilibrium price for shares.

Part 1: The Irrelevance of Dividend Policy

A. Walter

One assessment of the role of dividend policy treats dividends strictly as a passive residual of the financing decision. The amount of dividend payout will fluctuate from period to period in keeping with the fluctuations in the amount of acceptable investment opportunities available for the firm. The best known presentation of this treatment of dividend policy was in an article by Walter in 1956.¹

Walter makes the following assumptions:

- 1) Earnings retention is the sole source of additional funds.
- 2) Both the rate of return on added investment and the market capitalization rate are constants.

¹See J. E. Walter [58].

- 3) All increments to earnings are immediately distributed to shareholders.

Treating the stream of future earnings as a perpetual stream, Walter expresses the value of any common stock by the following formula:

$$(2-1) \quad V_c = \frac{D + \frac{R_a}{R_c} (E - D)}{R_c}$$

V_c = the value of common stock

D = cash dividends

E = earnings

R_a = the rate of return on additional investment

R_c = the market capitalization rate

This equation emphasizes the importance of both the dividend payout ratio and the relationship between R_a and R_c . Whenever R_a exceeds R_c , the present worth of future dividends resulting from the retention of earnings is greater than the dollar magnitude of retained earnings. Under such circumstances, the lower the dividend payout ratio, the higher is the value of the stock. More specifically, with Walter's assumptions, as long as R_a is greater than R_c , then the optimal payout ratio is zero. If R_c is greater than R_a , then the optimal payout ratio is one. If $R_a = R_c$, then the market price per share is insensitive to the payout ratio.

This rather simplistic treatment of dividend policy solely as a means of distributing unused investment funds strongly implies that dividends are irrelevant; that is, that investors are indifferent between dividends and capital gains. Thus, dividend policy is not considered to be an active decision variable for the firm.

B. Modigliani-Miller

A much more comprehensive argument for the irrelevance of dividends in the valuation of the firm is found in Modigliani and Miller's (hereafter MM) 1961 article.² Their essential point is that what investors really capitalize when they value a firm is earnings, and not dividends. The value of the firm is determined solely by the earning power of the firm, and the manner in which earnings are split between dividends and retained earnings does not matter.

MM's model is based upon the following assumptions:

- 1) There are perfectly competitive³ financial markets in which all investors are rational,⁴ and information is equally available to all investors at no cost.
- 2) The investment decision and the total earnings of the firm are given.
- 3) There is a frictionless tradeoff between retained earnings and new equity issue.
- 4) There is a constant discount rate applicable to future flows because of the certainty of expected profits.
- 5) There is an absence of taxes, transaction costs, and flotation costs.

²See M. H. Miller and F. Modigliani [45].

³Perfectly competitive financial markets mean that there are no buyers or sellers large enough for their transactions to have an appreciable impact upon the market price.

⁴According to MM, rational behavior means that investors always prefer more wealth to less, and are indifferent whether a given increment takes the form of cash payments or an increase in the market value of the shares that they hold.

In MM's model, the market price of a share of stock at the beginning of a period is equal to the present value of the dividends, which are assumed to be paid at the end of the period, plus the market price at the end of the period. Therefore:

$$(2-2) \quad P(t) = \frac{1}{1+r(t)} [d(t) + P(t+1)]$$

$P(t)$ = the market price of a share of stock at the beginning of a period

$r(t)$ = the capitalization rate for the firm

$P(t+1)$ = the market price at the end of the period

$d(t)$ = the dividend per share paid at the end of the period

MM next postulate that the firm wishes to take advantage of new investment possibilities which may be financed by either retained earnings or by new equity issue.⁵ Thus, the choice for the firm is whether to retain earnings, or to pay dividends and sell new stock in the amount of these dividends in order to finance the new investments. MM prove that the choice does not matter in the valuation of the firm as the stock's decline in market price because of external financing offsets exactly the payment of the dividend. Their proof is as follows. Rewriting equation (2-2) from above, the price per share equals:

$$(2-2) \quad P(t) = \frac{1}{1+r(t)} [d(t) + P(t+1)]$$

Furthermore, let:

$n(t)$ = the number of shares of record at the start of period t

$m(t+1)$ = the number of new shares sold during period t at the ex dividend price ($P(t+1)$)

⁵Since MM do not believe that leverage matters in the valuation of the firm, they believe that a new bond issue is equally as good as equity issue as an alternative to retained earnings.

$$n(t+1) = n(t) + m(t+1)$$

$$V(t) = n(t)P(t)$$

$$D(t) = n(t)d(t)$$

Expressing equation (2-2) in terms of totals gives one the following:

$$(2-3) \quad V(t) = \frac{1}{1+r(t)} [D(t) + n(t)P(t+1)]$$

Substituting for $n(t)$ in equation (2-3) gives:

$$(2-4) \quad V(t) = \frac{1}{1+r(t)} \{ D(t) + [n(t+1) - M(t+1)]P(t+1) \}$$

Substituting $V(t+1)$ for $n(t+1)P(t+1)$ in (2-4) gives:

$$(2-5) \quad V(t) = \frac{1}{1+r(t)} \{ D(t) + V(t+1) - m(t+1)P(t+1) \}$$

Equation (2-5) illustrates the three possible modes by which dividend policy might affect the current market value of the firm. Dividends may influence $V(t)$:

- a) directly via $D(t)$;
- b) indirectly through $V(t+1)$; or
- c) inversely through $m(t+1)P(t+1)$, since the higher the dividend payout in any period, the larger the required new capital to maintain any desired level of investment.

MM demonstrate that, under their assumptions, none of the three has any effect upon $V(t)$. Expressing $m(t+1)P(t+1)$ in terms of $D(t)$ gives:

$$(2-6) \quad m(t+1)P(t+1) = I(t) - [X(t) - D(t)]$$

$I(t)$ = the given level of the firm's desired investment

$x(t)$ = the firm's total net profit for the period

Substituting (2-6) into (2-5) gives:

$$(2-7) \quad V(t) = n(t)P(t) = \frac{1}{1+r(t)} [X(t) - I(t) + V(t+1)]$$

Therefore, $D(t)$ does not appear directly in the equation and, under MM

assumptions, $I(t)$, $X(t)$, $V(t+1)$, and $r(t)$ are all independent of $D(t)$. The only manner in which dividend policy could affect $V(t)$ is if future dividend decisions affected $V(t)$ indirectly through $V(t+1)$. Yet, one may repeat the above reasoning and conclude that $V(t+1)$ is independent of $D(t+1)$ and that $V(t+2)$ is independent of $D(t+2)$, and so on into the indefinite future.

Thus, given the investment policy of the firm, the dividend policy chosen by the firm has no effect upon the market valuation of the firm. As MM state: "Values are determined solely by 'real' considerations-- in this case, the earning power of the firm's assets and its investment policy--and not by how the fruits of the earning power are 'packaged' for distribution."⁶

Part 2: The Relevance of Dividend Policy

Unfortunately, the world postulated by MM does not exist. As a result, there have been many arguments claiming either net preference for dividends or net preference for capital gains, with this net preference based upon the violation of one or more of the MM assumptions given above. Some of these arguments are discussed below.

A. Gordon

Perhaps best known among these arguments is that belonging to Gordon,⁷ who argues for a net preference for dividends based upon the violation of

⁶See M. H. Miller and F. Modigliani [45], p. 416.

⁷See M. J. Gordon [25].

MM assumption number four. Gordon begins with the case of a firm which earns and pays out Y_0 in every future period. Thus, using the typical present value formula for determining the price of a stock:

$$(2-8) \quad P_0 = \frac{Y_0}{1+k} + \frac{Y_0}{(1+k)^2} + \frac{Y_0}{(1+k)^3} + \dots + \frac{Y_0}{(1+k)^t} + \dots$$

P_0 = the market price of the stock at the beginning of period 1

Y_0 = the expected earnings and dividends in perpetuity, with dividends paid at the end of the period

k = the discount rate, which is the stockholders' required rate of return

Gordon then postulates that the firm announces at $t=0$ that it will retain Y_0 earned in period 1 and invest it to earn a rate of return of $k=Y_0/P_0$ to begin in period 2. Thereafter, all earnings are paid out in dividends. The share price now equals:

$$(2-9) \quad P_0 = \frac{0}{1+k} + \frac{Y_0+kY_0}{(1+k)^2} + \frac{Y_0+kY_0}{(1+k)^3} + \dots + \frac{Y_0+kY_0}{(1+k)^t} + \dots$$

Thus, as a result of the firm's decision, the investor has sacrificed Y_0 in period 1 in order to earn an additional kY_0 in each period in perpetuity. Since kY_0 in perpetuity discounted at k equals Y_0 , then P_0 is unchanged by the change in the distribution of dividends over time.

This conclusion, however, is true only if k does not change as the distribution of dividend payments changes. Gordon cites two reasons why k is likely to change as the distribution of dividend payments changes.

These are:

- 1) Investors have an aversion to risk or uncertainty.
- 2) Given the riskiness of a corporation, the uncertainty of a dividend is expected to pay increases with the time in the future of the dividend.

Therefore, k is not independent of t . Rather, the rate k used to discount future flows is a weighted average of the discount rates for each period over the time horizon of the flows, and Gordon theorizes that these discount rates increase over time ($k_t > k_{t-1}$ for all t) as a result of the increasing uncertainty of the payout and the risk aversion by investors.

Consequently, by sacrificing current dividends for future ones by retaining earnings, a firm changes the weights used to calculate the discount rate k . This results in an increase in the composite rate and a decrease in the present value of future flows.

B. Baumol

Baumol⁸ argues for the relevance of dividend policy based upon the rationale of being irrational under uncertainty. He compares investor valuations of firms in the stock market with the familiar prisoner's dilemma example.⁹ Although the individual can gain (or not lose) by the simultaneous rationality of all investors, the incentive for the individual to behave rationally is not present. If investors and analysts alike have general expectations that low dividend payout stocks will sell at a discount,¹⁰ then they are forced to behave in a manner which makes the expectation become true.

This type of reasoning is similar to Keynes' analogy in which he

⁸See W. J. Baumol [4].

⁹For a good discussion of the prisoner's dilemma, see B. A. Davis and A. B. Whinston [14].

¹⁰At this point, I am not proposing any explanation as to how the original notion arose.

compared a newspaper competition for judging a beauty contest with investing in the stock market. "It is not a case of choosing those which, to the best of one's judgment, are really the prettiest, nor even those which average opinion thinks is the prettiest. We have reached the third degree where we devote our intelligences to anticipating what average opinion expects the average opinion to be."¹¹

C. Preference for Current Income

Another aspect of the relevancy argument involves investors who have a preference for current income. As long as MM assumptions four and five hold, investors could simply sell stock or reinvest dividends to satisfy their present and future desires for consumption. Nevertheless, in a world of uncertainty, stock prices fluctuate in the short run and many investors are reluctant to rely upon periodic sales of stock for current income. Moreover, transactions costs in the form of brokerage fees would certainly inconvenience, if not prohibit, the periodic sale of stock for income.

D. Taxes and Flotation Costs

Not all arguments for the relevance of dividend policy are based upon net preference for dividends. Whereas certain investors might prefer dividends, others prefer capital gains. For instance, the differential tax treatment¹² of dividend income and capital gains income

¹¹See J. M. Keynes [32].

¹²Although it has now changed, for the time period over which this study was done, the capital gains tax rate was one-half of the tax rate on ordinary income, up to a maximum of 25% for capital gains.

creates a strong bias in favor of the retention of earnings. Moreover, the existence of significant flotation costs when funds are acquired through external financing also favors the retention of earnings in the firm.

Part 3: Is There a Systematic Preference?

MM, as proponents of the irrelevance doctrine, argue that, although there may be preferences based upon the factors discussed above, there may not be any systematic preference in the market as a whole to make dividend policy matter in the valuation of the firm. MM believe that, even when one does find imperfections that bias individual preferences, the market will still behave at the margin in a manner consistent with the irrelevance proposition of the perfect market case. MM explain their "clienteles" theory in the following manner.

"If, for example, the frequency distribution of corporate payout ratios happened to correspond exactly with the distribution of investor preferences for payout ratios, then the existence of these preferences would clearly lead ultimately to a situation whose implications were different in no fundamental respect from the perfect market case. Each corporation would tend to attract to itself a 'clienteles', consisting of those preferring its particular payout ratio, but one clienteles would be entirely as good as another in terms of the valuation it would imply for the firm."¹³

Thus, MM's conclusion here is that the clienteles theory insures that no firm's stock will sell at a premium or discount simply because of their dividend payout ratio. Although this is intuitively appealing,

¹³ See M. H. Miller and F. Modigliani [45], p. 430.

such a theory needs testing to determine the degree of correspondence of the two distributions.¹⁴

Part 4: Past Empirical Work

Most of the past empirical work has concluded that the dividend payout ratio does affect the value of the firm. Beginning with Graham and Dodd¹⁵ in 1934, most regression studies have found the coefficient for dividends to be greater and more statistically significant than the coefficient for retained earnings. Such writers as Graham and Dodd,¹⁶ Harkavy,¹⁷ Johnson, Shapiro, and O'Meara,¹⁸ and Myron Gordon¹⁹ have typically employed a cross-sectional regression model of the following type.

$$(2-10) \quad P = a + b_1 D + b_2 R + e$$

P = the market price per share

D = dividends per share

R = retained earnings per share

e = the error term

As stated above, these studies found b_1 to be larger and more statistically significant than b_2 . These models, however, are quite

¹⁴As will be seen below, such a test is described in Part 2 of Chapter V and Part 2 of Chapter VI. The results are presented in Chapter VII.

¹⁵See B. Graham and D. L. Dodd [26].

¹⁶See B. Graham and D. L. Dodd [26], fourth edition, 1962.

¹⁷See O. Harkavy [27].

¹⁸See L. R. Johnson, J. O'Meara, and E. Shapiro [30].

¹⁹See M. J. Gordon [24].

crude and subject to a number of statistical biases.²⁰ The three principal problems with these models are:

- 1) They omit the influence of risk upon share price.
- 2) They omit the influence of growth upon share price.
- 3) They could result in biases in the coefficients caused by the problems of measuring true earnings based upon arbitrary accounting data.

In addition to the very simple model presented above, Gordon tests models in which the share price is the dependent variable and the independent variables are various combinations and specifications of the dividend payout ratio, the growth rate, an earnings instability index, leverage, an operating asset liquidity index, a debt maturity index, and corporation size. Gordon once again finds the coefficient for dividend payments to be quite statistically significant.

Nevertheless, this model also suffers from deficiencies. The two most prominent are in the specification²² of his risk variables and in his interpretation of the coefficient for dividend payments. To find that the dividend coefficient is significant in his model is necessary but not sufficient to conclude that dividends matter in the valuation of the firm. It may be that the dividend payment may be solely of informational importance; that is, the payout ratio merely conveys to the investor information about earnings. It may be that the earnings are really what matters to him instead of the form in which the earnings are disbursed.

²⁰For a discussion of these biases, see I. Friend and M. Puckett [23].

²¹See M. J. Gordon [24], pp. 154-177.

Thus, it is evident that the role of dividend policy in the valuation of the firm still remains an unresolved empirical issue. Hopefully this thesis improves upon the breadth and quality of past work.

CHAPTER III

DIVIDEND POLICY AND THE VALUATION OF THE FIRM: THE FIRST HYPOTHESIS AND THE UNDERLYING THEORETICAL MODEL

Introduction

This Chapter is divided into four parts. The first part contains an explanation and statement of the first hypothesis to be tested in this thesis. The second and third parts of this Chapter discuss the theoretical model underlying this empirical test. Part 2 presents a discounted cash flow model with an infinite time horizon. Part 3 points out the drawbacks of the infinite time horizon and, thus, formulates a finite horizon model to overcome these drawbacks.

To this point we will have expressed the price-earnings ratio as a linear function of the dividend payout ratio, the expected growth rate in earnings, and the investor discount rate. Nevertheless, nothing explicit has been discussed concerning the effect of risk upon the price-earnings ratio. Thus, in Part 4, we will incorporate into the model the risk variables which have been typically treated in the past as the ones most likely to affect the price-earnings ratio.

Part 1: The First Hypothesis

One often observes firms within an industry which both pay dividends and also raise capital through such external financing as public bond issues and new equity issue. Moreover, firms often follow this procedure in spite of significant costs connected with external financing. For instance, the sale of additional stock involves such transaction costs as the investment banker's commission, stamp taxes, fees to trustees, legal and accounting fees and expenses, printing and engraving expense, and registration fees. These costs often amount to 10 to 15 percent of

the gross proceeds realized.¹ In addition, a considerable amount of research has been done to substantiate the costs of underpricing or discounting the price of new issues in order to compensate for the likelihood of divergent investor expectations.²

Bond financing also involves substantial costs. In addition to transactions costs and issuance costs, there are also costs associated with increasing the debt-equity ratio beyond some optimal point and, thus, increasing the risk of cash insolvency and legal bankruptcy.³ There also could be costs associated with a higher debt-equity ratio leading to increased variability in the earnings available to common shareholders.⁴

It is clear that external financing does involve substantial costs not incurred when the firm relies upon internal financing. Consequently, firms that raise funds in the capital market in spite of these costs certainly behave as if dividend policy matters in the valuation of their firms.

It is my contention that firms use the following reasoning to lead them to the above conclusions and behavior. The firms view retained earnings and dividends as competing methods of acquiring resources. Therefore, if a firm's dividends are too low a percentage of earnings,

¹For examples of such estimates, see E. M. Lerner and W. J. Carleton [34], p. 110; J. F. Weston and E. F. Brigham [59], p. 565; and "Report of the Special Study of the Securities Markets of the Securities and Exchange Commission," House Document 95, Government Printing Office, Washington, D.C., 1963.

²See J. Lintner [37].

³See J. E. Stigly [54].

⁴See A. Barges [2].

such that this is reflected by a lower price per share, then its ability to acquire capital through external financing will be adversely affected.⁵ As a result, firms increase their dividend payments to an optimal payout ratio where the marginal yield of a dividend increase, in terms of the additional acquisition of funds that it permits through stock or bond issue at higher prices, is equal to the cost of foregone income retention. As previously mentioned, these costs are the transaction costs of external financing plus the costs of underpricing new issues.

The above reasoning has led to the formulation of the following test to examine whether the dividend policy of a firm matters in its valuation. More specifically, it is a test to see if there exists any investor net preference for dividends.

Firms in the gas utility industry were divided into three groups:

- 1) Those firms which both paid dividends⁶ and issued new common stock during the period 1962-1966.
- 2) Those firms which both paid dividends and issued new corporate bonds or preferred stock during the period 1962-1966.
- 3) Those firms which did not make a trip to the capital market (but paid dividends) during the period 1962-1966.

The null hypothesis to be tested is that, provided other things are equal,⁷ there is no significant difference in the valuation of the three

⁵The main problem here is obviously the flotation of shares. Nevertheless, bond and stock prices of a firm tend to move together.

⁶All firms in groups 1 and 2 either maintained or increased their dividends in 1966.

⁷Hopefully, the theoretical model includes all significant variables in the determination of the price-earnings ratio.

groups.⁸ This was tested for the year 1966 by a cross-sectional regression model with dummy variables added for group 1 and group 2 firms. The dummy variables were then checked for sign and statistical significance.

If the null hypothesis is not rejected, then this would be an indication that the net preference for dividends exists, and that it offsets the added costs of external financing. If the result of the test is that the group 1 and group 2 firms have a higher valuation, then this would be an even stronger indication of net dividend preference. A lower valuation would indicate that there is no net dividend preference by investors, and that the added costs of external financing should not have been incurred.

In addition, it seems appropriate to test for evidence that dividend policy matters in the valuation of the firm in ways other than by the use of dummy variables. Consequently, two additional tests using more continuous variables will be substituted for the dummy variable test.

In the first test, the dummy variables for group 1 and group 2 firms will be replaced by the number of trips that the particular firm has made to the capital market. The results from this substitution should give some insight into the importance of fixed costs among the total costs of issuing new capital.

In the second test, the dummy variables for group 1 and group 2 firms will be replaced by the ratio of total capital issued (1962-1966) to the total market value of stock in 1962. This ratio should give insight into

⁸By valuation I mean the price-earnings ratio.

the costs of discounting the price of new capital issue among the total costs of issuing new capital.

Moreover, by comparing the results of this second substitute test with the test using the number of trips to the capital market and the test using the dummy variables, one should be able to get insight into the relative costs of various financing strategies. For instance, assume one finds that the variable for the number of trips to the capital market for both group 1 and group 2 firms is significantly negative and the ratio variable for group 1 and group 2 firms is not. This would indicate that a strategy of a larger number of trips to the capital market with smaller capital issues is more costly than a strategy of issuing larger amounts of capital with each trip and making fewer trips to the capital market.

Part 2: An Infinite Horizon Model

The theoretical model⁹ to be presented here is predicated upon the basis that the investor strives to maximize the present value of all future income arising from his investment. The model is first presented in its simplest form and then extended in the next section to conform to the reality of the modern investment world.

In a world in which there are no taxes, no outside equity financing, no debt, a constant rate of return on corporate investment, and a constant retention ratio, the price that an investor is willing to pay for a share of stock is equal to the present value of all future expected

⁹This is a typical discounted cash flow model which is used extensively in finance literature. For example, see W. T. Carleton and E. M. Lerner [34].

receipts.¹⁰ That is,

$$(3-1) \quad P_0 = \frac{D_1}{1+k} + \frac{D_2}{(1+k)^2} + \dots + \frac{D_n}{(1+k)^n} + \dots$$

P_0 = the price of a share of stock at the beginning of period 1

D_t = the dividends per share in period t ($t=1 \dots$). It is assumed that dividends are paid at the end of the period

k = the discount rate, which is the investor's required rate of return. From the point of view of the corporation, it is the cost of capital.

Moreover,

$$(3-2) \quad D_t = (1-b)Y_t$$

b = the corporate retention rate

Y_t = corporate earnings in period t ($t=1 \dots$)

Furthermore, based upon the assumptions stated above, one can see that:

$$(3-3) \quad Y_1 = Y_0 + rbY_0 = Y_0(1+rb)$$

r = the constant rate of return on corporate investment

Therefore,

$$(3-4) \quad Y_t = Y_0(1+rb)^t$$

rb = the growth rate

¹⁰This may also be presented in continuous terms. Using the same symbols for the variables,

$$(1) \quad P_0 = \int_0^{\infty} D_t e^{-kt}$$

$$(2) \quad D_t = (1-b)Y_t$$

$$(3) \quad Y_t = Y_0 e^{rbt}$$

$$(4) \quad P_0 = \int_0^{\infty} (1-b) Y_0 e^{rbt} e^{-kt} dt$$

$$(5) \quad P_0 = (1-b)Y_0 \int_0^{\infty} e^{rbt} e^{-kt} dt$$

$$(6) \quad P_0 = (1-b)Y_0 \int_0^{\infty} e^{(-t[k-rb])} dt$$

Assuming $k > rb$ to assure convergence, then

$$(7) \quad P_0 = \frac{(1-b)Y_0}{k-rb} = \frac{D_0}{k-rb}$$

Substituting equation (3-4) into equation (3-2), and equation

(3-2) into (3-1), then

$$(3-5a) \quad P_0 = \frac{(1-b)(Y_0)(1+rb)}{(1+k)} + \frac{(1+b)(Y_0)(1+rb)^2}{(1+k)^2} + \dots + \frac{(1+b)Y_0(1+rb)^n}{(1+k)^n} + \dots$$

Or,

$$(3-5b) \quad P_0 = \sum_{i=1}^{\infty} (1-b) Y_0 \left(\frac{1+rb}{1+k}\right)^i$$

Assuming $k > rb$ ¹¹ and summing the progression:

$$(3-6) \quad P_0 = \frac{(1-b)Y_0(1+rb)}{k-rb}$$

This equation tells one that the price of a share at the start of a period is equal to the dividend expected in that period divided by the amount that the rate of return that stockholders require (k) exceeds the rate of growth of the dividend. A more intuitive interpretation of this equation can be seen by rearranging the terms and expressing k in terms of D_o , P_o , and rb .

$$(3-7) \quad k = \frac{D_o(1+rb)}{P_o} + rb$$

Thus, in the simplest case of infinite horizon and a constant growth rate for dividends, earnings and price per share, the stockholder required rate of return equals the expected current dividend yield per share plus the expected annual growth rate in earnings per share.

Treatment of Capital Gains in the Infinite Horizon Model

It can also be shown that the formulation in equation (3-6) is appropriate for the case in which investors are interested in the dividend payments during a finite time horizon and the capital gain on their stock

¹¹If this condition does not hold, then we have the case of the St. Petersburg paradox. See D. Durand [16].

at the end of this horizon.

If one assumes a finite horizon of N years in addition to the original assumptions, then the price of a share of stock at the beginning of period one will equal:

$$(3-8) \quad P_0 = \sum_{i=1}^N D_0 \left(\frac{1+rb}{1+k} \right)^i + P_0 \left(\frac{1+rb}{1+k} \right)^N$$

The first term on the right-hand side of the equation represents the present value of the dividends from year one through year N , and the second term represents the present value of the proceeds from the sale of the stock in year N . Subtracting $P_0 \left(\frac{1+rb}{1+k} \right)^N$ from both sides and summing the progression, then,

$$(3-9a) \quad P_0 \left[1 - \left(\frac{1+rb}{1+k} \right)^N \right] = \frac{(1-b)Y_0(1+rb)}{(1+k)} \frac{1 - \left(\frac{1+rb}{1+k} \right)^N}{1 - \left(\frac{1+rb}{1+k} \right)}$$

$$(3-9b) \quad P_0 \left[1 - \left(\frac{1+rb}{1+k} \right)^N \right] = \frac{(1-b)Y_0(1+rb)}{(1+k)} \frac{1 - \left(\frac{1+rb}{1+k} \right)^N}{\frac{(k-rb)}{(1+k)}}$$

$$(3-9c) \quad P_0 \left[1 - \left(\frac{1+rb}{1+k} \right)^N \right] = \frac{(1-b)Y_0(1+rb)}{(k-rb)} \left[1 - \left(\frac{1+rb}{1+k} \right)^N \right]$$

And dividing both sides by $\left[1 - \left(\frac{1+rb}{1+k} \right)^N \right]$,

$$(3-10) \quad P_0 = \frac{(1-b)Y_0(1+rb)}{k-rb}$$

This is the same as equation (3-6). This becomes obvious when one realizes that the price an investor is willing to pay for a share of stock in period N equals:

$$(3-11) \quad P_N = \sum_{i=N}^{\infty} D_0 \left(\frac{1+rb}{1+k} \right)^i$$

That is, the price in period N equals the present value of all expected future receipts from period N to infinity. Substituting this formulation

of P_N for $P_0 \left(\frac{1+rb}{1+k}\right)^N$ in equation (3-8) gives:

$$(3-12a) \quad P_0 = \sum_{i=1}^N D_0 \left(\frac{1+rb}{1+k}\right)^i + \sum_{i=N+1}^{\infty} D_0 \left(\frac{1+rb}{1+k}\right)^i$$

Or,

$$(3-12b) \quad P_0 = \sum_{i=1}^{\infty} D_0 \left(\frac{1+rb}{1+k}\right)^i$$

Thus, under the assumptions postulated, it does not matter whether capital gains are specifically included in the model. In either case presented above, the price-earnings ratio varies directly with the dividend payout ratio and the growth rate and inversely with the discount rate.

Part 3: The Finite Horizon Model

Nevertheless, there are drawbacks in the model presented in Part 2. It cannot be employed if no dividends are currently paid or if the firm engages in external financing. It also leads to an infinite value in share price whenever $rb > k$. Moreover, it implies that investors expect a constant rate of return and a constant rate of earnings retention so that it requires projecting a constant growth rate over an infinitely long horizon.

Thus, I will follow Malkiel,¹² who has formulated the following model to overcome these drawbacks. Assume that, instead of growing at a constant rate for an infinite period, earnings and dividends grow at a rate g for a period of N years. Thereafter, the security enjoys only the average growth expected of the standard or average security for the industry. Let:

E_t = the earnings per share in period t

¹²See B. G. Malkiel [39].

D_t = the dividends per share in period t . It is assumed that they are paid at the end of the period.

g = the expected growth rate in earnings per share and dividends per share for the next N years

P_o = the present value of the stream of future receipts; that is, the price per share at the beginning of period 1.

$\frac{D_o(1+g)^t}{E(t)}$ = the expected dividend payout ratio for period t

k = the stockholder's required rate of return; that is, the discount rate

m_s = the standard price-earnings ratio for the industry

Thus,

$$(3-13a) \quad P_o = \frac{D_o(1+g)}{1+k} + \frac{D_o(1+g)^2}{(1+k)^2} + \dots + \frac{D_o(1+g)^N}{(1+k)^N} + \frac{M_s E_o(1+g)^N}{(1+k)^N}$$

Or,

$$(3-13b) \quad P_o = \sum_{i=1}^N D_o \left(\frac{1+g}{1+k}\right)^i + M_s E_o \left(\frac{1+g}{1+k}\right)^N$$

The first N terms on the right-hand side of equation (3-13a) are simply the discounted present value of the dividend payments for the N years of the investor's time horizon. The numerator of the last term represents the market price of the security at the end of year N . This is because the earnings in year N , which equal $E_o(1+g)^N$, are capitalized at the standard earnings multiple (M_s) for the industry. Thus, after year N , the firm takes on the characteristics of a standard issue for the industry.

Let us first examine the case when $N=1$. Then,

$$(3-14a) \quad P_o = D_o \left(\frac{1+g}{1+k}\right) + M_s E_o \left(\frac{1+g}{1+k}\right)$$

Factoring out $(1+g)$,

$$(3-14b) \quad P_o = (1+g) \left[D_o \left(\frac{1}{1+k}\right) + M_s E_o \left(\frac{1}{1+k}\right) \right]$$

Rearranging terms,

$$(3-14c) \quad P_o = D_o \left(\frac{1}{1+k} \right) + M_s E_o \left(\frac{1}{1+k} \right) + g D_o \left(\frac{1}{1+k} \right) + g M_s E_o \left(\frac{1}{1+k} \right)$$

Or,

$$(3-14d) \quad P_o = M_s E_o \left(\frac{1}{1+k} \right) + D_o \left(\frac{1+g}{1+k} \right) + g M_s E_o \left(\frac{1}{1+k} \right)$$

Dividing by E_o ,

$$(3-15) \quad \frac{P_o}{E_o} = M_s \left(\frac{1}{1+k} \right) + \frac{D_o}{E_o} \left[\frac{1+g}{1+k} \right] + g \left(\frac{M_s}{1+k} \right)$$

Thus, for $N=1$, the price-earnings ratio for a share may be expressed as a simple linear combination of the dividend payout ratio, the growth rate, and the discount rate.

As N increases, however, the expression for P_o/E_o becomes complicated with cross product terms for the growth rate and the dividend payout rate variables. This can be illustrated by summing the progression given in equation (3-13b). Summing this progression, one gets:

$$(3-16) \quad P_o = \frac{D_o (1+g)}{k-g} - \frac{D_o (1+g)^{N+1}}{(k-g)(1+k)^N} + \frac{M_s E_o (1+g)^N}{(1+k)^N}$$

Dividing through by E_o gives:

$$(3-17) \quad \frac{P_o}{E_o} = \frac{D_o}{E_o} \left(\frac{1+g}{k-g} \right) - \frac{D_o}{E_o} \left[\frac{(1+g)^{N+1}}{(k-g)(1+k)^N} \right] + \frac{M_s (1+g)^N}{(1+k)^N}$$

One can see how complicated the formula becomes as N increases. Fortunately, Malkiel¹³ has shown that, for N as small as five, the simple linear combination is a reasonable approximation of the true expression.¹⁴

To this point, we have developed a linear model in which the price-earnings ratio varies directly with the dividend payout ratio and the

¹³See B. G. Malkiel [40].

¹⁴Consequently, in the cross-sectional tests I used growth rates based upon a five year time horizon.

growth rate, and inversely with the discount rate. In the next part of this chapter, we will discuss the typical manner for developing the influence of risk upon the discount rate and, thus, upon the valuation of the firm.

Part 4: Risk and the Determinants of the Discount Rate

In this section, we will review Gordon's¹⁵ development of the risk variables which most likely affect the stockholder's required rate of return on the discount rate (k). Gordon's treatment is typical of the manner in which risk has been analyzed in the past. In Chapter IV, it will be shown why this type of treatment is inadequate, and then we will develop the risk variables which will be used as the determinants of k in this empirical study.

Until now we have only defined the discount rate and demonstrated that the higher the discount rate, the lower the price-earnings ratio. In equation (3-7), k was expressed as the sum of the expected current dividend yield per share plus the expected annual growth rate in earnings per share. That is,

$$(3-7') \quad k = \frac{D_o(1+rb)}{P_o} + rb$$

There are other determinants of k and these are discussed below.

A. Operating Risk and the Growth Rate

The assumptions of the MM theory, as presented in Chapter II, contended that the required rate of return of stockholders was constant and

¹⁵See M. J. Gordon [24].

independent of the retention ratio (b) and, therefore, independent of the growth rate (rb). Thus, letting $d = D_0(1+rb)/P_0$ and a_1 be the constant k , then

$$(3-18) \quad d = a_1 - br \quad \frac{\partial d}{\partial br} = -1$$

One can see that as br increases, d declines by the same percentage.

More likely, however, when one considers the riskiness of an expected return, that k does vary with b and, therefore, with br . Given its dividend expectation and the expected growth rate, a corporation's cost of capital should vary directly with the uncertainty of the expectation. This uncertainty is normally referred to as the operating risk of the firm. One typically measures operating risk by the dispersion around an expected value; that is, the variance or standard deviation of the expected return.

Lintner¹⁶ has developed a theoretical model in which the variance of the growth rate increases with the growth rate and with time. Similarly, Malkiel¹⁷ has proved three theorems concerning increasing volatility of stocks as br increases. Lerner and Carleton¹⁸ have formulated two cases in which the variance of the growth rate is either proportionate to the growth rate or proportionate to the square of the growth rate. Gordon¹⁹ also asserts: "Common sense, as well as the mathematics of our model, suggest that as the growth rate increases, the required dividend yield on a share should fall--not in a one to one ratio, but by decreasing

¹⁶See J. Lintner [35].

¹⁷See B. G. Malkiel [39].

¹⁸See W. T. Carleton and E. M. Lerner [34], Chapter 7.

¹⁹See M. J. Gordon [24], p. 51.

amounts, so that the required dividend yield asymptotically approaches zero."

Thus Gordon formulates the following to replace equation (3-18) above.

$$(3-19) \quad d = a_1(1+br)^{-a_2} \quad a_2 > 0$$

This says that, as br increases, instead of d declining by the same percentage, it decreases by some percentage $(\frac{a_2}{1+br})$.²⁰

Substituting (3-19) into (3-7'), the discount rate becomes:

$$(3-20) \quad k = a_1(1+br)^{-a_2} + br$$

B. Operating Risk and the Dividend Expectation

The stockholders' required rate of return should also vary with the standard deviation of the dividend expectation, as well as the standard deviation of the growth rate. Nevertheless, use of the standard deviation alone would measure absolute dispersion and would penalize the larger firms.

To obtain a risk variable which is insensitive to scale, one must deflate the standard deviation by some scale variable. Most research in the past has accomplished this deflation by the use of the coefficient of variation, which is the ratio of the standard deviation of earnings to the expected value of earnings. Gordon, however, believes that deflating by the expected value of earnings causes this risk variable to reflect

²⁰This can be shown quite easily. Taking the log of (3-19),
 $\log d = \log a_1 - a_2 \log (1+br)$

$$\frac{\partial \log d}{\partial br} = \frac{-a_2}{1+br}$$

profitability, which is already accounted for in the dividend expectation and the growth rate. Therefore, he deflates the standard deviation by the net worth of the firm to eliminate the scale effects.²¹

²¹The superiority of net worth may be demonstrated by referring to the following table of financial data for four hypothetical firms (F_1 , F_2 , F_3 , F_4).

W = net worth

\bar{Y} = expected net income

U_1 = the standard deviation

$U_2 = U_1 / \bar{Y}$

$U_3 = U_1 / W$

	F_1	F_2	F_3	F_4
W	100	200	100	100
\bar{Y}	10	20	20	20
U_1	30	60	30	60
U_2	3.0	3.0	1.5	3.0
U_3	0.3	0.3	0.3	0.6

If one uses U_2 as the measure of operating risk, then F_3 is one-half as risky as F_1 . Yet, the firms are the same size and have the same dispersion of earnings. F_3 is one-half as risky because it is twice as profitable and we have already accounted for profitability in the valuation equation through the expected dividend payout ratio and the expected growth rate of earnings.

If one uses U_3 as the measure of operating risk, then the measure is insensitive to profitability. F_1 and F_2 , which differ only by a scale factor, have the same riskiness. F_4 , which has twice the dispersion of F_1 , is judged to be twice as risky. F_3 , which has the same risk per unit of investment as F_1 , is now judged to have the same risk level as F_1 .

Thus, the principal advantage arising from the use of net worth in the denominator is that it measures risk per unit of investment. This is analogous to the use of the dividend payout ratio and the growth rate in earnings, which measure profitability per unit of investment.

Gordon specifies this influence on k as follows:

$$(3-21) \quad k = a_1 \left(1 + \frac{s}{W}\right)^{a_3} \quad a_3 > 0$$

s = the standard deviation of expected earnings per share

W = net worth per share

Combining equation (3-21) with equation (3-20) gives the following functional form for the discount rate:²²

$$(3-22) \quad k = a_1 (1+br)^{-a_2} \left(1 + \frac{s}{W}\right)^{a_3} + br$$

C. Financial Risk

In addition to operating risk, there is another category of risk which is normally judged to affect the discount rate. This variable is financial risk, which is best measured by the debt-equity ratio. As this ratio increases, there is an increase in the proportion of such fixed charges as interest payments, lease commitments, and preferred stock payments. This trend encompasses both the increasing risk of cash insolvency leading to legal bankruptcy and the increasing variability in the earnings available to common shareholders.²³

²²The functional form was specified in nonlinear form for two reasons. It has been reasoned before that, with increasing leverage (which is introduced into the analysis in the next section), there is an increasing risk of insolvency and that it increases at an increasing rate. This would necessitate a nonlinear specification of the influence of risk variables upon the discount rate. Secondly, several writers who have tested valuation models using linear specifications of the risk variables have found these variables to be insignificant. For instance, see M. J. Gordon [24], H. Benishay [5], and D. Usher, The Debt-Equity Ratio, unpublished Ph.D. dissertation, University of Chicago School of Business Administration, 1960. For a brief discussion of this thesis, see M. J. Gordon [24], Chapter 6.

²³See A. Barges [2], Chapter 2.

If we let,

$$h = L/W$$

$$L = \text{net debt per share}^{24}$$

$$W = \text{net worth per share}$$

then the influence of financial risk upon the discount rate can be specified as follows:

$$(3-23) \quad k = a_1(1+h)^{a_4^{25}} \quad a_4 > 0^{26}$$

Incorporating this into the previous expression given for k in equation (3-22), the discount rate now equals:

$$(3-24) \quad k = a_1(1+br)^{-a_2} \left(1+\frac{s}{W}\right)^{a_3} (1+h)^{a_4} + br$$

Thus, following Gordon, I have expressed k as an increasing function of the operating and financial risk of the firm.²⁷

²⁴Net Debt = L+CL+ID+LD+LR+PS-CG-AR
 CL = current liabilities
 ID = intermediate term debt
 LD = long term debt
 LR = liability reserves such as pension liabilities
 PS = preferred stock
 CG = cash and government bonds
 AR = accounts receivable

²⁵In addition, Gordon assumes that the interest rate and the rate of return on investment do not vary with h .

²⁶If one is aware of the traditional argument concerning the ways in which the debt-equity ratio may affect the cost of capital, then he knows that, at first, k may decrease as h increases. Nevertheless, by assuming that a_4 is positive, one is assuming that h has increased beyond this phase and that the increasing risk of insolvency now increases k .

²⁷Gordon also includes variables for corporate size, liquidity of assets, and debt maturity. As risk variables, they have minor influence and thus were not included in this discussion. Moreover, the main purpose of this section is to show how risk was typically treated in past models. This was done in order to clarify the next section, which demonstrates why this treatment is inadequate.

CHAPTER IV

THE CAPITAL ASSET PRICING MODEL: RISK AND THE VALUATION OF THE FIRM

Introduction

In Chapter III, we developed a finite horizon model in which the price-earnings ratio was formulated as a linear function of the dividend payout ratio, the expected growth rate in earnings, and the investor discount rate. Moreover, we expressed the discount rate as a positive function of the operating and financial risk of the firm. These two types of risk influenced the price-earnings ratio through three variables. These three variables were the variance of the growth rate in earnings, the ratio of the standard deviation of the dividend expectation to the net worth of the firm, and the debt-equity ratio.

As will be shown in this chapter, this treatment of risk is inadequate. In the first of two parts of this chapter, we will develop the capital asset pricing model in its most simple form. From this model, we will demonstrate that the only risk which matters in the valuation of a share of stock is the marginal contribution that stock makes to the risk of a diversified portfolio. As will be seen below, this risk is measured by a stock's beta coefficient.

In the second part of this chapter, we will explore various extensions of the simple presentation of the capital asset pricing model. The result of this analysis is that two additional variables are added to the model to determine their effects upon the price-earnings ratio of a stock. These two variables are the square of the beta coefficient and the residual from the first-pass regressions used to estimate the beta coefficient.

Part 1: The Capital Asset Pricing Model

A. Specific Risk and Systematic Risk

The problem with the use of the variables in equation (3-24) to represent the influence of risk upon the stockholders' required rate of return is that they measure the specific risk of a stock totally independent of other stocks. The significance of this is that, as will be shown below, the market does not compensate the investor for specific risk.

More appropriately, the risk of a stock should be measured according to its marginal contribution to the risk of an investor's diversified portfolio. This is a stock's systematic risk, which measures the change in the price of a stock relative to changes in the security market as a whole. It is only this systematic risk of a stock which is compensated for in terms of a higher return. The discussion of the capital asset pricing model given below will demonstrate why this is true.

B. The Capital Asset Pricing Model: Risk Compensation for Perfectly Diversified Portfolios

The capital asset pricing model, which is the basis for the conclusion that only systematic risk is compensated for in the security markets, is developed under the following assumptions.¹

¹For a discussion of these assumptions, see M. J. Jensen [29]. This presentation of the capital asset pricing model is not based upon the works of any particular author. Nevertheless, probably the best discussion and development of the model can be found in W. F. Sharpe [53].

- 1) All investors are single period, expected utility of terminal wealth maximizers, who choose among alternative portfolios upon the basis of the means of their expected returns and their standard deviations. All investors are assumed to be risk averse.
- 2) All investors have identical subjective estimates of means, variances, and covariances of return among all assets.
- 3) All may lend and borrow at an exogenously determined risk free interest rate (R_f), and there are no restrictions upon short sales.
- 4) All assets are perfectly divisible and liquid, all assets are perfectly marketable, and there are no transaction costs.
- 5) There are no taxes.
- 6) All investors are price takers.
- 7) The quantities of all assets are given.

Let us define the expected return of an asset, the variance and standard deviation of this expected return, and the covariance of this return with the return of another asset in the following manner.

- a) the expected return on security i :²

$$ER_i = \frac{1}{n} \sum_{t=1}^n R_{it}$$

$$R_{it} = \frac{P_{it} - P_{i,t-1} + D_{it}}{P_{i,t-1}}$$

- b) the variance of the expected return:³

²The expected value is the mean value of the distribution of future returns.

³The variance is the measure of the dispersion of the rates of return from the expected value.

$$V_i = \frac{1}{n} \sum_{t=1}^n (R_{it} - ER_i)^2$$

c) the standard deviation of the expected return:

$$S = \sqrt{V}$$

d) the covariance of security i with security j:⁴

$$C_{ij} = \frac{1}{n} \sum_{t=1}^n (R_{it} - ER_i)(R_{jt} - ER_j)$$

According to the capital asset pricing model, an investor will allocate his funds partly to the riskless asset earning R_f and partly to a portfolio of common stocks. The expected return on such holdings will be the average of the expected return on the risky common stock portfolio and the risk-free rate R_f , weighted proportionally to the relative allocation. Thus:

$$(4-1a) \quad ER = xR_f + (1-x)ER_p$$

$$(4-1b) \quad ER - R_f = (1-x)(ER_p - R_f)$$

ER = the expected return on the total holdings

ER_p = the expected return on the common stock portfolio

R_f = the risk-free interest rate

x = the proportion of wealth invested at R_f

By definition, the variance of the risk free asset is zero. Thus, the variance of the return on the total holdings equals:

$$(4-2) \quad V = (1-x)^2 V_p$$

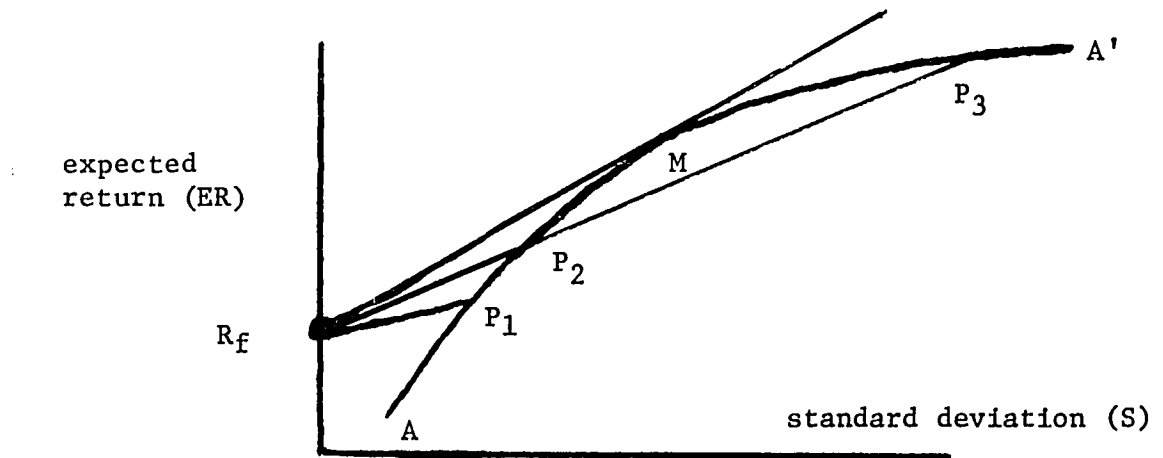
V_p = the variance of the common stock portfolio

Moreover, in terms of the standard deviation of the return on the total holdings:

⁴The covariance is a measure of the dependence between the rates of return on security i and security j.

$$(4-3) \quad S = (1-x) S_p$$

As stated in the assumptions, investors choose among alternative portfolios upon the basis of the mean and the standard deviation of the expected returns. Thus, every possible attainable portfolio can be plotted in a space with the expected return on the vertical axis and the standard deviation on the horizontal axis. Moreover, an efficient frontier for these attainable portfolios may be obtained by identifying those portfolios with maximum expected return for a given level of risk. This frontier is represented by the curvature AA' in the figure below.



Equation (4-1b) above shows that the expected return is a linear function of the proportion x invested in the risk free asset. Thus, in ER-S space, any straight line going through the risk free interest rate and any point P on the efficient frontier represents an available set of investment opportunities. Since these lines differ only in slope, it is clear that only one line would result in investment opportunities which dominate all of the portfolios on the efficient frontier. This is the line that is just tangent to the efficient frontier at point M .

By our assumptions, all investors have the same time horizon and

view their portfolio opportunities in the same way. Thus, all face the same set of efficient portfolios, and will all hold some combination of the risk-free asset and the risky portfolio M.⁵ This portfolio M must be the market portfolio; that is, it must consist of all risky assets in the market, each weighted by the ratio of its total market value of all assets. As Fama states:⁶ "If this portfolio does not contain all the risky assets in the market, or if it does not contain them in exactly the proportions in which they are outstanding, then there will be some assets that no one will hold. This is inconsistent with equilibrium, since in equilibrium, all assets must be held."

This line R_fM in the figure above is called the capital market line. Since the line goes through the point of the market portfolio's expected return (ER_m) and its risk (S_M), the equation of the capital market line is:

$$(4-4) \quad ER - R_f = \frac{ER_M - R_f}{S_M} \cdot S$$

ER, S = the expected return and the standard deviation, respectively, of any particular portfolio on the capital market line.

Equation (4-4) says that, for any portfolio on the capital market line, the expected return in excess of the risk-free return is proportional to the risk of that portfolio. The slope of the capital market line, $ER_M - R_f / S_M$, is called the market price of risk. Thus the expected return in excess of R_f equals the amount of risk taken (S) times the market price of risk. Equation (4-4) expresses quantitatively

⁵The exact combination will depend upon the investor's utility function; that is, his tradeoff between risk and return.

⁶See E. F. Fama [19].

the principle of risk compensation for perfectly diversified portfolios.

C. Individual Securities, Imperfectly Diversified Portfolios, and Risk Compensation

In order to prove the assertion made concerning specific and systematic risk, it is necessary to demonstrate that, since individual stocks and imperfectly diversified portfolios will fall below the capital market line, the market does not compensate for the total risk assumed by the purchase of individual securities and imperfectly diversified portfolios.

Sharpe⁷ has proved that, for the capital asset pricing model, the covariance of the return on each individual security is proportional to the excess of the expected return on that security over the risk-free return. That is,

$$(4-5) \quad ER_i - R_f = K \cdot C_{im}$$

ER_i = the expected return on security i

K = the constant of proportionality

C_{im} = the covariance of the return on security i with the return on the market portfolio M

The expected return on a portfolio is equal to the weighted average of the expected returns on individual securities. Similarly, the covariance of any portfolio with the market portfolio is a weighted average of the covariance of the individual securities with the market portfolio. Thus, for any portfolio P,

$$(4-6) \quad ER_P - R_f = K \cdot C_{pm}$$

⁷See W. F. Sharpe [53], Chapter 5.

More specifically, for the market portfolio,

$$(4-7) \quad ER_m - R_f = K \cdot S_m^2$$

since the covariance of the market portfolio with itself is just the variance of the market.

Equation (4-7) allows us to identify K, the constant of proportionality. For equation (4-7) to be true,

$$(4-8) \quad K = \frac{ER_m - R_f}{S_m^2}$$

Substituting the expression for K in (4-8) into (4-5), one gets the following:

$$(4-5') \quad ER_i - R_f = \frac{ER_m - R_f}{S_m^2} \cdot C_{im}$$

One can now compare equation (4-5'), which holds for any security or portfolio, with equation (4-4), which holds only for those portfolios on the capital market line. It can be seen that for portfolios below the capital market line, the market price of risk $(ER_m - R_f / S_M)$ rewards only part of the total risk. The only part of the total risk which is compensated for in terms of a higher expected return is C_{iM} / S_M . This part of total risk is called systematic risk, which was referred to earlier as the marginal contribution to the risk of an investor's diversified portfolio.

By rewriting equation (4-5') in the following way, one can illustrate these different aspects of risk more clearly.

$$(4-5'') \quad ER_i = a_i + B_i ER_m + e_i$$

e_i = an individualistic factor reflecting that portion of security i's return which is not a linear function of ER_M

a_i = the intercept

B_i = the beta coefficient; that is, the slope of the linear relationship between ER_i and ER_M

Within the context of this model, the variance of the return for any portfolio P would equal:

$$(4-10) \quad V(ER_P) = \frac{1}{N} \overline{V(e_i)} + \overline{B_i}^2 [V(ER_M)]$$

$V(ER_P)$ = the variance for any portfolio P

$V(e_i)$ = the mean of the variances of the individualistic factors

\overline{B} = the mean of the beta coefficients for all securities in portfolio P

$V(ER_M)$ = the variance of the market portfolio

One can see that, as N increases, the first term in the expression $[1/N(Ve_i)]$ goes to zero. Thus, an individual security's contribution to the riskiness of the portfolio is measured by its B_i and not by $V(e_i)$.

This illustrates why it is only systematic risk which is compensated for by a higher return. Specific risk is avoidable risk. It can be driven to zero by diversification (that is, as N increases). The beta coefficient, however, represents unavoidable risk because it is that portion of the variance of a portfolio which cannot be diversified away by increasing the number of securities in the portfolio.

The result of this analysis of the capital asset pricing model is that the beta coefficient has been promoted over the debt-equity ratio, the coefficient of variation, and the variance of the growth rate to the single most important risk characteristic of any security or portfolio. Thus the beta coefficient will be used as the risk variable

in the cross-sectional regression model for testing the role of dividend policy in the valuation of the firm. The procedures used for computing beta will be discussed in Part 1 of Chapter VI.

Part 2: Extensions of the Capital Asset Pricing Model

A. The Zero Beta Portfolio

The capital asset pricing theory presented above would predict that a_i would not be significantly different from zero if one ran the following regression:

$$(4-11) \quad ER_{it} - R_f = a_i + B_i(ER_{Mt} - R_f) + e_{it}$$

Nevertheless, past empirical work by Douglas,⁹ Lintner,¹⁰ and Black, Jensen and Scholes¹¹ have found that a_i does differ from zero and is related to beta in the following manner:

$$(4-12) \quad a_i = \alpha(1-B_i)$$

One can see that stocks with $B < 1$ have positive abnormal returns and stocks with $B > 1$ have negative abnormal returns. One possible explanation offered by Brennan¹² for such a finding is that investors do

⁸The interpretation of the beta coefficient is as follows. If a security has a beta equal to one, then it is of average riskiness. That is, if the market advances by 10%, then the price of a stock with a beta of one would advance by 10%. A stock with a beta greater than one would advance by more than 10% and a stock with a beta less than one would advance by less than 10%. The same generalizations apply to market declines.

⁹See G. W. Douglas [15].

¹⁰See J. Lintner [36].

¹¹See F. Black, M. C. Jensen, and M. Scholes [6].

¹²See M. J. Brennan [10].

not enjoy unlimited borrowing and lending at the risk-free rate R_f . Therefore, the investor may not be allocating his investments among some combination of a riskless asset and a risky portfolio. Instead, the relevant choice for the investor may be between the market portfolio and another portfolio which, though risky, possesses no market risk. This portfolio would be composed of long and short holdings in risky assets such that the beta coefficient would equal zero.

Thus, the expected return on a security would still be a linear function of the security's beta, but the new expression would be:

$$(4-13) \quad ER_i = ER_z + B(ER_m - ER_z)$$

ER_z = the expected return on the zero beta portfolio, $ER_z > R_f$

B. Douglas-Lintner

A more disturbing interpretation of the non-zero a_i is provided by the research of Douglas¹³ and Lintner.¹⁴ Douglas regressed mean annual rates of return on variances and standard deviations of annual rates of return for a large sample of common stocks for the period 1946-1963. He found a significant positive relationship between the expected value of these rates and their own variances.

In a separate test, Lintner estimated the beta coefficient for 301 common stocks over a ten year period by regressing their annual rates of return (ER_{it}) on the yearly annual rate of return for all stocks in the sample (ER_M). He then regressed the mean annual rate of return for each

¹³See G. W. Douglas [15].

¹⁴See J. Lintner [36].

company (ER_i) on the beta estimated in the first-pass regressions plus the residual variance around the first-pass regressions $V(e_i)$. As was explained in connection with equation (4-9) above, this is the nonmarket-connected component of each share's total variance.

Thus, Lintner's second-pass regression was as follows:

$$(4-14) \quad ER_i = a_0 + a_1 b_i + a_2 V(e_i) + u_i$$

ER_i = the expected rate of return on security i

b_i = the estimated beta coefficient for the first-pass regressions

$v(e_i)$ = the nonmarket-connected portion of a security's variance

Based upon the capital asset pricing model, the coefficient for $V(e_i)$ should not be significantly different from zero because this is the portion of an asset's risk which can be neutralized through diversification. Yet Lintner found that the coefficient a_2 was positive and significant.

Thus both Lintner and Douglas found that an asset's own variance was as important as its covariance with a market portfolio in determining its expected return and equilibrium price. According to the results, shareholders were not only compensated for systematic risk, but also for unnecessary risk which would have been diversified away by holding even a modest portfolio.¹⁵

C. Fama-MacBeth

Extending the Lintner-Douglas results an additional step, Fama and MacBeth¹⁶ formulated the following four factor model to explain the expected

¹⁵In 1966, B. F. King found that a portfolio with as few as ten common stocks could reduce the individual impact of variance from 40 percent to 11 percent. See B. F. King [33].

¹⁶For a discussion of their unpublished manuscript, see M. J. Jensen [29], p. 371.

return on a security.

$$(4-15) \quad ER_i = a_0 + a_1 b_i + a_2 b_i^2 + a_3 S_i + u_i$$

ER_i = the expected return on security i

b_i = the beta coefficient estimated by regressing ER_i on ER_M

b_i^2 = the beta coefficient squared. This variable tests for any significant nonlinearities in the risk-return relationship.

s_i = the residual standard deviation from the time series regression used to estimate the beta coefficient

Fama and MacBeth found that both b_i^2 and S_i , in addition to b_i , were positive and significant, although small in their absolute influence upon the expected return. Their principal conclusion was that "while there are no 'systematic' nonlinearities in the risk-return relationship and no 'systematic' effect of nonportfolio risk on individual security return, such effects do materialize in a random fashion from period to period."¹⁷

D. Miller-Scholes

In another test, Miller and Scholes¹⁸ replicated the results obtained by Lintner. Instead of concluding that an asset's own variance is an important factor in the risk-return relationship, they investigated several possible sources of bias which could cause the results. They first tested whether Lintner's results could have been caused by the misspecification of the basic equation used to estimate the beta coefficient. They checked for the effects of not including the riskless rate of interest in

¹⁷ See M. J. Jensen [29], p. 371.

¹⁸ See M. H. Miller and M. Scholes [43].

the regression,¹⁹ for the effects of possible nonlinearities in the risk-return relationship, and for the effects of distortions caused by heteroschedasticity in the residual variance in the regression equations used to estimate the beta coefficient. After careful consideration, they concluded that none of the biases could account for the Lintner-Douglas results.

They next investigated the possible biases stemming from the variables used to approximate returns and risks. They found no evidence that biases due to an improper choice of a market index used to calculate ER_M had any significant effect upon the results.

Nevertheless, they did find a great deal of evidence that the Lintner-Douglas results could have arisen as a result of the following two biases. The first bias arises because the b_i 's used in the second-pass regressions are not exact measures of systematic risk. They are estimates which are subject to the errors of sampling fluctuations. For example, they found that the standard error for their estimates was 0.3. Thus, for a firm with a beta coefficient of 1, the 95 percent confidence interval would stretch from 0.4 to 1.6. The possibility of such large sampling fluctuations would tend to make the coefficient of b_i in the second-pass regressions biased toward zero.

In addition to the problem of measurement errors which tend to bias the coefficient of b_i toward zero, there is another bias which Miller and Scholes found to be associated with the variable $v(e_i)$ in the second-pass regressions. They found that the distribution of returns was skewed to the right, imputing a positive bias to the coefficient for $V(e_i)$. As

¹⁹ That is, using equation (4-9) instead of (4-11).

Miller and Scholes stated, the result of this would be that "we would observe an apparent ex post association between mean returns and residual variances, even though no such association existed ex ante in the minds of the investor."²⁰

With their work, Miller and Scholes may have preserved the validity of the simple capital asset pricing model. Nevertheless, whether Lintner's interpretation or Miller and Scholes' interpretation is correct, the fact is that b_i^2 and $V(e_i)$ [or $S(e_i)$], along with the beta coefficient, are consistently significant in explaining expected returns. Thus, in the cross-sectional model which will be discussed in detail in part 1 of Chapter VI, the stockholder's required rate of return will be considered a function of beta (b_i), beta squared (b_i^2), and the residual standard deviation $S(e_i)$.²¹

²⁰See M. H. Miller and M. Scholes [43], p. 67.

²¹I also tried using log beta with $S(e_i)$ to see if this gave a better fit to the data than beta plus beta squared. The latter performed better.

CHAPTER V

TAXES, THE DIVIDEND PAYOUT RATIO, AND THE SECOND HYPOTHESIS

Introduction

In Chapter III, we developed the finite horizon valuation model in which the price-earnings ratio was expressed as a linear function of the dividend payout ratio, the expected growth rate in earnings, and the investor discount rate. In Chapter IV, we developed the risk variables which influence the discount rate and, thus, the price-earnings ratio. We did this through a discussion of the capital asset pricing model and its extensions.

Nevertheless, to this point we have not explicitly considered the effect of personal taxes upon the valuation of a firm's stock. Thus, in Part 1 of this chapter, we will incorporate taxes into the capital asset pricing model. This extension of the capital asset pricing model has resulted in two basic interpretations concerning the influence of differential tax rates on ordinary income and capital gains upon the valuation of a firm's stock. These two interpretations will also be discussed in Part 1 of this Chapter.

In Part 2 of this Chapter, we will develop the second major hypothesis which is to be tested empirically in this thesis. This test is based upon the reasoning presented in Part 1. The test is designed to determine the extent of the relationship between a stockholder's differential tax rates for dividends and capital gains and the dividend payout ratio of the firm in which the stockholder is investing.

Part 1: Taxes and the Capital Asset Pricing Model

Until now, it has been assumed for the capital asset pricing model that there are no taxes, which is obviously false. Nevertheless, Brennan¹ demonstrated that, as long as dividend yields are perfectly certain, the equilibrium price of an asset still can be expressed as a linear function of its systematic risk (beta) when investors face differential tax rates on dividends and capital gains. By including these differential tax rates in the capital asset pricing model, Brennan derives the following expression for the expected return on an asset:

$$(5-1) \quad ER_i = T_2 R_f + B_i [ER_M - T_1 d_M - T_2 R_f] + T_1 d_i$$

$d_i = D_i/P_i$ = the dividend yield on asset i

$d_M = D_M/P_M$ = the dividend yield on the market portfolio

$T_1 = T_d - T_g / 1 - T_g$

$T_2 = 1 - T_d / 1 - T_g = 1 - T_1$

T_d = a complicated average of the marginal tax rate on dividends

T_g = the marginal tax rate on capital gains

Comparing equation (5-1) with equation (4-5"), one can see that the introduction of differential tax rates on capital gains and dividends changes the intercept and the slope of the equilibrium risk-return relationship and introduces a new variable--the dividend yield--into the expected return. More specifically, if $T_d > T_g$, then the intercept is lower and the slope is less. Moreover, equation (5-1) implies that the higher the firm's dividend yield, then the higher its equilibrium before-tax expected return. This is required by the investor because the after-tax return,

¹See M. J. Brennan [11].

which is of primary interest to him, would otherwise be lower the higher the dividend yield.

Nevertheless, others, such as Black and Scholes,² argue that there is no a priori reason to expect the existence of differential tax rates on dividends and capital gains to affect expected returns. The reasoning here is that firms will find it advantageous to adjust dividend payments so that there is nothing to be gained at the margin from either a reduction or increase in the total supply of dividends. That is, for equivalent risk levels, if some assets sold at either a premium or discount simply because of their dividend payout ratio, then affected firms could act to eliminate the premium or discount by changing their dividend policy. Therefore, changes on the supply side eliminate differential values.

Black and Scholes' argument is essentially a restatement of the MM clientele theory, which suggests that the frequency distribution of the corporate payout ratios corresponds exactly with the distribution of investor preferences for a given payout ratio. That is, a firm would tend to attract a particular clientele that preferred that firm's ratio best of all, and each different clientele would be equally as good in terms of its valuation of the respective firm.

For instance, assume a model in which the investor has the choice between a dividend payment now and investing it in some alternative investment, and foregoing the dividend payment now and letting the

²Black, F. and Scholes, M., "Capital Market Equilibrium and the Pricing of Corporate Liabilities," Financial Note 16, Mimeographed, Massachusetts Institute of Technology, September 1970, Revised January 1971. For a discussion of this paper see M. J. Jensen [29], p. 384.

company reinvest it so as to yield a capital gain. Let:

r = the return on investment by the firm

i = the return on investment for an individual investor who invests a dividend payment in an alternative investment

D = the dividend payment

t_g = the tax rate on capital gains

t_d = the tax rate on ordinary personal income

n = the number of periods

For the investor to be indifferent between receiving the dividend payment and investing it at rate of return i , or leaving the dividend with the firm in the form of retained earnings to be reinvested at rate of return r , then the following equality must hold.

$$(5-2a) \quad D(1+r)^n(1-t_g) = [D(1-t_d)(1+i)^n - D(1-t_d)] (1-t_g) + D(1-t_d)$$

Simplifying, the investor would be indifferent if

$$(5-2b) \quad (1+r)^n(1-t_g) = [(1+r)^n(1-t_g) + t_g] (1-t_d)$$

If we assume that the yield on the two investments is the same ($r=i$), then the investor would prefer retention by the firm only if

$$(5-2c) \quad (1+r)^n(1-t_g) > [(1+r)^n(1-t_g) + t_g] (1-t_d)$$

This is true only if

$$(5-2d) \quad (1-t_g) > (1-t_g)(1-t_d) + t_g(1-t_d)$$

or if

$$(5-2e) \quad (1-t_g) > 1 - t_g - t_d + t_g t_d + t_g - t_g t_d$$

This is true only if

$$(5-2f) \quad (1-t_g) > (1-t_d)$$

Ceteris paribus, the investor will prefer retention only if the tax rate

on ordinary income is greater than the tax rate on capital gains. Moreover, the larger the differential between t_d and t_g , the more one's investment value increases through retention.

Part 2: The Second Hypothesis

The reasoning presented in Part 1 leads to the following testable hypothesis concerning a firm's dividend behavior. The null hypothesis to be tested is: firms adjust the supply of their dividends to eliminate at the margin any discount or premium on its common stock price caused solely by the dividend payout ratio of the firm.

This hypothesis was tested in the following manner. Both a simple linear regression and Spearman's rank correlation coefficient test were run to determine the significance of the relationship between corporate dividend payout ratios and a variable reflecting the marginal stockholder differential tax rates for dividends and capital gains.³ A highly significant relationship⁴ between the tax rate differential and the dividend payout ratio would imply a MM clientele effect and thus substantiate their view. It would also imply that firms do adjust the supply of dividends to eliminate premiums or discounts at the margin.

It should be made clear that there is an important distinction made here between the two major hypotheses which has not always been made in the past literature. The test of the second hypothesis pertains to firms

³Both tests are described in more detail in Part 2 of Chapter VI.

⁴As the tax rate variable is defined, it would be a positive relationship between this variable and the dividend payout ratio which would imply the MM clientele effect.

adjusting the supply of dividends to meet investor preferences. It does not address itself to the question concerning why firms pay dividends at all. The first hypothesis with the cross-sectional regressions and the dummy variables will test whether there are preferences among investors which only dividends, and not capital gains, can satisfy.

Derivation of the Variable Reflecting the Differential Tax Rates for Capital Gains and Dividends

The variable reflecting the differential tax rate for dividends and capital gains can be derived in the following manner, which was first proposed by Elton and Gruber.⁵ The methodology involves observations of the ex dividend price behavior of a share of common stock. The theory is that, for the market to be in equilibrium, the price movement of a share of stock on the ex dividend day must be such that prospective buyers and sellers of the stock are indifferent to the timing of the sale or purchase; that is, between completing the transaction before or after the ex dividend day. For instance, for a marginal stockholder to be indifferent as to the timing of the sale of a share of stock, then the following must be true.⁶

$$(5-3) \quad P_b - t_g(P_b - P_c) = P_a - t_g(P_a - P_c) + D(1-t_d)$$

P_b = the price of the stock before the ex dividend day

P_a = the price of the stock ex dividend

P_c = the price of the stock when purchased

⁵See E. J. Elton and M. J. Gruber [17].

⁶This ignores any differential transactions costs on the sales. Nevertheless, the absolute value of the differential is likely to be small.

t_d = the tax rate on ordinary income

t_g = the tax rate on capital gains

D = the dividends per share

Rearranging, one can see that: $\frac{P_b - P_a}{D} = \frac{1 - t_d}{1 - t_g}$

The statistic $P_b - P_a / D$ represents the readily observable ex dividend behavior of the price of a common share which would cause the marginal stockholder with a particular set of tax rates (t_d and t_g) to be indifferent as to the timing of the sale of his common stock. One may therefore run the proposed linear regression and Spearman's rank correlation coefficient test to determine the relationship between the dividend payout ratio and $P_b - P_a / D$ for the gas utility industry. A significant positive relationship would indicate a MM clientele effect.⁷

⁷The higher the differential between t_d and t_g , the lower is $1 - t_d / 1 - t_g$. Moreover, the higher the differential between t_d and t_g , the lower the desired dividend payout ratio.

CHAPTER VI

THE SPECIFICATION OF THE VARIABLES USED IN THE EMPIRICAL TESTS

Introduction

In Chapters III, IV, and V, the theoretical models were developed which serve as the basis for the tests of the two basic hypotheses formulated in this thesis. In this Chapter, the empirical specifications of the variables used in these tests are presented.

In Part 1 of this Chapter, the derivation of the sample used for the test of both hypotheses is discussed. Also presented in Part 1 are the specifications of the variables used in the cross-sectional test of hypothesis 1. These specifications include two specifications of the price-earnings ratio, five specifications of the dividend payout ratio, ten specifications of the expected growth rate in earnings, and two specifications of the beta coefficient.

In Part 2 of this chapter, the specification of the dividend payout ratio and the specification of the statistic used to calculate the marginal stockholder's tax rates on ordinary income and capital gains are discussed. These variables are used in both the regression test and the Spearman rank correlation coefficient test of hypothesis 2. Also discussed in this part are the groupings of firms used in the Spearman rank correlation coefficient test of hypothesis 2.

Part 1: Specification of the Cross-sectional Regression Model for the Test of Hypothesis 1

In Chapters III and IV, the theoretical models were developed that serve as the basis for the following cross-sectional regression to be

tested for the year 1966.¹

$$(P/E)_i = a + b_1(DP)_i + b_2(g)_i + b_3(B)_i + b_4(B^2)_i + b_5(S)_i + b_6(DC) + b_7(DB) + (e)$$

$(P/E)_i$ = the price-earnings ratio for security i

$(DP)_i$ = the dividend payout ratio for security i

$(g)_i$ = the growth rate for security i

$(B)_i$ = the beta coefficient for security i

$(B^2)_i$ = the beta coefficient squared for security i

$(S)_i$ = the residual standard deviation from the first-pass regressions used to estimate the beta coefficient for each security i

(DC) = the dummy variable for group 1 firms

(DB) = the dummy variable for group 2 firms

(e) = the error term

A. The Sample

The list of public utility firms issuing new securities was obtained from Moody's Public Utility Manual.² Firms which did issue new securities during the period 1962-1966 were separated into two groups:

- 1) Those firms which issued new common stock or convertible debentures at least once during the years 1962-1966, and also paid dividends in each of those years.
- 2) Those firms which issued either new corporate bonds or preferred stock at least twice during the years 1962-1966, and paid dividends in each of those years.

¹1966 was chosen so that past and future growth rates could be calculated without the problem of dealing with price controls.

²See Moody's Public Utility Manual [47].

These firms, along with the firms which issued new bonds and preferred stock only once, were then eliminated from the list of firms obtained from the entire index of utility companies in Moody's Public Utility Manual. This remaining group of firms, which I will call group 3 firms, was composed of firms which had not made any trips to the capital market during the years 1962-1966.

Next, firms which were wholly-owned or nearly wholly-owned subsidiaries of other firms were eliminated from the list of group 1, group 2, and group 3 firms. Each of these three groups were then divided into four industries based upon the major source of revenue received by the firm. These four industries were the gas utility, electrical utility, telephone utility, and water utility industries.

From among these industries, the gas utility industry was chosen for analysis. In the gas utility industry, there were 63 firms which did not go to the capital market during the years 1962-1966, and met all of the criteria stated above. Unfortunately, since data were required for the years 1957-1971,³ 37 of these firms had to be eliminated for insufficient data. Twenty-two gas utility companies met all of the criteria and issued either bonds or preferred stock at least twice during 1962-1966. Twenty-four firms issued preferred stock or bonds once during the period, but these were not included in the sample in order to clearly distinguish between group 2 and group 3 firms. Nineteen firms met all of the criteria and also issued common stock or convertible debentures during the period. This left a sample of 67 firms: 19 group 1 firms, 22 group 2 firms, and 26 group 3 firms. These firms were then tested by the cross-sectional

³The reason for requiring data for these years will be given in the discussion of the specification of the expected growth rate in earnings.

model specified below.

B. The Dependent Variable

The price-earnings ratio was the variable used as the dependent variable. It was used rather than absolute price because of the desire to make comparisons among the values of different securities. Clearly, the ratio of absolute prices of two stocks is a matter of the denominations in which they are issued and thus is not relevant for comparisons.

The correct empirical specification of the price-earnings ratio is complicated by the realization that it is subject to short run fluctuations. The numerator may fluctuate because of temporary short run speculative movements, and the denominator frequently contains random components for any given year.

Therefore, in addition to the simple price-earnings ratio, the cross-sectional model was also tested with a normalized price-earnings ratio, a variation of which was first introduced by Friend and Puckett.⁴ This approach assumes that the short run earnings abnormalities sum to zero over the sample of companies within a given industry.⁵ Let:

$(P/E)_{it}$ = the price-earnings ratio of company i in period t . The numerator equals the arithmetic average of the high and low price of the share of stock in period t . The denominator is the reported earnings per common share.

$(P/E)_{kt}$ = the average price-earnings ratio in period t for the industry as a whole.

Since $(P/E)_{kt}$ is assumed to be free of short run earnings disturb-

⁴See I. Friend and M. Puckett [23].

⁵This assumption is probably satisfactory as long as there are no major cyclical fluctuations.

ances, the variations about trend values of the ratio $(P/E)_{it} / (P/E)_{kt}$ are due to short run components of the i th company's earnings. Thus, if one computes the following time series regression,

$$(6-1) \quad (P/E)_{it} / (P/E)_{kt} = a_i + b_i t + e_{it}$$

then the normalized price-earnings ratio for any particular firm in any period t may be computed as follows:

$$(6-2) \quad (P/E)_{it}^{\text{normal}} = [a_i + b_i t] (P/E)_{kt}$$

Equation (6-1) was regressed for the years 1957-1966 for the sample of firms from the gas utility industry. For $(P/E)_{kt}$, Moody's average price-earnings ratio for the natural gas industry stocks was used.⁶ The average was computed for 30 common stocks, including 10 transmission companies, 10 distribution companies, and 10 integrated companies. Equation (6-2) was then used to calculate the normalized price-earnings ratio for each firm in the sample for the year 1966. $(P/E)_{it}$ was computed in the same manner as described above, with data coming from Moody's Public Utility Manuals [47].

C. The Independent Variables

1. The Dividend Payout Ratio

This writer believes that the most appropriate specification for this variable would be the dividend to cash flow ratio derived from Brittain's partial adjustment dividend supply model.⁷ The main advantages of this variable over a simple dividend payout ratio are:

⁶The source of this data was Moody's Public Utility Manual [47].

⁷See J. Brittain [12].

- 1) It corrects for the inconsistencies in measuring firm earnings. These inconsistencies arise from the differences among firms, and over time for a given firm, in the accounting methods used in computing depreciation.
- 2) Since the ratio is derived from a model in which the firm only partially adjusts to current changes, the variable itself is not as sensitive to temporary, transitory changes in either dividends or earnings. Therefore, it more accurately reflects what investors expect as a regular dividend.
- 3) Since it is a supply determined equation, it helps correct for the bias in the regression equation arising from the influence of high prices upon dividend flows: that is, the feedback effect.

The variable is derived in the following manner. In this model, the change in dividends for a given period is assumed to be only partially adjusted to the cash flow in that period. That is,

$$(6-3a) \quad D_t - D_{t-1} = a + c(rCF_t - D_{t-1})$$

D_{t-1} = the dividends in period $t-1$. The rationale for including past dividends arises from the reluctance of firms to adjust dividends upward to higher levels until they are positive they can be maintained.

D_t = the dividends paid in period t

CF_t = the cash flow in period t

a = the constant term. It should equal zero, but will likely be positive. This demonstrates the greater reluctance by the firm to decrease dividends than to increase them.

c = the partial adjustment coefficient. It is postulated that c will be less than one, reflecting the conservative bias of firms against large revisions of dividends for any given year.

r = the long term dividend payout ratio of the firm

Rearranging terms,

$$(6-3b) \quad D_t = a + b_1 CF_t + b_2 D_{t-1} + E_t$$

where $b_1 = cr$ and $b_2 = 1-c$.

Using the appropriate econometric techniques, one can run a time series regression for equation (6-3b), estimating the coefficients b_1 and b_2 . These can in turn be used to derive c and r . Knowing c and r , one can then predict the dividend payment for the desired period. It is my belief that this predicted ratio of the dividend payment to cash flow is superior to the simple ratio of current dividends to current earnings as an estimate of the investor's expected dividend payout ratio.

Regressions based upon equation (6-3b) were run for the entire sample of firms for the gas utility industry for the ten year period of 1958-1967. The data source was Moody's Public Utility Manual [47]. D_t and D_{t-1} were the total reported cash dividends paid to common shareholders. The sum of net income, depreciation, depletion, and amortization allowances was used for CF_t . After estimating the coefficients a , b_1 , and b_2 in equation (6-3b) for each firm, b_1 and b_2 were used to derive c and r . These were substituted into equation (6-3a) along with the estimated intercept for each firm in the sample, the dividend payments for 1965 for each firm, and the cash flow for each firm in 1966 in order to compute a predicted dividend payment for 1966. Dividing this predicted dividend payment by the cash flow for 1966 gave the dividend to cash flow ratio for each firm.

In addition to this predicted dividend to cash flow ratio, other ratios were tried in the cross-sectional regressions. These were:

a) the simple ratio of reported dividends to reported net income for the year 1966; b) the simple ratio of reported dividends to reported cash flow (as computed above) for 1966; c) the ratio of reported dividends to normalized earnings for 1966. Normalized earnings were computed by dividing the arithmetic average of the high and low prices in 1966 for each security by the 1966 normalized price-earnings ratio for each firm. The final ratio tested was the ratio of the predicted dividend payment to normalized earnings.

2. The Growth Rate

The ideal variable would be a weighted average of the investors' expected growth rate for the appropriate time horizon. Unfortunately, this information cannot be obtained and, thus, one must settle for a proxy.

Many writers⁸ have criticized the use of past growth rates as proxies because they have been historically poor predictors of actual future growth. Nevertheless, that does not mean that they are not good proxies for investors' expectations of future growth. Cragg and Malkiel⁹ have shown that five year predictions of growth in earnings per share by security analysts were not any closer to actual growth rates than the naive extrapolation of past growth rates.

Consequently, the proxy for the growth rate expected by investors was calculated in the following manner.

$$(6-4) \quad g_p = L_n (V_n / V_{n-4})$$

⁸For instance see V. Niederhoffer and P. J. Regan [48].

⁹See J. G. Cragg and B. G. Malkiel [13].

g_p = the growth rate calculated for the years 1962-1966

V_n = the arithmetic average of the value of the variable for the years 1965, 1966, and 1967. It was normalized in this manner to avoid any problems caused by an abnormal cross-sectional year resulting in an abnormal growth rate for the five year period.

V_{n-4} = the arithmetic average of the value of the variable for the years 1961, 1962, and 1963. V_{n-4} was normalized to prevent using a peak or trough year as a base and, therefore, measuring abnormal growth for the five year period.

$\ln(V_n/V_{n-4})$ = the natural log of the ratio V_n/V_{n-4}

A five year growth rate (1962-1966) was chosen because of Malkiel's assertion¹⁰ that, for a five year time horizon, the simple linear combination given in equation (3-15) is a reasonable approximation for the more complicated expression given in equation (3-17).

The logical choice for the variable is the growth in earnings per share. Nevertheless, some past studies¹¹ have found the growth rate in assets per share to be a better explanatory variable. This could be because book earnings, however correct ex post, consistently tend to lag behind expected income. The resolution of which growth rate does give the best fit in the model can itself give additional insight into investors' valuation decisions and, thus, warrants the use of different growth rates. Therefore, five year growth rates were calculated for earnings per share,¹² assets, revenue, cash flow per share,¹³ and net

¹⁰See B. G. Malkiel [40].

¹¹See J. G. Cragg and B. G. Malkiel [13] and see J. G. McDonald and J. C. Van Horne [42].

¹²Earnings per share is based upon the amount of common stock outstanding at the end of the year.

¹³Cash flow per share equals the sum of net earnings before common dividends plus depreciation, depletion, amortization, deferred income taxes (net), and investment tax credit (net), less the interest charged

tangible assets per share.¹⁴ The growth rates expressed in per share values were adjusted for stock splits and stock dividends. The source of the data was Moody's Public Utility Manual [47].

There is the possibility that the use of past growth rates would bias the dummy variables for group 1 and group 2 firms. It is reasonable to assume that some firms going to the capital market are doing so to take advantage of extraordinary investment opportunities resulting in a higher growth rate than was attained in the past. Moreover, it is reasonable to assume that investors, observing these firms going to the capital market, would expect this higher growth rate, and thus revise upward their valuation of these firms. In these cases, past growth rates would be inadequate as proxies for expected future growth.

As a result, future growth rates for revenues, assets, earnings per share, cash flow per share, and net tangible assets per share were calculated and tried in the cross-sectional regressions. Of course, the assumption here is that the future growth rates are unbiased estimates of expected future growth rates. This assumption may be no better than assuming that past growth rates are unbiased estimates of expected future growth rates. Nevertheless, if going to the capital market does signal to the investor that a higher growth rate can be expected, then future

to construction per common share. This would have been preferable as a definition of cash flow for computing the predicted dividend payment. Unfortunately, the cash flow per common share for many of the companies were not reported for the years 1957-1961.

¹⁴This is the common stockholders' equity less intangible assets as shown on the company's books, divided by the number of common shares. It is just a reflection of tangible book value applicable to common shares.

growth rates are likely to be better estimates than past growth rates.

The future growth rates were calculated in the following manner.

$$(6-5) \quad g_f = \text{Ln}(V_{n+4}/V_n)$$

g_f = the growth rate calculated for the years 1966-1970

V_{n+4} = the arithmetic average of the variable for the years 1969, 1970, and 1971

V_n = the arithmetic average of the variable for the years 1965, 1966, and 1967

$\text{Ln}(V_{n+4}/V_n)$ = the natural log of the ratio V_{n+4}/V_n .

Once again, the source of the data was Moody's Public Utility Manual [47].

Growth rates expressed in per share values were adjusted for stock splits and stock dividends.

3. The Risk Variables

The beta coefficient was estimated upon both a yearly return basis and monthly return basis. For the beta coefficient calculated upon a yearly return basis, the following time series regression was run for the ten year period 1958-1967.

$$(6-6) \quad R_{it} = a + b_1 R_{mt} + e_{it}$$

$R_{it} = P_t/P_{t-1} + D_{it}/P_{it}$ = the yearly rate of return for year t

P_{it} = the average of the high and low prices for security i in year t, adjusted for stock splits and stock dividends

P_{it-1} = the average of the high and low prices for the year t-1

D_{it} = the cash dividend per share for security i in year t

D_{it}/P_{it} = the dividend yield for security i in year t

$R_{mt} = P_{mt}/P_{mt-1} + D_{mt}/P_{mt}$ = the yearly rate of return for the Standard and Poor's 500 stock index¹⁵

P_{mt} = the average value of the index for the year t. The yearly figure is an average of monthly prices and the monthly data are averages of the daily prices of the stocks which make up the index

D_{mt}/P_{mt} = the dividend yield for the year t. The P_{mt} here is based upon Wednesday prices for the year.

The b_1 coefficient, b_1^2 , and the residual standard deviation from equation (6-6) were then used as the beta coefficient, beta squared, and the specific risk variable in the cross-sectional model.

For the beta coefficient calculated upon a monthly return basis, the following time series regression was run for the five year period 1964-1968.

$$(6-7) \quad R_{it} = a + b_1 R_{mt} + e_{it}$$

R_{it} = the monthly rate of return for security i in month t

$$R_{it} = P_{it}/P_{it-1} + D_{it}/P_{it}$$

P_{it} = the average price for security i in month t, calculated by averaging the high and low prices for the first week of the month with the high and low prices for the last week of the month. Prices were adjusted for stock splits and stock dividends. The source of the data on prices was Barron's.¹⁶ The source of the data on stock splits and stock dividends was Moody's Dividend Record.¹⁷

P_{it-1} = the average price for security i in month t-1

D_{it} = the cash dividend per share for security i in month t. The source of the data was Moody's Cumulative Dividend Record [46].

R_{mt} = the monthly rate of return for the Standard and Poor 500 stock index for month t

$$R_{mt} = P_{mt}/P_{mt-1} + D_{mt}/P_{mt}$$

¹⁵The Federal Reserve Bulletin, Board of Governors of the Federal Reserve System, Washington, D.C., 1958-1967.

¹⁶See [3].

¹⁷See [46].

P_{mt} = the average value of the index for month t . It is based upon a daily average of the prices of the stocks which make up the index.

P_{mt-1} = the average value of the index for month $t-1$

D_{mt}/P_{mt} = the dividend yield for the index in month t . P_{mt} is based upon Wednesday prices for the month.

The b_1 coefficient, b_1^2 , and the residual standard deviation for equation (6-7) were also tried in the cross-sectional model. These risk variables were calculated upon a monthly return basis, as well as a yearly return basis, because of Breen and Lerner's¹⁸ findings that calculated beta coefficients differed according to the time period over which the time series was run and also differed with the length of time used to calculate the rate of return. There is also the problem with measuring errors, which were mentioned in connection with the Miller-Scholes interpretation of the Douglas-Lintner results.¹⁹ Thus, the beta coefficient was calculated in both ways to test whether the Breen and Lerner findings were substantiated by the gas utility sample. Moreover, it was important to discern if the use of the two different beta affected the cross-sectional results in any way.

4. The Dummy Variables

The two dummy variables used in the model were for group 1 and group 2 firms. The variables were either zero or one.

5. Number of Trips to the Capital Market

For this test, the number of trips to the capital market for group 1 and group 2 firms were substituted for the dummy variables. The source of

¹⁸ See W. J. Breen and E. M. Lerner [8].

¹⁹ See M. H. Miller and M. Scholes [43].

the date for the number of trips each firm made during the period 1962-1966 was Moody's Public Utility Manual [47].

6. Ratio of Capital Issued to Initial Stock Value

For each of the firms in group 1 and group 2, the market value of the firm in 1962 was determined by multiplying the number of outstanding shares by the average of the high and low stock price for the year. The source of this data was Moody's Public Utility Manual [47]. The total value of capital issued during the period was also computed. The stock value was obtained by multiplying the number of shares offered times the price at which they were offered. Both of these data are reported in Moody's Public Utility Manual [47]. The total value of each bond issue is also reported in Moody's [47]. The ratio used in this test as a substitute for the dummy variables was derived by dividing the sum of the total value of capital issued (1962-1966) by the market value of stock outstanding in 1962.

Part 2: Marginal Stockholder Tax Rates and the Second Hypothesis

Firms were ranked according to their dividend payout ratio,²⁰ then paired with their respective $P_b - P_a / D$ statistic, which was calculated for each of the four quarterly dividend payments in 1966. The ex dividend date and the amount of payment were obtained from Moody's Cumulative Dividend Record. The stock prices were obtained from listings of the NYSE, ASE, and Over the Counter markets in the Wall Street Journal.²¹

²⁰As will be seen below, the ratio of dividends to normalized earnings performed best in the cross-sectional model. Therefore, it was used as the proxy for the expected dividend payout ratio.

²¹See The Wall Street Journal [57].

Unfortunately, observations for only 51 of the 67 firms could be obtained.

The statistic $P_b - P_a / D$ was specified as follows.

P_b = the closing price of the stock on the day prior to the ex dividend day

P_a = the closing price of the stock on the ex dividend day

D = the cash dividend payment per share

In the first test to determine the extent of the relationship between the dividend payout ratio and marginal stockholder tax rates, I ran the simple regression of the dividend payout ratios on their respective $P_b - P_a / D$ statistics. (The results of this test are presented in Chapter VII.)

Nevertheless, the theory to be tested states that high dividend payout ratios will be positively related to high $P_b - P_a / D$ statistics. It does not say that relationship will be linear. Thus, I also used the Spearman rank correlation coefficient test, which is particularly good in testing correlation for variables with small samples. This test was conducted as follows.

The ranked firms were divided into 7 groups,²² with 8 firms in the first and last groups and 7 in the other five groups. The average dividend payout ratio and the average $P_b - P_a / D$ statistic was computed for each group. Spearman's rank correlation coefficient was then calculated for the seven groups for each of the four quarterly dividend payments.

By computing the statistic $P_b - P_a / D$ as above, one is assuming that

²²Groups were used for two reasons. The first was based upon the belief that the correlation would be more likely to prevail on the average. The second reason is that the rank correlation test is designed for small samples.

the entire price movement on the ex dividend day was caused by the dividend payment. This would not be true if some new information became available that day which changed investors' assessments of a company's future prospects. Thus, to account for such changes, the statistic $P_b - P_a / D$ was adjusted for that day's percentage change in the Dow Jones 60 stock composite index. Spearman's rank correlation coefficient was then calculated for the seven groups using the new adjusted statistic.

In addition to these tests, the average $P_b - P_a / D$ statistic over the four quarters was calculated for each firm. The firms were again divided into the seven groups, and Spearman's rank correlation coefficient was calculated.

Other groupings were tried to see if the results were sensitive to the size of the groups. All of the above tests were performed for five groups of firms and for ten groups of firms, as well as the original seven.

In each of the four quarters, the implied marginal tax rates for capital gains and for dividends also were calculated. These were based upon the average $P_b - P_a / D$ statistic for the 51 firms. An average over the four quarters was also calculated. The implied tax rates were then compared with previous estimates of marginal stockholder tax rates to give some indication of the validity of the tests.

CHAPTER VII

EMPIRICAL RESULTS

In this chapter, the results from the tests of the two hypotheses are presented and discussed. The issues and sub-issues concerning hypothesis one are analyzed first. The second part of the chapter discusses the test for the clientele effect in the gas utility industry.

Part 1: Hypothesis One

A. Basic Results

One of the goals of the cross-sectional model is to explain as much of the variance in the price-earnings ratio through the use of variables representing the expected return and the riskiness of this return. After explaining this variance, the dummy variables indicate whether there is a significant difference in the valuation of the firms. Therefore, in this section, I will report just the particular specification which performed best in terms of adjusted R^2 and significance of the variables. These results will then be compared with those obtained from two other specifications of the growth rate so as to emphasize a key point in the appropriate specification of the model. Thereafter, I will explain how the results changed with different specifications of all other variables, and discuss the implications of these changes.

The specification of the growth rate (past growth rate in assets) in the results presented first in this section is similar to that used in many past tests of valuation models.¹ Since this particular specification

¹See J. G. McDonald and J. C. Van Horne [42] and J. G. Cragg and B. G. Malkiel [13].

resulted in the highest adjusted R^2 for the model and the most significant coefficient for the growth rate, it corroborates these past findings and confirms the legitimacy of the use of the past growth rate in assets as a proxy for relative expected growth rates in earnings per share.

Nevertheless, this specification may not be best in a theoretical sense for use in this cross-sectional model. Theoretically, the proxy for the expected growth rate should be calculated upon a per share basis for this model so as to reflect the full dilution effects of new capital issue. Consequently, the results of specifications of the model using both the past growth rates in earnings per share and the actual future growth rate in earnings per share also will be presented in this section to compare with the results of the model when the past growth rate in assets is used.

The equation which performed best in terms of adjusted R^2 and significance of the variables is presented in Table 1.² In Part (a), the dependent variable is the normalized price-earnings ratio $((P/E)_N)$. The independent variables are: a) the ratio of dividends to normalized earnings (D/NE) ; b) the growth rate in gross assets based upon the years 1962-1966 (G_A^P) ; c) the beta coefficient based upon yearly returns (YB) ; d) beta squared (YB^2) ; e) the residual standard deviation from the first pass regressions used to estimate the beta coefficient (YS) ; f) the dummy variable for group one firms (D_C) ; and g) the dummy variable for group two firms (D_B) .

²Although estimated in the regression analysis, the intercept is omitted from all of the results as it was not of importance for the analysis.

The R^2 statistic adjusted for degrees of freedom for the regression presented in Table 1 is .8605, and the F statistic is significant at the 1 percent level.³ The dividend payout ratio and the growth rate are both positive, as expected, and significant at the 1 percent level. The residual standard deviation is positive and significant at the 10 percent level. The beta coefficient is negative, but only significant at the 22 percent level. The most important result, however, is that both dummy variables are negative, with D_c significant at the 1 percent level and D_b significant at the 4 percent level.

Although the beta squared coefficient is not significantly positive, the addition of beta squared to the equation does improve the fit of the model. Beta becomes more significantly negative when beta squared is added.⁴ Thus, there is some indication of nonlinearities in the relationship between the price-earnings ratio and beta; that is, as beta increases, the price-earnings ratio declines, and it declines at a slightly increasing rate.

The primary conclusion that may be drawn upon the basis of Table 1a is that there is a significant difference in the valuation of group three firms as compared with group one firms and group two firms. Specifically, both D_c and D_b are significantly negative which implies

³For all of the reported results, the F statistic was significant at the 1 percent level. Therefore, it is omitted from the remaining tables.

⁴As noted earlier, I also tried fitting $\log B$ to the data, but $B + B^2$ performed better. Therefore, the results for $\log B$ are omitted.

a lower valuation for these firms. This indicates that, provided that the model accounts for all of the significant factors which determine the price-earnings ratio of a stock, the costs of external financing more than offset any net preference for dividends which may exist.

The results for the case in which the past growth rate in earnings per share is substituted into the model are presented in Table 2. Table 3 contains the results for the case in which the actual future growth rate in earnings per share is substituted into the model. Comparing the results in Tables 1a, 2, and 3, one can see that the size, sign, and significance of the coefficients for D/NE , YB , YB^2 , and YS are substantially the same for all three specifications of the expected growth rate.

The dummy variables, however, indicate that the growth rates based upon earnings per share reflect the dilution effects of new capital issue that the growth rate in gross assets does not reflect. As one would expect, this results in less negative coefficients for the dummy variables, especially for D_c . Moreover, comparing Table 2 with Table 3, the future growth rate in earnings per share, in addition to being statistically significant when the past growth rate in earnings per share is not, more fully reflects the dilution effects of new capital issue than the past growth rate in earnings per share.⁵

Nevertheless, the most important point is that both dummy variables

⁵This interpretation is true only if one assumes that future growth rates are better proxies for expected future growth rates than actual past growth rates. The "t" statistics tend to support this assumption.

remain significantly negative at the 7 percent and 4 percent levels respectively. Thus, even though a growth rate based upon per share values is more correct in a theoretical sense, it makes little difference in these particular empirical results.

B. Additional Issues Analyzed by the Use of Different Specifications

In the model, we are trying to get a proxy for expectations. Since expectations are not directly measurable, a number of specifications were tried in order to obtain the best proxies. Still to be determined, however, is whether the results presented above are sensitive to the other specifications of the model. The results which will be presented in the remainder of Part One of this chapter supply answers to the following questions as they relate to the first hypothesis.

1) Do the results tend to corroborate the Miller-Scholes interpretation of the residual standard deviation resulting from the time series regression used to estimate the beta coefficients?

2) What was the effect of normalizing the price-earnings ratio? How did the results change when the simple price-earnings ratio was substituted into the model?

3) When one analyzes the tests using the growth rates other than the three presented above, do the results tend to corroborate the assertion that growth rates based upon per share value are better proxies for expected future growth rates in earnings per share than proxies based upon gross assets or revenues?

4) Do these additional growth rate specifications also tend to corroborate the previously presented evidence that actual future growth rates are good proxies for expected future growth rates?

5) What ratio was the best proxy for the expected dividend yield? Were the results sensitive to various specifications of the dividend payout ratio?

6) What was the best proxy for the expected risk connected with the rate of return of a stock? Were the results affected by the switch to the risk variables estimated upon the basis of monthly rates of return?

7) Do the results change when variables other than the dummy variables are used to test for differences in valuation? What were the results when variables for the number of trips to the capital market by each firm were substituted for D_c and D_b ? What were the results when variables for the ratio of total capital issued (1962-1966) to 1962 stock value were substituted for D_c and D_b ?

C. Specific Analysis Concerning the Questions Above

1. The Residual Standard Deviation

Part (b) of Table 1 also shows the results when the residual standard deviation is omitted from the equation. The adjusted R^2 statistic falls only to .8557, which indicates that the residual standard deviation adds little to the explanation of the variance of the price-earnings ratio. Among the independent variables, only the growth rate experiences any significant change. Although still significantly

positive at the 1 percent level, the coefficient and the t value of the growth variable fall with the addition of the residual standard deviation.

The positive sign for the residual standard deviation tends to substantiate the Miller-Scholes interpretation of the influence of this variable upon the rate of return; that is, its significance arises as a result of errors in measurement, sampling fluctuations, and skewness in returns. If this variable was a good proxy for specific risk, and if specific risk did have an influence upon the valuation of a stock by shareholders, then the YS variable would be significantly negative.

It should be emphasized, however, that the basic results of Tables 1a, 2, and 3 are not changed by the omission of the residual standard deviation. Both D_c and D_b are still significantly negative.

2. The Dependent Variable: The Substitution of the Simple Price-Earnings Ratio for the Normalized Price-Earnings Ratio

The dependent variable for the equation presented in Tables 1, 2, and 3 is the normalized price-earnings ratio. In general, the normalized price-earnings ratio performed better than the simple price-earnings ratio in terms of the R^2 statistic adjusted for degrees of freedom and in terms of the significance of the explanatory variables.

This result, along with the results presented below concerning the best specification of the dividend payout ratio, indicates that investors have a concept of normalized earnings which they capitalize to determine the appropriate price for a stock. Thus, the normalized price-earnings

ratio performs better than a ratio for the year based upon reported book earnings.

Table 4 contains the same equation as Table 1 except the dependent variable is the simple price-earnings ratio $((P/E)_S)$ rather than the normalized price-earnings ratio. The most important result is that the two dummy variables are still significantly negative, with D_c significant at the 1 percent level and D_b significant at the 2 percent level.

The only two significant changes⁶ are that adjusted R^2 falls from .8605 to .7486, and that the beta coefficient is now significantly negative at the 4 percent level. The lower adjusted R^2 corroborates the assertion that investors do have a concept of normalized earnings per share and that these normalized earnings, rather than reported earnings per share, are what investors capitalize to determine the equilibrium price of a stock.

As for the second change, one would expect the beta coefficient to become more significant with the switch to the simple price-earnings ratio. Beta is a measure of the responsiveness or fluctuation in the price of a stock relative to changes in the market as a whole. By normalizing the price-earnings ratio, some of the fluctuations are removed and, thus, the significance of beta as an explanatory variable declines.

⁶These two changes are also true in general, regardless of the specification of the independent variables.

3. The Growth Rates

The basic results derived from the test of ten different proxies for the expected growth in earnings per share were as follows.

1) To be theoretically correct, the proxy for the expected growth rate should be calculated upon a per share basis so as to reflect the full dilution effect of new capital issue. Although growth rates based upon gross assets and revenues were good proxies for expected future growth rates upon a relative basis, they did not reflect fully the dilution effects of new capital issue.

2) In general, actual future growth rates served as better proxies for expected future growth rates than actual past growth rates.

3) Regardless of the specification of the growth rate, the basic conclusion that both D_c and D_b were significantly negative was not altered.

These basic results are discussed in more detail below.

As stated, ten different specifications of the growth rate were tested in the model in order to find a good proxy for expected future returns. Five growth rates based upon past growth during the years 1962-1966 were tried to see if investors' expectations were simply the extrapolation of past growth rates. Growth rates based upon the years 1966-1970 were also calculated and tried in the model. This was done because of the possibility that past growth rates were not adequate when investors were expecting higher growth from extraordinary

investment opportunities.⁷ Moreover, past growth rates stated in per share terms may not reflect the full dilution effect upon expected return per share caused by the trip or trips to the capital market.⁸

The equations presented in Tables 1 and 4 used the past growth rate in gross assets (G_A^P). As one can see, it was significant at the 1 percent level. In general, this growth rate performed quite well regardless of the specification of the dividend payout ratio or the risk variables. As stated above, this result is consistent with previous studies which found that the past growth rate in assets was a good proxy for relative expected growth in earnings per share.

Results for the other past growth rates are presented in Tables 2, 5, 6, and 7. Among these four other growth rates, only the growth in gross revenues (G_R^P) is significant. These results tend to substantiate the assertion that book values per share, which in these cases are earnings per share (G_{EPS}^P), cash flow per share (G_{CF}^P), and tangible equity per share (G_{NT}^P), tend to lag behind investor expectations. Nevertheless, both of the dummy variables are significantly negative in all five cases in which past growth rates were used in

⁷As stated in the preceding chapter, the trip to the capital market may signal to the investor that such expectations are justified. Alternatively, it is also possible that some investors expected lower growth in earnings per share for firms diluting their stock.

⁸Nevertheless, there may also be the problem that future growth rates reflect the dilution effects of new capital issue not expected by investors. Since all of the future growth rates were significantly positive, one may conclude that they are reasonably good proxies for expected growth in earnings per share.

the model.

Results for the five future growth rates are presented in Tables 3, 8, 9, 10, and 11. In all five cases, the growth variables are significantly positive. The significance of the future growth rates indicates that investors' expectations were reasonably accurate. This finding agrees with the efficient market hypothesis⁹ of modern portfolio theory. This hypothesis asserts that the current price of a stock fully reflects the present state of knowledge so that the current price is an unbiased estimate of future price discounted to present value.

As one can see from Tables 3 (G_{EPS}^F), 10 (G_{CF}^F), and 11 (G_{NT}^F), growth rates based upon per share values do result in coefficients for the dummy variables which reflect the dilution effects of new capital issue that the growth rate in gross values does not reflect. Nevertheless, it should be emphasized once again that, in all five cases in which future growth rates were used, both dummy variables were significantly negative. Thus, the basic conclusion that the costs of external financing more than offset any net preference for dividends which may exist is not changed regardless of the specification of the proxy for the expected growth rate.

4. The Dividend Payout Ratio

a) General Results. In attempting to determine the best proxy for expected dividend yield, five different specifications of the

⁹For a good discussion of the efficient market hypothesis, see E. F. Fama [20].

dividend payout ratio were tested in the model. These included the ratio of actual dividends to normalized earnings, the ratio of actual dividends to net income, and the ratio of actual dividends to cash flow. In addition, two ratios were derived from the use of Brittain's partial adjustment dividend supply model. This model was employed in an attempt to arrive at a dividend payout ratio not influenced by temporary, transitory changes in dividends or earnings. The two ratios derived from this model were the ratio of the predicted dividend payment (from Brittain's model) to normalized earnings and the ratio of the predicted dividend payment to cash flow.

The principal conclusions from the results derived from these substitutions may be stated as follows.

1) Brittain's model performed reasonably well in deriving an expected dividend payment.

2) The ratio of dividends to normalized earnings performed best as a proxy for the expected dividend yield of a stock. This tends to further confirm the hypothesis that investors have a concept of normalized earnings, which are what are capitalized rather than reported earnings.

3) In considering proxies for the expected dividend yield, the closer the denominator of the payout ratio is to the income available to common shareholders, the better the specification of the expected dividend yield.

b) The Ratio of Actual Dividends to Normalized Earnings and the Ratio of the Predicted Dividend Payout to Normalized Earnings. The

dividend payout ratio presented in Tables 1-11 is the ratio of dividends to normalized earnings (D/NE). This ratio performed best in terms of adjusted R^2 and statistical significance. As was stated above, this tends to confirm the notion that investors have a concept of normalized earnings.

Tables 12 and 13 give the results when the ratio of the predicted dividend payment to normalized earnings (D_{pred}/NE) is substituted into the model. Comparing Table 12 with Table 1 and Table 13 with Table 2, substituting the ratio of the predicted dividend payment to normalized earnings results in a lower adjusted R^2 , a slightly less significant D_c , and a slightly more significant D_b . Thus, there are no substantial changes in results. Consequently, one may conclude that the model for predicting dividend payments, as it was described in Part 1 of Chapter VI, worked reasonably well in deriving an expected dividend payment for a given year.¹⁰

c) The Ratio of Dividends to Net Income. Tables 14 and 15 contain the results for the model when the ratio of dividends to

¹⁰ There are two reasons why the ratio of predicted dividends to normalized earnings did not perform as well as the ratio of actual dividends to normalized earnings. The first concerns the definition of cash flow used in equation (6-3a) and equation (6-3b). This problem is discussed in the text below. The second problem is that a ten year period was used to estimate equation (6-3a). In the cases where a firm had an abnormal year or two in dividend payments, the estimates for c and r would not be especially accurate. If a longer period were used to estimate equation (6-3b), the importance of one or two abnormal years would be lessened. At other times, a shorter estimation period excluding the one or two abnormal years may have produced the c and r resulting in a much better prediction of expected dividend payments to common shareholders.

normalized earnings. The normalized price-earnings ratio is the dependent variable in Table 14 and the simple price-earnings ratio is the dependent variable in Table 15. Comparing Table 14 with Table 1 and Table 15 with Table 4, one can see that the adjusted R^2 statistic declined quite significantly, and the significance of the coefficients of the dummy variables also decreased. In Table 14, the dummy variables are negative but not significantly different from zero. In Table 15, the dummy variables are negative, but significant at only the 20 percent level.

This result was most likely caused by the incorrect specification of the expected return. The denominator of the dividend payout ratio used in Tables 14 and 15 is net income. It is reported net income and is not normalized in any way. Moreover, net income includes earnings available for preferred shareholders as well as common shareholders. In contrast, the denominator of the payout ratio used in Tables 1 and 4 (D/NE) is normalized, and includes only that income available for common shareholders. These results tend to corroborate the results of earlier studies which analyzed the difficulties associated with the use of reported net income in valuation models.

d) The Ratio of Dividends to Cash Flow and the Ratio of the Predicted Dividend Payment to Cash Flow. In Part 1 of Chapter VI, the model for deriving the predicted dividend payment was presented. The estimated c and r coefficients were based upon the stable relationship between a firm's dividend payments and its cash flow. As

seen in Tables 12 and 13, the ratio of this predicted dividend payment to normalized earnings performed well. Nevertheless, the ratio which was proposed in Part 1 of Chapter VI was the ratio of the predicted dividend payment to cash flow ($D_{\text{pred}}/\text{CF}$). These results are presented in Tables 16 and 17.

Table 16 specifies the expected return as the ratio of this predicted dividend payment to cash flow plus the past growth rate in gross assets, which is a reasonably good proxy for relative expected future growth in earnings per share. In this Table, the adjusted R^2 statistic equals a very low .1421, and the dummy variables are positive, but not significant. Moreover, the only significant variable is beta squared.

Table 17 substitutes G_{EPS}^F for G_A^P . In this case, G_{EPS}^F , YB^2 , and D_c are now significantly positive, but the adjusted R^2 statistic is still only .4482. The payout ratio is not significant.

Tables 18 and 19 present the results when the ratio of actual dividends to cash flow (D/CF) is used as the specification of the expected dividend payout ratio. The results in Table 18 are very similar to those in Table 16, and those in Table 19 are very similar to the results in Table 17.

Once again, the substitution of the simple price-earnings ratio for the normalized price-earnings in the models with these two cash flow specifications of the payout ratio resulted only in a more significantly negative beta coefficient. Substituting other past growth rates into the model, I still found that the only significant variable was beta squared. The results from the use of the other

future growth rates varied little from Tables 17 and 19. Thus, one can see that, regardless of the specification of the other variables regressed with D/CF or D_{pred}/CF , the results were not good.

One problem with the use of D/CF and D_{pred}/CF as specifications of the expected dividend payout ratio is that the denominator is not normalized and, thus, is likely to contain random, transitory components. This explains the large variance and the low t values for the cash flow payout ratios. Secondly, the definition of cash flow used may not have been adequate. The definition used was the sum of net income, depreciation, amortization allowances, and depletion.¹¹ The definition in Moody's Public Utility Manual is the sum of net earnings before common dividends plus depreciation, depletion, amortization, deferred income taxes (net), less the interest charged to construction per common share.¹² Thus, the definition used in this study included income available for preferred dividends and the interest charged to construction per common share, and excluded the deferred taxes. The definition in Moody's would have been preferable. Unfortunately, the necessary information was not available for all of the firms in the sample, especially for the years 1957-1961.

e) The Principal Conclusions Concerning the Dividend Payout Ratio. As stated at the beginning of this section, the principal conclusion which can be drawn from the results presented above for the various specifications of the dividend payout ratio is that the

¹¹This is the definition of cash flow given in many finance text books. For instance, see J. F. Weston and E. F. Brigham [59], p. 363.

¹²See [47], "Definitions," 1967, p. x.

closer the denominator of the payout ratio is to the income available to common shareholders, the better the specification of the model in general.¹³ Moreover, normalizing the denominator also results in a better specification of the expected dividend payout ratio.

5. The Risk Variables Based Upon Monthly Rates of Return

The model was also tested for a major change in the specification of the risk variables. Estimates for the beta coefficient, beta squared, and the residual standard deviation based upon monthly rates of return were substituted for the variables based upon yearly rates of return. The principal conclusions drawn from these substitutions were as follows.

1) The principal conclusion is that both D_c and D_b are still significantly negative when MB and MB^2 are used in the model instead of YB and YB^2 .

2) The risk variables based upon yearly rates of return were better proxies for the effect of risk upon the price-earnings ratios of the various stocks.

¹³In their finance text, Weston and Brigham [59] warn students of finance to be cautious about concluding that there is a cause and effect relationship between cash flow and dividends. The observation that dividends are more stable in relation to cash flow does not mean that cash flow, rather than earnings, is a determinant of dividends. Instead, they argue that the stable relationship is caused by the purely statistical phenomenon of adding a stable figure (depreciation and depletion) to a fluctuating figure (earnings) and, thus, getting a more stable figure than earnings alone. This would explain why cash flow performs well as an aid in predicting the dividend payment, yet the payout ratios using cash flow in the denominator are not significant. See [59], p. 363.

3) The results from adding the residual standard deviation based upon monthly rates of return (MS) to the regression equation tend to corroborate the Miller-Scholes interpretation of the significance of this variable. This is the same conclusion that was reached concerning YS.

The specifics of these results and their explanations are as follows.

Tables 20-26 present the results when beta (MB), beta squared (MB^2), and the residual standard deviation (MS) are estimated based upon monthly rates of return. Moreover, each table contains results when the residual standard deviation is omitted from the cross-sectional model. Tables 20-24 use the normalized price-earnings ratio as the dependent variable. The simple price-earnings ratio is the dependent variable in Tables 25 and 26. Tables 20, 21, and 22 incorporate D/NE with G_A^P , G_{EPS}^P , and G_{EPS}^F respectively. Tables 23 and 24 combine D_{pred}/NE with G_A^P and G_{EPS}^F . Tables 25 and 26, with the simple price-earnings ratio as the dependent variable, combine D/NE with G_A^P and G_{EPS}^F .

In Tables 20-22, the results for the cross-sectional model with the residual standard deviation omitted (Part a) are similar to the results in Tables 1, 2, and 3 when the risk variables were based upon yearly rates of return. In all three tables, both of the dummy variables are negative and significant at the 4 percent level or better. Similarly, G_A^P and G_{EPS}^F are positive and significant; G_{EPS}^P is positive, but insignificantly different from zero. The beta and beta squared coefficients are negative and

positive respectively, with neither coefficient statistically significant. The adjusted R^2 statistic is high and compares favorably with the adjusted R^2 statistic in Tables 1, 2, and 3.

When the residual standard deviation is added to the regression equation in Part (b), the results are altered in the following way. In Table 20, the absolute value and the significance of the coefficients of both dummy variables decline, with D_b becoming insignificantly different from zero. In Tables 21 and 22, the addition of the residual standard deviation causes the same results for the dummy variables, except that both coefficients of the dummy variables are now insignificantly different from zero.

There is one major difference between all previously reported results and the results presented in Part (b) in Tables 20, 21, and 22. For all previous results, the goodness-of-fit test for checking the normality of the distribution revealed that the distribution was normal at the 5 percent level at least. Most of the time, however, the distribution was normal at the 1 percent level of significance. With the addition of MS, the distribution is normal at only the 50 percent level of significance for Tables 20 and 21, and normal at only the 25 percent level of significance for Table 22. This results in biased estimates of the coefficients and makes the t tests for significance invalid. Thus the results in Part (a) of Tables 20, 21, and 22 should be considered the ones valid for comparison with previous results.

The results in Tables 23 and 24 are similar to the results in

Tables 12 and 13. These tables involve the substitution of the ratio of the predicted dividend payment to normalized earnings. One difference is that the beta coefficient in Table 23 is positive, but insignificantly different from zero. In both of these cases, the addition of the residual standard deviation causes the absolute value of the coefficients and their significance to decline in a manner similar to Tables 20 and 22.

The results for switching the dependent variable from the normalized price-earnings ratio to the simple price-earnings ratio are presented in Tables 25 and 26. In general, the significance of all of the variables declines, and this is reflected in the lower adjusted R^2 statistic in Tables 25 and 26 as compared with Tables 20 and 22. Adding MS to the equations causes the same results for the dummy variables as in Tables 20-24. As seen by the goodness-of-fit tests for normality, the cause of these results is also the same.

Unlike the case with yearly rates of return, switching the dependent variable to the simple price-earnings ratio does not improve the explanatory power of the beta coefficient based upon monthly rates of return. This, and the general low significance of MB, may be caused by the particular specification of the price-earnings ratio used in the model.¹⁴ The price-earnings ratio is the ratio of the average of the high and low prices of the year to annual earnings per share. MB measures monthly fluctuations, but only the sum of these fluctuations is reflected in the yearly price.

¹⁴The low significance of MB may also be caused by the fact that 12 of the 67 firms were not listed on any exchange or among the stocks traded over the counter. Thus monthly prices were not available. For these firms, I used the average MB, MB^2 , and MS from their group. I also ran the regressions omitting these firms. There was little change from the reported results.

Thus, a stock may fluctuate substantially from month to month, but very little from year to year. Alternatively, a stock may be very stable over most of the year, and then experience a large movement in one month, and, thus, show a large change from year to year.

This latter interpretation is corroborated by the results presented in Tables 27-29. Comparing the estimated betas calculated upon both a yearly rate of return and a monthly rate of return basis, one can see that the estimates substantiate the Breen and Lerner findings that estimated beta coefficients differed according to the time period over which the time series is run and also differed with the length of time used to calculate the rate of return. The mean value for MB was .3548 and the mean value for YB was .6684. This indicates that the firms in the sample, as compared with the market index, exhibited more stability upon a month to month basis than upon a year to year basis.

This added stability inferred by the average of the MB's compared with the average of the YB's may also be a function of the manner in which MB was calculated. P_t for any given month was calculated as an average of that month's prices. This was done in order to be consistent with the Standard and Poor's index which was calculated and reported as a monthly average in the Federal Reserve Bulletin. Much of the monthly fluctuations for stocks may have been smoothed out and eliminated by this averaging process.

Although MB differed absolutely from YB, it still performed adequately upon a comparative basis for the cross-sectional model. Nevertheless, with the price-earnings ratio defined as it is, the risk variables based upon yearly rates of return more accurately reflect the relative risks of the

stocks and the effects of this risk upon the valuation of the firm.

The very high value for the coefficient of MS plus the loss of normality in the model with the addition of MS to the regression together reinforce the Miller-Scholes evidence that the significance of the residual standard deviation from the first-pass regressions in explaining rates of return is caused by measuring errors, sampling fluctuations, and skewness in the rates of return. As with the YS variable, if the MS variable were a good proxy for specific risk, and if specific risk had an influence upon the price-earnings ratio, then the coefficient for MS would be significantly negative.

6. Two Additional Tests for Difference in Valuation Among the Three Groups of Firms

In addition to tests for differences in valuation among the three groups based upon the dummy variables, tests were also made based upon more continuous variables. Instead of the simple (0,1) categorization of dummy variables, differences in valuation were tested by substituting the number of trips to the capital market for group 1 firms (T_c) for D_c and the number of trips to the capital market for group 2 firms (T_b) for D_b . In another test, the ratios of total capital issued (1962-1966) to total stock value in 1962 for both group 1 firms and group 2 firms were substituted for D_c and D_b .

The principal conclusion which may be drawn upon the basis of the results of these two substitute cases is that the number of trips to the capital market seems to be a much more significant variable than the ratio of capital issued to initial stock value in explaining the lower valuation

of group 1 and group 2 firms. The results leading to this conclusion are discussed below.

The results for the substitution of T_c and T_b for D_c and D_b are presented in Tables 30-34. Little is changed in the results of the regressions except that T_c and T_b are not as significantly negative as D_c and D_b . This may be because the dummy variable measured the combined effects of the number of trips to the capital market and the ratio of capital issued (1962-1966) to initial 1962 stock value.

The results when R_c and R_b are substituted for D_c and D_b are less impressive. As one can see in Tables 35-38, R_b is never significantly negative and R_c is positive in three cases, although it is not significant. The principal reason for these results is that the costs of capital issue are mostly fixed costs and do not vary that much with the size of the issue. Consequently, one would expect that the number of trips to the capital market would be a more significant variable in determining differences in valuation than the ratio of capital issued to stock value.

Moreover, the low t values resulting from the substitution of R_c and R_b for D_c and D_b may also be explained by the presence of multicollinearity. Simple correlation coefficients for D_c , D_b , T_c , T_b , R_c and R_b with each of the dependent and independent variables (from Tables 30-38) are presented in Table 39. As one can see, R_c is highly correlated with a number of other variables. This has resulted in multicollinearity in this specification of the model.

This is confirmed by comparing the estimates of the variances of the estimated coefficients. They are much higher for all of the estimated coefficients with R_c and R_b are substituted into the model. For instance,

comparing Table 31 with Table 36, the coefficients for T_c , T_b , R_c , and R_b are:

$$T_c = -.2866$$

$$R_c = -.4290$$

$$T_b = -.3631$$

$$R_b = -1.612$$

The variances for these coefficients are:

$$T_c = .0406$$

$$R_c = .8650$$

$$T_b = .0415$$

$$R_b = 3.3330$$

These higher variances for the estimate coefficients for R_c and R_b have resulted in lower t values for the estimated coefficients.

Part 2: The Second Hypothesis: The Clientele Effect

As was explained in Part 2 of Chapter VI, I regressed the dividend payout ratio (D/NE) on the adjusted and unadjusted $P_b - P_a/D$ statistic for each of the four quarterly dividend payments of 1966 and for the average $P_b - P_a/D$ statistic for each firm for the year 1966. These results are presented in Tables 40-44. In Part 2 of Chapter VI, I theorized that a significantly positive relationship would indicate a MM clientele effect. As one can see, in only two of the ten regressions is the relationship positive, and these coefficients are not significant.

Nevertheless, the clientele effect implies that high values of D/NE would be associated with high values of $P_b - P_a/D$. It does not necessarily imply that the relationship is linear. Thus, I also tested for the clientele effect by using Spearman's rank correlation test as described in Part 2 of Chapter VI. These results are presented in Tables 45-49. Once again, only in the third quarter is the relationship between D/NE and $P_b - P_a/D$ positive.

The Spearman rank correlation coefficient, however, is not significant.

In order to test whether the $P_b - P_a/D$ statistic was a reasonable proxy for the ratio of $1-t_d/1-t_g$, I computed the implied tax rates for t_d and t_g . These were based upon the average adjusted and unadjusted $P_b - P_a/D$ statistic for the year. These tax rates are contained in Table 50. The implied marginal tax rate for ordinary income based upon the unadjusted statistic is .3497 and the implied marginal stockholder tax rate for the adjusted tax rate is .4286. These estimates compare favorably with other estimates of marginal stockholder tax rates. Jolivet¹⁵ estimated for the New York Stock Exchange that the marginal stockholder tax rate on ordinary income for 1965 was 36 percent, and Weston and Brigham¹⁶ estimated for the same year that it was 46 percent. Elton and Gruber¹⁷ estimated for the New York Stock Exchange that the marginal stockholder tax rate on ordinary income for 1966 was 36.4 percent.

Thus, the evidence seems to indicate that, for the gas utility industry,¹⁸ there is no clientele effect. For the most part, there is no significant correlation between the dividend payout ratio and the statistic used as the proxy for the ratio of marginal tax rates on ordinary income and capital gains.

These results reinforce the results concerning the first hypothesis. Since no evidence of strong net preference for dividends was found in testing the first hypothesis, one would not expect a clientele effect

¹⁵See V. Jolivet [31].

¹⁶See J. F. Weston and E. F. Brigham [59], p. 309.

¹⁷See E. J. Elton and M. J. Gruber [17].

¹⁸MM state that the clientele theory holds for a given industry or risk class, so the test is appropriate.

based upon the dividend payout ratio to develop.¹⁹

¹⁹In fact, it has been pointed out to this writer that the results of the tests of the second hypothesis based upon the $P_b - P_a / D$ statistic are de facto evidence that investors not only do not prefer dividends, they prefer capital gains. One can assume that the movement of price on the ex dividend day reflects all aspects of dividend policy, including the tax aspect. Thus, the price movement would also reflect net preference for dividends as well as the bias against dividends caused by the favorable capital gains tax. Thus only if $P_b - P_a$ was exactly equal to or greater than D could one say that there was net dividend preference. To the extent that the average $P_b - P_a / D$ statistic in both the adjusted and unadjusted cases was below one (the average $P_b - P_a / D$ statistic in the unadjusted case was .789 and in the adjusted case was .711), one can conclude that the net dividend preference is not strong enough to offset the tax effect. This conclusion more strongly corroborates the results of the test of the first hypothesis by the cross-sectional regression model.

CHAPTER VIII

SUMMARY OF CONCLUSIONS

Part 1: Summary of Conclusions

The results presented in Chapter VII lead to the following summary of conclusions.

A. The First Hypothesis: Net Preference for Dividends

The evidence indicates that the null hypothesis of hypothesis one should be rejected; that is, one should reject the hypothesis that there is no significant difference in valuation among the three groups of firms. More specifically, it was found that firms issuing new capital and paying dividends were valued lower than those firms which did not issue new capital. In Part 1 of Chapter III, it was argued that firms which both issued new capital and paid dividends did so to adjust their dividend payments to an optimal payout ratio where the marginal yield of a dividend increase, in terms of the additional acquisition of funds that it permitted through stock or bond issue at higher prices, was equal to the cost of foregone income retention. The results from the test of the cross-sectional model, however, indicate that this marginal yield arising from net dividend preference is not strong enough to offset such higher costs of external financing as flotation costs and the costs of underpricing the new capital issue.

B. Results of the Alternative Specifications

In testing the cross-sectional model, a number of questions concerning the appropriate specification of the variables in investor valuation models were also answered. Some of these are summarized below.

1. The Price-Earnings Ratio

Normalizing the price-earnings ratio, as described in Part 1 of Chapter VI, improved the results of the cross-sectional model. This indicates that investors have a concept of normalized earnings, and it is the normalized earnings, and not reported earnings, which are capitalized to determine the price of a stock.

2. The Dividend Payout Ratio

The predicted dividend payout ratio derived from Brittain's partial adjustment dividend supply model was adequate as a proxy for the investor's expected dividend payment. Nevertheless, the ratio of reported dividends to normalized earnings proved to be the best proxy for the expected dividend payout ratio. The tests of the cross-sectional model also demonstrated that, for the dividend payout ratio, the closer the denominator was to income available for common shareholders, the better was the ratio as a proxy for the expected dividend payout ratio.

3. The Growth Rates

Although the past growth rates in gross assets and revenues proved to be good proxies for comparative expected future growth in earnings per share, the per share growth rates were more appropriate for the test of hypothesis one because they reflect the full dilution effects of new capital issue upon the expected rate of return per common share. Moreover, the results show that all five future growth rates were good proxies for expected future growth in earnings per share. This indicates that investors' expectations were accurate and is a result consistent with

the efficient market hypothesis of portfolio theory.

4. Risk Variables Calculated Upon Both a Yearly and Monthly Basis

Although the results concerning the dummy variables did not differ when the risk variables calculated upon a monthly rate of return basis were substituted for those based upon a yearly return basis, the latter performed better as a measure of comparative risk in the cross-sectional regression model. Moreover, for both sets of risk variables, the evidence supports the Miller-Scholes interpretation of the residual standard deviation in explaining rates of return.

C. Other Tests of Differences in Valuation

Although the results were less conclusive when T_c and T_b or R_c and R_b were substituted for D_c and D_b to measure differences in valuation among the three groups of firms, it appears from the evidence that the number of trips to the capital market is of primary significance in determining the costs of capital issue.

D. The Second Hypothesis: The Clientele Effect

Based upon both the Spearman rank correlation test and the stronger test by linear regression, no evidence of a clientele effect was found for the gas utility industry. This is consistent with the results from the test of the first hypothesis. MM proposed the theoretical clientele effect to demonstrate that market imperfections were necessary, but not sufficient, conditions for the assertion that dividend policy mattered in the valuation of the firm. More specifically, they proposed the theory

to illustrate that any net preference for dividends by investors would not necessarily lead to a permanent premium in the market for firms with high dividend payout ratios. Nevertheless, if there is no net preference for dividends by investors, then one would not expect a clientele effect to develop.

Part 2: Suggestions for Future Research

The conclusions reached in this thesis were based upon a sample of firms from the gas utility industry. Similar samples were constructed for electric, water, and telephone utilities. In the future, research based upon the methods developed in this thesis should be extended to these industries. Moreover, this type of analysis also should be extended to include unregulated industries which rely extensively upon external capital financing. Only until the results presented in this thesis are confirmed by analysis of other industries can they be termed truly conclusive.

The tests should also be conducted for different time periods than the ones used in this thesis. The variables in the cross-sectional regression model were normalized in order to correct for problems caused by temporary aberrations or cyclical fluctuations. They were then compared with the results obtained when the variables were not normalized. Nevertheless, normalization may not have corrected all of the problems. Thus, additional insight may be obtained by applying the methods of analysis used in testing hypothesis one in different time periods.

The test for the clientele effect also should be extended to different years. In addition, larger samples may give better insight into the extent of the correlation between dividend payout ratios and marginal stockholder tax rates on dividends and capital gains.

In tests of the capital asset pricing model, many researchers have found that a beta coefficient based upon monthly rates of return was superior to one based upon yearly rates of return. In the cross-sectional regression model presented in this thesis, the beta coefficient based upon yearly rates of return performed better. As discussed in Chapter VII, the principal reason that the beta coefficient based upon yearly rates of return performed better is because of the specification of the price-earnings ratio. Nevertheless, the averaging process used in calculating a monthly rate of return may have also contributed to the poorer performance of the beta coefficient based upon monthly returns. Thus, if monthly rates of return could be recalculated in future tests of the model so as to avoid this averaging process, results may improve for the beta coefficient based upon monthly rates of return. This could be done by choosing a P_{it} and the Standard and Poor's Index for a particular day of the month rather than computing them as averages for the month.

APPENDIX

Tables of Results

Tables 1 - 29: Cross-Sectional Regression Model Results* with Dummy Variables

Tables 30-34: Cross-Sectional Regression Model Results* with Trips to the Capital Market Variables

Tables 35-39: Cross-Sectional Regression Model Results* with Ratio Variables

Tables 40-44: Linear Regression Tests of Hypothesis 2

Tables 45-50: Spearman Rank Correlation Test of Hypothesis 2

*For the reported results, the coefficient is given immediately below the variable and the t-ratio is given below in parentheses.

List of Variables

A. Test of First Hypothesis

$(P/E)_N$ = the normalized price-earnings ratio

$(P/E)_S$ = the simple price-earnings ratio

D/NE = the ratio of actual dividends to normalized earnings

D_{pred}/NE = the ratio of the predicted dividend payment to normalized earnings

D/E = the ratio of actual dividends to reported net income

D/CF = the ratio of actual dividends to actual cash flow

D_{pred}/F = the ratio of the predicted dividend payment to actual cash flow

G_A^P = the past growth rate in assets

G_R^P = the past growth rate in revenues

G_{EPS}^P = the past growth rate in earnings per share

G_{CF}^P = the past growth rate in cash flow per share

G_{NT}^P = the past growth rate in net tangible assets per share

G_A^F = the future growth rate in assets

G_R^F = the future growth rate in revenues

G_{EPS}^F = the future growth rate in earnings per share

G_{CF}^F = the future growth rate in cash flow per share

G_{NT}^F = the future growth rate in net tangible assets per share

YB = the beta coefficient based upon yearly returns

YB^2 = the beta coefficient squared

YS = the residual standard deviation

MB = the beta coefficient based upon monthly returns

MB^2 = the beta coefficient squared

MS = the residual standard deviation

D_c = the dummy variable for group 1 firms

D_B = the dummy variable for group 2 firms

T_C = the number of trips to the capital market by group 1 firms (1962-1966)

T_B = the number of trips to the capital market by group 2 firms (1962-1966)

R_C = the ratio of capital issued (1962-1966) to initial stock value (1962)
for group 1 firms

R_B = the ratio of capital issued (1962-1966) to initial stock value (1962)
for group 2 firms

B. Test of the Second Hypothesis

P_b = the closing price of the stock on the day prior to the ex dividend day

P_a = the closing price of the stock on the ex dividend day

D = the amount of dividend payment per share

t_d = the marginal stockholder tax rate on dividends

t_g = the marginal stockholder tax rates on capital gains

Table 1

$$a) \quad (P/E)_N = D/NE + G_A^P + YB + YB^2 + YS + D_c + D_B$$

24.497	6.8366	-3.6311	1.423	19.167	-3.2435	-1.7396
(17.684)	(2.915)	(-1.2441)	(1.067)	(1.7456)	(-3.2316)	(-2.0691)

$$\text{Adjusted } R^2 = .8605$$

$$F = 59.136$$

$$b) \quad (P/E)_N = D/NE + G_A^P + YB + YB^2 + D_c + D_B$$

24.139	8.3992	-2.5237	1.7706	-3.3358	-1.5684
(17.327)	(3.811)	(-1.174)	(1.321)	(-3.273)	(-1.847)

$$\text{Adjusted } R^2 = .8557$$

Table 2

$$(P/E)_N = D/NE + G_{EPS}^P + YB + YB^2 + YS + D_c + D_B$$

24.661	1.399	-3.077	1.531	29.014	-1.930	-1.596
(16.795)	(.804)	(-1.357)	(1.071)	(+2.716)	(-2.014)	(-1.909)

$$\text{Adjusted } R^2 = .8435$$

Table 3

$$\begin{aligned}
 (P/E)_N = & D/NE + G_{EPS}^F + YB + YB^2 + YS + D_c + D_B \\
 & 22.491 \quad 3.933 \quad -2.762 \quad 1.283 \quad 26.546 \quad -1.676 \quad -1.671 \\
 & (13.488) (2.143) (-1.283) (.949) (2.582) (-1.857) (-2.116)
 \end{aligned}$$

$$\text{Adjusted } R^2 = .8538$$

Table 4

$$\begin{aligned}
 \text{a) } (P/E)_S = & D/NE + G_A^P + YB + YB^2 + YS + D_c + D_B \\
 & 20.433 \quad 7.2074 \quad -5.3436 \quad 2.3294 \quad 7.8128 \quad -2.9048 \quad -2.3302 \\
 & (12.462) (2.597) (-2.135) (1.476) (.601) (-2.445) (-2.341)
 \end{aligned}$$

$$\text{Adjusted } R^2 = .7486$$

$$\begin{aligned}
 \text{b) } (P/E)_S = & D/NE + G_A^P + YB + YB^2 + D_c + D_B \\
 & 20.287 \quad 7.844 \quad -5.2998 \quad 2.4714 \quad -2.9424 \quad -2.2604 \\
 & (12.5776) (3.0741) (-2.1295) (1.5927) (-2.4935) (-2.2992)
 \end{aligned}$$

$$\text{Adjusted } R^2 = .7513$$

Table 5

$$(P/E)_N = D/NE + G_R^P + YB + YB^2 + YS + D_c + D_B$$

24.543	6.087	-2.582	1.288	25.564	-2.529	-1.516
(17.137)	(2.033)	(-1.181)	(.936)	(2.576)	(-1.742)	(-2.35)

Adjusted $R^2 = .8508$

Table 6

$$(P/E)_N = D/NE + G_{CF}^P + YB + YB^2 + YS + D_c + D$$

25.053	2.069	-3.132	1.481	30.355	-2.049	-1.679
(15.199)	(.739)	(-1.374)	(1.045)	(2.860)	(-2.201)	(-2.001)

Adjusted $R^2 = .8434$

Table 7

$$\begin{aligned}
 (P/E)_N = & D/NE + G_{NT}^P + YB + YB^2 + YS + D_c + D_B \\
 & 24.778 \quad 3.124 \quad -2.805 \quad 1.310 \quad 27.905 \quad -2.165 \quad -1.629 \\
 & (16.75) \quad (.986) \quad (-1.265) \quad (.939) \quad (2.60) \quad (-2.333) \quad (-1.968)
 \end{aligned}$$

$$\text{Adjusted } R^2 = .8445$$

Table 8

$$\begin{aligned}
 (P/E)_N = & D/NE + G_A^F + YB + YB^2 + YS + D_c + D_B \\
 & 25.653 \quad 7.134 \quad -3.405 \quad 1.531 \quad 29.379 \quad -2.393 \quad -1.979 \\
 & (18.093) \quad (2.964) \quad (-1.621) \quad (1.164) \quad (2.960) \quad (-2.730) \quad (-2.509)
 \end{aligned}$$

$$\text{Adjusted } R^2 = .8624$$

Table 9

$$(P/E)_N = D/NE + G_R^F + YB + YB^2 + YS + D_c + D_B$$

24.957	4.692	-2.675	1.247	25.538	-2.42	-1.801
(17.375)	(1.940)	(-1.231)	(.913)	(2.417)	(-2.624)	(-2.203)

$$\text{Adjusted } R^2 = .8514$$

Table 10

$$(P/E)_N = D/NE + G_{CF}^F + YB + YB^2 + YS + D_c + D_B$$

23.913	5.025	-2.777	1.202	24.806	-1.86	-1.754
(16.979)	(2.416)	(-1.30)	(.895)	(2.40)	(-2.09)	(-2.209)

$$\text{Adjusted } R^2 = .8563$$

Table 11

$$\begin{aligned}
 (P/E)_N = & D/NE + G_{NT}^F + YB + YB^2 + YS + D_c + D_B \\
 & 24.584 \quad 9.089 \quad -2.676 \quad 1.194 \quad 22.11 \quad -1.386 \quad -1.884 \\
 & (18.059) (2.749) (-1.276) (.906) (2.173) (-1.582) (-2.481) \\
 \text{Adjusted } R^2 = & .8611
 \end{aligned}$$

Table 12

$$\begin{aligned}
 (P/E)_N = & D_{\text{pred}}/NE + G_A^P + YB + YB^2 + YS + D_c + D_B \\
 & 33.033 \quad 8.466 \quad -3.742 \quad 1.574 \quad 29.999 \quad -4.145 \quad -2.710 \\
 & (11.818) (2.585) (-1.290) (.859) (1.976) (-3.101) (-2.549) \\
 \text{Adjusted } R^2 = & .7333
 \end{aligned}$$

Table 13

$$(P/E)_N = D_{\text{pred}}/NE + G_{\text{EPS}}^F + YB + YB^2 + YS + D_c + D_B$$

27.824	7.8601	-3.4695	1.161	35.331	-1.8634	-2.558
(9.478)	(3.609)	(-1.264)	(.671)	(2.646)	(-1.639)	(-2.619)

$$\text{Adjusted } R^2 = .7607$$

Table 14

$$(P/E)_N = D/E + G_A^P + YB + YB^2 + YS + D_c + D_B$$

31.452	6.645	-1.962	2.136	31.18	-1.289	-.140
(9.871)	(1.789)	(-.598)	(1.036)	(1.819)	(-.938)	(-.128)

$$\text{Adjusted } R^2 = .6592$$

Table 15

$$(P/E)_S = D/NE + G_A^P + YB + YB^2 + YS + D_c + D_B$$

28.299	7.344	-4.32	2.623	21.371	-1.696	-1.081
(9.385)	(2.128)	(-1.406)	(1.358)	(1.328)	(-1.288)	(-1.018)

$$\text{Adjusted } R^2 = .6256$$

Table 16

$$(P/E)_N = D_{\text{pred}}/CF + G_A^P + YB + YB^2 + YS + D_c + D_B$$

.8843	9.2859	-9.4589	9.259	-13.849	3.4285	2.0516
(.0828)	(1.559)	(-1.452)	(2.353)	(-.524)	(1.477)	(1.003)

$$\text{Adjusted } R^2 = .1421$$

Table 17

$$(P/E)_N = D_{\text{pred}}/CF + G_{EP}^F + YB + YB^2 + YS + D_c + D_B$$

13.067	18.788	-7.760	6.395	13.982	3.649	.1979
(1.490)	(6.042)	(-1.483)	(2.010)	(.726)	(2.101)	(.118)

$$\text{Adjusted } R^2 = .4482$$

Table 18

$$(P/E)_N = D/CF + G_A^P + YB + YB^2 + YS + D_c + D_B$$

13.1	8.6549	-8.975	9.0335	-5.379	3.0041	1.9574
(1.2908)	(1.4696)	(-1.397)	(3.3283)	(-.208)	(1.309)	(.971)

$$\text{Adjusted } R^2 = .1655$$

Table 19

$$(P/E)_N = D/CF + G_{EPS}^F + YB + YB^2 + YS + D_c + D_B$$

19.815	18.576	-7.4815	6.3192	16.723	3.2717	.1327
(2.470)	(6.273)	(-1.475)	(2.051)	(.9126)	(1.934)	(.082)

$$\text{Adjusted } R^2 = .4811$$

Table 20

$$a) (P/E)_N = D/NE + G_A^P + MB + MB^2 + D_c + D_B$$

24.793	7.1704	-1.4174	7.4214	-3.5431	-2.111
(18.977)	(3.160)	(-.194)	(.737)	(-3.594)	(-2.484)

$$\text{Adjusted } R^2 = .8589$$

$$b) (P/E)_N = D/NE + G_A^P + MB + MB^2 + D_c + D_B + MS$$

23.463	7.1105	-2.6569	4.6593	-2.51	-.6347	134.1
(19.105)	(3.478)	(-.405)	(.514)	(-2.596)	(-.712)	(3.889)

$$\text{Adjusted } R^2 = .8859$$

Goodness of Fit Test for Normality: Chi-Square = 4.7582 with 5 degrees of freedom

Table 21

$$a) \quad (P/E)_N = D/NE + G_{EPS}^P + MB + MB^2 + D_c + D_B$$

24.789	.1943	-3.68	12.798	-2.3068	-2.036
(17.415)	(.1067)	(-.470)	(1.184)	(-2.380)	(-2.311)

$$\text{Adjusted } R^2 = .8365$$

$$b) \quad (P/E)_N = D/NE + G_{EPS}^P + MB + MB^2 + D_c + D_B + MS$$

23.565	1.346	-4.579	8.632	-1.096	-.439	140.07
(17.443)	(.802)	(-.640)	(.871)	(-1.117)	(-.463)	(3.682)

$$\text{Adjusted } R^2 = .8639$$

Goodness of Fit Test for Normality: Chi-Square = 5.874 with 5 degrees of freedom

Table 22

$$a) \quad (P/E)_N = D/NE + G_{EPS}^F + MB + MB^2 + D_c + D_B$$

22.624	4.047	-3.5728	11.542	-1.8655	-2.0349
(13.727)	(2.180)	(-.476)	(1.124)	(-2.055)	(-2.469)

$$\text{Adjusted } R^2 = .8492$$

$$b) \quad (P/E)_N = D/NE + G_{EPS}^F + MB + MB^2 + D_c + D_B + MS$$

22.234	2.514	-4.6769	9.4423	-1.1046	-.6937	120.09
(14.123)	(1.368)	(-.662)	(.976)	(-1.186)	(-.750)	(3.124)

$$\text{Adjusted } R^2 = .8666$$

Goodness of Fit Test for Normality: Chi-Square = 6.7172 with 5 degrees of freedom

Table 23

$$a) \quad (P/E)_N = D_{\text{pred}}/NE + G_A^P + MB + MB^2 + D_c + D_B$$

32.46	10.173	3.2958	.6091	-4.5684	-2.8869
(12.242)	(3.167)	(.320)	(.043)	(-3.33)	(-2.54)

$$\text{Adjusted } R^2 = .7189$$

$$b) \quad (P/E)_N = D_{\text{pred}}/NE + G_A^P + MB + MB^2 + D_c + D_B + MS$$

30.169	9.871	.8512	-2.649	-3.018	-.644	195.26
(12.383)	(3.431)	(.092)	(-.208)	(-2.268)	(-0.539)	(4.139)

$$\text{Adjusted } R^2 = .7747$$

Goodness of Fit Test for Normality: Chi-Square = 8.6046 with 5 degrees of freedom

Table 24

$$a) \quad (P/E)_N = D_{\text{pred}}/NE + G_{\text{EPS}}^F + MB + MB^2 + D_c + D_B$$

26.384	8.5298	-.5534	6.7528	-1.7721	-2.6195
(9.249)	(3.829)	(-.057)	(.504)	(-1.523)	(-2.50)

$$\text{Adjusted } R^2 = .7426$$

$$b) \quad (P/E)_N = D_{\text{pred}}/NE + G_{\text{EPS}}^F + MB + MB^2 + D_c + D_B + MS$$

25.991	6.4352	-2.4285	4.8436	-.7982	-.8408	167.67
(9.1095)	(2.7029)	(-0.2555)	(0.3732)	(-0.6038)	(-0.6517)	(3.2566)

$$\text{Adjusted } R^2 = .7579$$

Goodness of Fit Test for Normality: Chi-Square = 10.1195 with 5 degrees of freedom

Table 25

$$a) \quad (P/E)_S = D/NE + G_A^P + MB + MB^2 + D_c + D_B$$

20.271	6.7926	-.4428	5.938	-3.2744	-2.6543
(13.022)	(2.511)	(-.051)	(.499)	(-2.544)	(-2.353)

$$\text{Adjusted } R^2 = .7410$$

$$b) \quad (P/E)_S = D/NE + G_A^P + MB + MB^2 + D_c + D_B + MS$$

18.906	6.5663	-2.0297	3.4399	-2.1842	-1.1744	139.1
(12.656)	(2.628)	(-.254)	(.313)	(-1.723)	(-1.006)	(3.299)

$$\text{Adjusted } R^2 = .7790$$

Goodness of Fit Test for Normality: Chi-Square = 4.6047 with 5 degrees of freedom

Table 26

$$a) \quad (P/E)_S = D/NE + G_{EPS}^F + MB + MB^2 + D_c + D_B$$

18.56	3.5698	-1.3638	8.3756	-1.7647	-2.6071
(9.251)	(1.561)	(-.152)	(.684)	(-1.490)	(-2.425)

$$\text{Adjusted } R^2 = .7224$$

$$b) \quad (P/E)_S = D/NE + G_{EPS}^F + MB + MB^2 + D_c + D_B + MS$$

18.001	1.9974	-2.490	5.636	-.8941	-1.117	131.35
(9.436)	(.8949)	(-.293)	(.485)	(-.770)	(-.976)	(2.842)

$$\text{Adjusted } R^2 = .7515$$

Goodness of Fit Test for Normality: Chi-Square = 9.2996 with 5 degrees of freedom

Table 27: YB and MB

A. Group 1 Firms	YB	MB
1. Atlanta Gas Light Co.	1.2629	0.5490
2. Berkshire Gas Co.	0.3335	0.3547
3. Brockton Taunton Gas Co.	0.3655	0.2177
4. Cascade Natural Gas Co.	1.2566	0.3192
5. City Gas Co. of Florida	1.4735	0.4325
6. Fall River Gas Co.	0.7378	0.3588
7. The Gas Service Co.	0.4269	0.2234
8. Greenwich Gas Co.	0.3889	0.3588
9. Hartford Gas Co.	0.6682	0.3588
10. Haverhill Gas Co.	0.3856	0.3588
11. Intermountain Gas Co.	1.4852	0.3485
12. Mountain Fuel Supply Co.	0.4843	0.2405
13. Northwest Natural Gas Co.	0.6090	0.3322
14. Piedmont Natural Gas Co.	1.2520	0.5023
15. Southeastern Public Service Co.	0.7203	0.0660
16. Southwest Gas Co.	0.4163	0.5805
17. Tennessee Gas Transmission Co.	0.6029	0.5279
18. Washington Gas Light Co.	0.9628	0.1610
19. Washington Natural Gas Co.	0.7725	0.5264

Table 28: YB and MB

B. Group 2 Firms

	YB	MB
1. Florida Public Utilities Co.	1.1997	0.3135
2. Houston Natural Gas Corp.	0.3737	0.7508
3. Panhandle Eastern Pipeline Co.	-0.0365	0.3898
4. Southern Union Gas Co.	0.1902	0.5336
5. United Gas Improvement Co.	0.9436	0.5857
6. Kansas-Nebraska Natural Gas Co.	0.5388	0.6539
7. Indiana Gas and Water Co.	0.6807	0.4518
8. Consolidated Natural Gas Co.	0.4631	0.3700
9. El Paso Natural Gas Co.	-0.2304	0.5116
10. Honolulu Gas Co.	1.1160	0.2982
11. Lone Star Gas Co.	0.4793	0.6575
12. New Jersey Natural Gas Co.	1.6007	0.4583
13. Equitable Gas Co.	.5045	.3067
14. Brooklyn Union Gas Co.	.7421	.2696
15. Laclede Gas Co.	.7165	.0536
16. Montana-Dakota Utilities Co.	.4977	.4114
17. Northern Natural Gas Co.	.4823	.2735
18. Oklahoma Natural Gas Co.	.3110	.5501
19. Texas Eastern Transmission Co.	.5404	.3558
20. Northern Illinois Gas Co.	.5003	.3102
21. Columbia Gas System	.8684	.3320
22. Transcontinental Gas Pipeline Co.	.6656	.2889

Table 29: YB and MB

C. Group 3 Firms

	YB	MB
1. American Natural Gas Co.	0.9561	0.5625
2. Battle Creek Gas Co.	0.2575	0.3012
3. Carolina Pipeline Co.	0.8432	0.5556
4. Chattanooga Gas Co.	0.4242	0.2766
5. Commonwealth Gas Corp.	0.8602	0.1918
6. Commonwealth Natural Gas Corp.	0.8653	0.0093
7. Corning Natural Gas Corp.	0.3419	0.2084
8. Elizabethtown Gas Co.	0.8695	0.1319
9. Gas Light Co. of Columbus	0.1448	0.3012
10. Hagerstown Gas Co.	-0.3277	0.3012
11. Indiana Gas and Chemical Corp.	0.6450	0.3012
12. Iowa and Illinois Gas and Electric Co.	0.3253	0.4756
13. Michigan Gas and Electric Co.	1.1682	0.3012
14. Mississippi River Corporation	0.9266	0.4364
15. Mississippi Valley Gas Co.	0.9060	0.2232
16. National Gas and Oil Corporation	0.4986	0.4962
17. New Britain Gas Light Co.	0.2705	0.3012
18. Petersburg and Hopewell Gas Co.	0.2179	0.3012
19. Providence Gas Co.	0.6473	0.0065
20. Rio Grande Valley Gas Co.	1.9139	0.4428
21. South Georgia Natural Gas Co.	1.0056	0.0034
22. South Jersey Gas Co.	1.1147	0.1421
23. Southern Natural Gas Co.	0.9170	0.5437

C. Group 3 Firms (Cont.)

	YB	MB
24. West Ohio Gas Co.	0.8807	0.4150
25. Wisconsin Southern Gas Co.	0.3523	0.3012
26. York County Gas Co.	0.0069	0.3012

Table 30

$$\begin{aligned}
 (P/E)_N &= D/NE + G_A^P + YB + YB^2 + T_c + T_B + YS \\
 &\quad 23.351 \quad 6.962 \quad .2164 \quad .0955 \quad -.3560 \quad -.2876 \quad 15.785 \\
 &\quad (15.264)(2.575) \quad (.0876) \quad (.0609) \quad (-1.847) \quad (-1.474) \quad (1.236) \\
 \text{Adjusted } R^2 &= .8191
 \end{aligned}$$

Table 31

$$\begin{aligned}
 (P/E)_S &= D/NE + G_A^P + YB + YB^2 + T_c + T_B + YS \\
 &\quad 19.431 \quad 6.086 \quad -5.244 \quad 2.306 \quad -.2866 \quad -.3611 \quad 10.541 \\
 &\quad (12.144)(2.150) \quad (-2.028) \quad (1.406) \quad (-1.422) \quad (-1.782) \quad (.7889) \\
 \text{Adjusted } R^2 &= .7337
 \end{aligned}$$

Table 32

$$(P/E)_N = D/NE + G_{EPS}^F + YB + YB^2 + T_c + T_B + YS$$

21.684	4.600	.6354	-.344	-.1467	-.3616	21.959
(11.935)	(2.162)	(.253)	(-.2165)	(-.800)	(-1.826)	(1.761)

$$\text{Adjusted } R^2 = .8134$$

Table 33

$$(P/E)_S = D/NE + G_{EPS}^F + YB + YB^2 + T_c + T_B + YS$$

17.836	4.358	-4.859	1.906	-.109	-.434	15.424
(9.527)	(1.985)	(-1.870)	(1.158)	(-.579)	(-2.150)	(1.197)

$$\text{Adjusted } R^2 = .7317$$

Table 34

$$\begin{aligned}
 (P/E)_N &= D/NE + G_A^P + MB + MB^2 + T_c + T_B \\
 &\quad 23.613 \quad 7.344 \quad -3.098 \quad 7.607 \quad -.3250 \quad -.2980 \\
 &\quad (16.468) \quad (2.758) \quad (-.3658) \quad (.6567) \quad (-1.710) \quad (-1.534) \\
 \text{Adjusted } R^2 &= .8186
 \end{aligned}$$

Table 35

$$\begin{aligned}
 (P/E)_N &= (D/NE) + G_A^P + YB + YB^2 + R_c + R_B + YS \\
 &\quad 22.803 \quad 4.224 \quad -3.461 \quad 2.064 \quad .0112 \quad -.2203 \quad 19.969 \\
 &\quad (14.347) \quad (1.439) \quad (-1.510) \quad (1.429) \quad (.0093) \quad (-.1183) \quad (1.677) \\
 \text{Adjusted } R^2 &= .8348
 \end{aligned}$$

Table 36

$$\begin{aligned}
 (P/E)_S = & D/NE + G_A^P + YB + YB^2 + R_c + R_B + YS \\
 & 19.119 \quad 5.716 \quad -5.866 \quad 2.846 \quad -.429 \quad -1.612 \quad 7.731 \\
 & (10.439) \quad (1.689) \quad (-2.221) \quad (1.711) \quad (-.310) \quad (-.751) \quad (.564) \\
 \text{Adjusted } R^2 = & .7179
 \end{aligned}$$

Table 37

$$\begin{aligned}
 (P/E)_N = & D/NE + G_{EPS}^F + YB + YB^2 + R_c + R_B + YS \\
 & 20.128 \quad 4.935 \quad -3.083 \quad 1.679 \quad 1.208 \quad -.967 \quad 20.235 \\
 & (11.398) \quad (2.556) \quad (-1.392) \quad (1.206) \quad (1.298) \quad (-.530) \quad (1.795) \\
 \text{Adjusted } R^2 = & .846
 \end{aligned}$$

Table 38

$$(P/E)_S = D/NE + G_{EPS}^F + YB + YB^2 + R_c + R_B + YS$$

16.389	4.739	-5.409	2.387	1.239	-2.088	9.853
(7.792)	(2.067)	(-2.072)	(1.453)	(1.115)	(-.955)	(.737)

$$\text{Adjusted } R^2 = .7248$$

Table 39

Simple Correlation Coefficients

	<u>D_c</u>	<u>D_B</u>	<u>T_c</u>	<u>T_B</u>	<u>R_c</u>	<u>R_B</u>
(P/E) _N	.2479	.0401	.1696	-.0639	.4983	-.0401
(P/E) _S	.2454	-.0914	.1542	-.1036	.4553	-.0791
D/NE	.3536	-.0089	.1912	.0136	.4595	-.0237
YB	.1512	-.1187	.1149	-.0709	.2429	-.0532
YB ²	.1068	-.1151	.0677	-.1063	.2334	-.0847
YS	.0416	.0565	.2634	-.0447	.3070	-.0063
G _A ^P	.4065	-.1010	.4559	-.1228	.6334	-.0647
G _{EPS} ^F	.0008	.1358	.0151	.1344	.1738	.1992

Table 40: First Quarter

$$(D/NE)_i = a_1 + a_2 \left(\frac{P_b - P_a}{D} \right)_i + e_i$$

$\frac{P_b - P_a}{D}$	<u>Estimated Coefficient</u>	<u>t ratio</u>
1) Unadjusted	-0.2218	-1.124
Adjusted $R^2 = .0057$		
2) Adjusted	-0.3646	-1.819
Adjusted $R^2 = .0478$		

Table 41: Second Quarter

$$(D/NE)_i = a_1 + a_2 \left(\frac{P_b - P_a}{D} \right)_i + e_i$$

$\frac{P_b - P_a}{D}$	<u>Estimated Coefficient</u>	<u>t ratio</u>
1) Unadjusted	-0.2386	-1.068
Adjusted $R^2 = .0031$		
2) Adjusted	-0.5733	-0.2928
Adjusted $R^2 = .0001$		

Table 42: Third Quarter

$$(D/NE)_i = a_1 + a_2 \left(\frac{P_b - P_a}{D} \right)_i + e_i$$

$\frac{P_b - P_a}{D}$	<u>Estimated Coefficient</u>	<u>t ratio</u>
1) Unadjusted	0.1805	1.1918
Adjusted $R^2 = .0091$		
2) Adjusted	0.5705	0.3963
Adjusted $R^2 = .0001$		

Table 43: Fourth Quarter

$$(D/NE)_i = a_1 + a_2 \left(\frac{P_b - P_a}{D} \right)_i + e_i$$

$\frac{P_b - P_a}{D}$	<u>Estimated Coefficient</u>	<u>t ratio</u>
1) Unadjusted	-0.4189	-0.3929
Adjusted $R^2 = .0001$		
2) Adjusted	-0.6986	-0.7133
Adjusted $R^2 = .0001$		

Table 44: Average for 1966

$$(D/NE)_i = a_1 + a_2 \left(\frac{P_b - P_a}{D} \right)_i + e_i$$

$\frac{P_b - P_a}{D}$	Estimated Coefficient	<u>t ratio</u>
1) Unadjusted	-0.1082	-0.3295
Adjusted $R^2 = .0001$		
2) Adjusted	-0.2573	-0.9186
Adjusted $R^2 = .0001$		

Table 45: First Quarter

Spearman Rank Correlation Test: $D/NE, \frac{P_b - P_a}{D}$

- 1) 7 Groups
 - a) Spearman R, Unadjusted $P_b - P_a / D = -.0446$
 - b) Spearman R, Adjusted $P_b - P_a / D = -0.429$
- 2) 10 Groups
 - a) Spearman R, Unadjusted $P_b - P_a / D = -0.5394$
 - b) Spearman R, Adjusted $P_b - P_a / D = -0.5394$
- 3) 5 Groups
 - a) Spearman R, Unadjusted $P_b - P_a / D = -0.8$
 - b) Spearman R, Adjusted $P_b - P_a / D = -0.8$

Table 46: Second Quarter

Spearman Rank Correlation Test: $D/NE, \frac{P_b - P_a}{D}$

- 1) 7 Groups
 - a) Spearman R, Unadjusted $P_b - P_a / D = -0.0357$
 - b) Spearman R, Adjusted $P_b - P_a / D = 0.1071$
- 2) 10 Groups
 - a) Spearman R, Unadjusted $P_b - P_a / D = -0.2606$
 - b) Spearman R, Adjusted $P_b - P_a / D = -0.0424$
- 3) 5 Groups
 - a) Spearman R, Unadjusted $P_b - P_a / D = -0.100$
 - b) Spearman R, Adjusted $P_b - P_a / D = -0.100$

Table 47: Third Quarter

Spearman Rank Correlation Test: $D/NE, \frac{P_b - P_a}{D}$

- 1) 7 Groups
 - a) Spearman R, Unadjusted $P_b - P_a / D = 0.5714$
 - b) Spearman R, Adjusted $P_b - P_a / D = 0.3214$
- 2) 10 Groups
 - a) Spearman R, Unadjusted $P_b - P_a / D = 0.4667$
 - b) Spearman R, Adjusted $P_b - P_a / D = 0.2364$
- 3) 5 Groups
 - a) Spearman R, Unadjusted $P_b - P_a / D = 0.40$
 - b) Spearman R, Adjusted $P_b - P_a / D = 0.20$

Table 48: Fourth Quarter

Spearman Rank Correlation Test: $D/NE, \frac{P_b - P_a}{D}$

1) 7 Groups

a) Spearman R, Unadjusted $P_b - P_a / D = -0.0714$

b) Spearman R, Adjusted $P_b - P_a / D = -0.6429$

2) 10 Groups

a) Spearman R, Unadjusted $P_b - P_a / D = -0.2242$

b) Spearman R, Adjusted $P_b - P_a / D = -0.3333$

3) 5 Groups

a) Spearman R, Unadjusted $P_b - P_a / D = -0.50$

b) Spearman R, Adjusted $P_b - P_a / D = -0.60$

Table 49: Average for 1966

Spearman Rank Correlation Test: $D/NE, \frac{P_b - P_a}{D}$

1) 7 Groups

a) Spearman R, Unadjusted $P_b - P_a / D = 0.0$

b) Spearman R, Adjusted $P_b - P_a / D = 0.0$

2) 10 Groups

a) Spearman R, Unadjusted $P_b - P_a / D = -0.0182$

b) Spearman R, Adjusted $P_b - P_a / D = 0.103$

3) 5 Groups

a) Spearman R, Unadjusted $P_b - P_a / D = 0.20$

b) Spearman R, Adjusted $P_b - P_a / D = 0.30$

Table 50

Implied Marginal Stockholder Tax Rates
Based Upon the Average for the
Four Quarters for 1966

- 1) The average for the unadjusted $P_b - P_a / D$:

Implies $t_d = .3497$

$t_g = .1748$

- 2) The average for the adjusted $P_b - P_a / D$:

Implies $t_d = .4286$

$t_g = .1958$

BIBLIOGRAPHY

1. Anthony, Robert, "The Trouble with Profit Maximization," Harvard Business Review, Vol. XXXVIII, November-December, 1960, pp. 126-134.
2. Barges, Alexander, The Effects of Capital Structure on the Cost of Capital, Prentice Hall, Inc., Englewood Cliffs, N. J., 1963.
3. Barron's Business and Financial Weekly, Dow Jones and Company, Inc., New York, 1964-1968.
4. Baumol, W. J., "On Dividend Policy and Market Imperfections," The Journal of Business, Vol. 36, January, 1963, pp. 112-115.
5. Benishay, Haskel, "Variability in Earnings-Price Ratios of Corporate Equity," American Economic Review, Vol. LI, March, 1961, pp. 81-94.
6. Black, Fischer, Jensen, M. C., and Scholes, Myron, "The Capital Asset Pricing Model: Some Empirical Tests," Studies in the Theory of Capital Markets, edited by M. C. Jensen, Praeger Publishers, New York, 1972, pp. 79-124.
7. Blume, Marshall, "Portfolio Theory: A Step Toward Its Practical Application," Journal of Business, Vol. 43, April, 1970, pp. 152-173.
8. Breen, W. J., and Lerner, E. M., "On the Use of Beta in Regulatory Proceedings," Bell Journal of Economics and Management Science, Vol. 3, Autumn, 1972, pp. 612-621.
9. Breen, W. J., and Lerner, E. M. "Corporate Financial Strategies and Market Measures of Risk and Returns," Journal of Finance, Vol. XXVIII, May, 1973, pp. 339-351.
10. Brennan, M. J., "Capital Market Equilibrium with Divergent Borrowing and Lending Rates," Journal of Financial and Quantitative Analysis, Vol. VI, December, 1971, pp. 1197-1205.
11. Brennan, M. J., "Investor Taxes, Market Equilibrium, and Corporate Finance," unpublished Ph.D. dissertation, Massachusetts Institute of Technology, June, 1970.
12. Brittain, J., "The Tax Structure and Corporate Dividend Policy," American Economic Review, Vol. LIV, May, 1964, pp. 272-287.

13. Cragg, J. G., and Malkiel, B. G., "The Consensus and Accuracy of Some Predictions of the Growth of Corporate Earnings," Journal of Finance, Vol. XXIII, March, 1968, pp. 67-84.
14. Davis, Otto A., and Whinston, A. B., "The Economics of Urban Renewal," Urban Economics: Readings and Analysis, edited by Ronald E. Grieson, Little, Brown, and Company, Boston, 1973.
15. Douglas, G. W., "Risk in the Equity Markets: An Empirical Appraisal of Market Efficiency," Yale Economic Essays, Vol. IX, Spring, 1969, pp. 3-45.
16. Durand, David, "Growth Stocks and the Petersburg Paradox," Journal of Finance, Vol. XII, September, 1957, pp. 348-363.
17. Elton, E. J., and Gruber, M. J., "Marginal Stockholder Tax Rates and the Clientele Effect," Review of Economics and Statistics, Vol. LII, February, 1970, pp. 68-74.
18. Fama, E. F., "The Behavior of Stock Market Prices," Journal of Business, Vol. 38, January, 1965, pp. 34-105.
19. Fama, E. F., "Risk, Return, and Equilibrium: Some Clarifying Comments," Journal of Finance, Vol. XXIII, March, 1968, pp. 29-40.
20. Fama, E. F., "Efficient Capital Markets: A Review of Theory and Empirical Work," Journal of Finance, Vol. XXV, May, 1970, pp. 383-417.
21. Fama, E. F., and MacBeth, J. D., "Risk, Return and Equilibrium: Empirical Tests," unpublished manuscript, University of Chicago, July, 1972.
22. Farrar, D. E., and Selwyn, L. L., "Taxes, Corporate Policy, and Return to Investors," National Tax Journal, Vol. XX, December, 1967, pp. 449-454.
23. Friend, Irwin, and Puckett, Marshal, "Dividends and Stock Prices," American Economic Review, Vol. LIV, September, 1964, pp. 656-682.
24. Gordon, M. J., The Investment, Financing, and Valuation of the Corporation, Irwin, Inc., Homewood, Illinois, 1962.
25. Gordon, M. J., "Optimal Investment and Financing Policy," The Journal of Finance, Vol. XVIII, May, 1963, pp. 264-272.

26. Graham, Benjamin and Dodd, D. L., Security Analysis, McGraw-Hill Publishing Company, New York, First Edition (1934), Fourth Edition (1962).

27. Harkavy, O., "The Relation Between Retained Earnings and Common Stock Prices for Large Listed Corporations," Journal of Finance, Vol. VIII, September, 1953, pp. 283-297.

28. Hirshleifer, J., "On the Theory of Optimal Investment Decision," Journal of Political Economy, Vol. LXVI, August, 1958, pp. 95-103.

29. Jensen, M. J., "Capital Markets: Theory and Evidence," Bell Journal of Economics and Management Science, Vol. 3, Autumn, 1972, pp. 357-398.

30. Johnson, L. R., O'Meara, J., and Shapiro, E., "Valuation of Closely Held Stocks for Federal Tax Purposes: Approach to an Objective Method," University of Pennsylvania Law Review, 1951, pp. 166-195.

31. Jolivet, V., "Tax Rates on Dividends," American Economic Review, Vol. LVI, June, 1966, pp. 473-477.

32. Keynes, J. M., The General Theory of Employment, Interest, and Money, Harcourt, Brace, and World, Inc., New York, 1965.

33. King, B. F., "Market and Industry Factors in Stock Price Behavior," The Journal of Business, Vol. 39, Supplement, January, 1966, pp. 139-190.

34. Lerner, E. M., and Carleton, W. J., A Theory of Financial Analysis, Harcourt, Brace, and World, Inc., New York, 1966.

35. Lintner, John, "Optimal Dividends and Corporate Growth Under Uncertainty," Quarterly Journal of Economics, Vol. LXXVIII, February, 1964, pp. 49-95.

36. Lintner, John, "The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets," The Review of Economics and Statistics, Vol. XLVII, February, 1965, pp. 13-37.

37. Lintner, John, "The Aggregation of Investors' Diverse Judgment and Preferences in Purely Competitive Securities Markets," Journal of Financial and Quantitative Analysis, Vol. IV, December, 1969, pp. 347-400.

38. Logue, D. E., "On the Pricing of Unseasoned Equity Issues: 1965-1969," Journal of Financial and Quantitative Analysis, Vol. VIII, January, 1973, pp. 91-104.

39. Malkiel, B. G., "Equity Yields and the Structure of Share Prices," American Economic Review, Vol. LIII, December, 1963, pp. 1004-1031.
40. Malkiel, B. G., "The Valuation of Public Utility Equities," Bell Journal of Economics and Management Science, Vol. 1, Spring, 1970, pp. 143-160.
41. McDonald, J. G., and Fisher, A. K., "New Issue Stock Price Behavior," Journal of Finance, Vol. XXVII, March, 1972, pp. 97-102.
42. McDonald, J. G., and Van Horne, J. C., "Dividend Policy and New Equity Financing," Journal of Finance, Vol. XXVI, May, 1971, pp. 507-519.
43. Miller, M. H., and Scholes, Myron, "Rates of Return in Relation to Risk: A Re-examination of Some Recent Findings," Studies in the Theory of Capital Markets, edited by M. C. Jensen, Praeger Publishers, New York, 1972, pp. 47-48.
44. Modigliani, Franco, and Miller, M. H., "The Cost of Capital, Corporation Finance, and the Theory of Investment," American Economic Review, Vol. LXVIII, June, 1958, pp. 261-297.
45. Modigliani, Franco, and Miller, M. H., "Dividend Policy, Growth, and the Valuation of Shares," The Journal of Business, Vol. 34, October, 1961, pp. 411-433.
46. Moody's Annual Cumulative Dividend Record, Moody's Investors Service, Inc., New York, 1964-1968.
47. Moody's Public Utility Manual, Moody's Investors Service, Inc., New York, 1957-1971.
48. Niederhoffer, Victor and Regan, P. J., "Earnings Changes, Analysts' Forecasts, and Stock Prices," Financial Analysts Journal, Vol. 28, May-June, 1972, pp. 65-71.
49. Reilly, F. K., and Hatfield, K., "Investor Experience with New Stock Issues," Financial Analysts Journal, Vol. 25, September-October, 1969, pp. 73-80.
50. Reilly, F. K., "Further Evidence of Short-Run Results for New Issue Investors," Journal of Financial and Quantitative Analysis, Vol. VIII, January, 1973, pp. 83-90.
51. "Report of the Special Study of the Securities Markets of the Securities and Exchange Commission," House Document 95, Government Printing Office, Washington, D.C., 1963.

52. Sharpe, W. F., "Capital Asset Prices: A Theory of Market Equilibrium Under Conditions of Risk," Journal of Finance, Vol. XIX, September, 1964, pp. 425-442.

53. Sharpe, W. F., Portfolio Theory and Capital Markets, McGraw-Hill, New York, 1970.

54. Stiglitz, J. E., "Some Aspects of the Pure Theory of Corporate Finance: Bankruptcies and Take-Overs," Bell Journal of Economics and Management Science, Vol. 3, Autumn, 1972.

55. Stoll, H. R., and Curley, A. J., "Small Business and the New Issues Market for Equities," Journal of Financial and Quantitative Analysis, Vol. V, September, 1970, pp. 309-322.

56. Turnovsky, S. J., "The Allocation of Corporate Profits Between Dividends and Retained Earnings," Review of Economics and Statistics, Vol. XLIX, November, 1967, pp. 583-589.

57. The Wall Street Journal, Dow Jones and Company, Inc., Dallas, 1966.

58. Walter, J. E., "Dividend Policy and Common Stock Prices," Journal of Finance, Vol. XI, March, 1956, pp. 29-41.

59. Weston, J. F., and Brigham, E. F., Managerial Finance, Holt, Rinehart, and Winston, Second Edition, New York, 1966.