# *Discerning the Determinants of Common Stock Valuation: An Empirical Analysis*

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**Abstract**
This empirical study combines the fundamental intrinsic-value theory with the modern-portfolio theory to help discern the main determinants of common-stock valuation. This study differs from previous studies in that a simulated ex ante, controlled valuation-experiment is performed: for each dividend-paying firm in a cross-sectional sample alternately employed in a stock-valuation model are first, actual dividends; and then second, a measure representing the dividend-paying-ability of the firm. For each alternative strategy a set of results is generated, then generalised and a comparison is made to see which strategy works best. An analysis-of-variance and a comparison-of-forecast-errors respectively indicate that a dividend-paying-ability measure (1) has greater informational content and (2) generally leads to better price appraisal when employed in a valuation model.

**Keywords:** *Valuation, Dividend-paying-ability, CAPM, JEL Classification: G 12*

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## 1) INTRODUCTION

This study begins by posing the question: What do investors capitalise to determine the value of a share of common stock? That is to ask, what is the most important determinant of the intrinsic value of the common stock of a firm: actual dividends that a firm pay (or is expected to pay) to its shareholders; or some alternative measure that reflects firm earnings and defines the potential dividend-paying-ability of the firm.

Of course Miller and Modigliani (1961) have shown that capitalising dividends should lead to the same result as capitalising earnings (the broadest measure of the potential dividend-paying-ability of the firm), under a certain set of economic assumptions.However, when these assumptions are relaxed, certain ambiguities and conflicts arise regarding the appropriate variable to capitalise to determine the intrinsic-value of a share of common stock.

This paper is concerned with the potential ambiguity of the signalling effect of cash-dividends. On one hand there is the notion of the greater the current and future expected dividends, the greater the intrinsic current-value of the stock; all other things are equal. Implicit in this idea is the basic tenent of asset-valuation; only an asset's stream of cash flows (current and future) is relevant to its fundamental value. The greater the expected future cash flows (dividends), the greater the fundamental value of the asset (share of stock). In this sense, dividends convey information about the firm's prospects in a direct manner: The greater the level of dividends the greater must be the firm's earnings and thus the more favourable the firm's prospects.

On the other hand, conflicting with the above approach is the notion of a contrary signalling effect of the firm's dividend-pay-out policy: A high dividend-pay-out ratio may suggest less of a need for retained earnings and thus imply a lack of profitable economic investment opportunities. A low dividend-pay-out ratio may suggest more of a need for retained earnings, implying the existence of profitable economic investment opportunities. All other things equal, a lower dividend-pay-out ratio may suggest higher share value according to this line of reasoning.

Thus investors are faced with an inherent ambiguity when trying to determine share value with discounted-dividend approach. The present study attempts to resolve this ambiguity by showing that it is the firm's ability to pay dividends (reflected by a measure of firm-earnings) that better determines the intrinsic value of its common stock. The study's premise is that modelling dividend-paying-ability implicitly takes into account, to some extent, the impact of retained earnings on the value of the firm: Reinvested earnings that are not paid out to shareholders may lead to an increase in firm size; and therefore an increase in future net cash inflows, and thus an increase in firm value, other things being equal. Therefore, modelling dividend-paying-ability in stock valuation appears to capture a factor influencing firm value that modelling dividends does not. In that case, modelling dividend-paying-ability in stock valuation may lead to more accurate appraisals of firm value.[2] Indeed, many analysts have found that using dividends, or specific forecasts of dividends, in valuation models gives erroneous results.[3]

## II) HOW THIS STUDY DIFFERS FROM PREVIOUS WORK:

### A) METHODOLOGICAL APPROACH

Previous studies in the area of firm-value determination have been of two main types: 1) Surveys of investors and financial analysts[4]; and 2) Analysis of variance to identify which company fundamentals are most important in determining stock prices.[5]

In studies of the former type, firm-earnings emerges as the single most important variable in the eyes of investors and analysts. In studies of the latter type, firm-earnings is found to be the variable with the greatest explanatory power regarding movements in security returns and prices. The suggestion from these two types of studies is that dividend-paying-ability (as represented by some measure of firm-earnings) and not dividends may be the main determinant of the intrinsic value of a share of common stock.

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[2] Lending support to this hypothesis is a study by MacDonald and Power (1995) which demonstrates that retained earnings contain relevant information for stock prices beyond that contained in dividends.
[3] See, for example, Michaud and Davis (1982).
[4] See, for example, Clayman and Schwartz (1994) and Chang and Most (1980)
[5] See, for example, Jacque and Rie (1994), Vander Weide and Carlton (1988), and Malkiel (1970).

However, perhaps the ultimate litmus test is to discern which variable leads to most accurate appraisal of firm-value when applied in a stock valuation model. To date, little, if any, work has been done in this area.

To this end, the current study performs a simulated, ex ante valuation-experiment to discern whether actual dividends or an alternative measure representing the firm's ability to pay dividends is the better variable to use in a stock valuation model. This study differs from previous studies in the sense that a controlled valuation-experiment is conducted: For each dividend-paying firm in a cross-sectional sample, alternately employed in a valuation model are first, actual dividends; and then second, a measure representing the dividend-paying-ability of the firm. For each alternative strategy a set of results are generated, then generalised, and a comparison is made to see which strategy works best, on average. This cross-sectional experiment is conducted four times, each time with a different sample over a different horizon of equal length. The findings indicate that a measure of dividend-paying-ability, when compared to actual dividends, (1) generally has greater informational content and (2) generally leads to better firm appraisal when employed in a valuation model.

**B) MEASURE OF DIVIDEND-PAYING-ABILITY**

The previous studies in this area (mentioned above) are comparing firm-earnings versus dividends as the main determinant of firm value. Implicitly in these studies firm-earnings is taken as the broadest measure of dividend-paying-ability. We define dividend-paying-ability more precisely, in a narrower sense. This more precise dividend-paying-ability measure is equal to the product of firm earnings ($NE_{i0}$) and the historical average firm pay-out-ratio (dividends-to-earnings) of 45%. Firm earnings ($NE_{i0}$) is a normalised earnings measure, taken as the annual average of a firm's previous five-year earnings-per-share, to smooth out any possible cyclical fluctuations. The pay-out-ratio of .45 is the average pay-out- ratio of the firms in our samples over the years of our study.[6]

[6] This type of precise measure of dividend-paying-ability was successfully applied in a study by financial analysts Sorensen and Williamson (1985). This precise measure of dividend-paying-ability was also successfully used in a combination-forecast study by Terregrossa (1999).

The rationale behind the use of this more narrowly defined measure of dividend-paying-ability in this study is two-fold. First is the inherent signalling effect of this precise measure when compared to actual dividends: If a firm's dividend-paying-ability measure, $.45(NE_{io})$, is different from its actual dividend, $D_{io}$, then the dividend-paying-ability measure will embody information that the actual dividend variable will not. More precisely, if a firm is paying an amount of dividends, $D_{io}$, that is less than its standardised, potential pay-out measure, $.45(NE_{io})$, this may imply that a firm has profitable economic investment opportunities, financed at least in part by retained earnings. If, on the other hand, a firm is paying dividends, $D_{io}$, in excess of its standardised, potential pay-out measure, $.45(NE_{io})$, this may indicate that that a firm has a lack of profitable investment opportunities, and thus less of a need for retained earnings. In the former case, this dividend-paying-ability measure, $.45(NE_{io})$, may reflect positive information regarding a firm's prospects; in the latter case, negative.

Secondly, this more narrowly defined measure of dividend-paying-ability is in effect a compromise, a middle ground between capitalising earnings and capitalising dividends. By capitalising the standardised, potential pay-out measure we maintain a signalling effect concerning a firm's prospects; and at the same time stay reasonably close to the basic asset-valuation tenet that only actual cash flows are relevant to the valuation process. In this sense, we seem to be having our cake and eating it, too.

### C) MEASURE OF SYSTEMATIC RISK

One aspect of modern portfolio theory is that only the systematic part of an asset's total risk is relevant to its intrinsic value. Thus, we use the Capital Asset Pricing Model (CAPM) as a method of security valuation and appraisal.[7]

[7] Markowitz (1959), Sharpe (1964) and Lintner (1965) shared the 1990 Nobel Prize in Economics for their work in developing the CAPM.

The CAPM has come under close scrutiny lately.[8] The long-run relationship between an asset's expected-return and its index of systematic or market-related risk (beta) has been found to be flat, instead of upward sloping. The main problem seems to be in the measurement of beta. The traditional or conventional approach has been to use historical security- and market-return information to estimate a security's future level of covariance-of-return with the market portfolio. This has been likened to negotiating the forward path of a car solely by looking in the rear-view mirror.

We make an adjustment in the measurement of a firm's beta that allows us to look through the car's front window. We incorporate forward-looking information regarding a firm's systematic-volatility of return in our beta estimation. Specifically, we utilise the dispersion (standard deviation) of financial analysts' earnings forecasts, which has been found to be the most important explanatory risk variable with respect to security returns and prices.[9]

In fact, some researchers maintain that dispersion of analysts' forecasts may actually serve as a more reliable and useful proxy of a security's systematic risk.[10]

Incorporating this forward-looking systematic risk measure into our beta estimation (and our use of a fairly broad measure of the market portfolio) may legitimise the use of the CAPM as a valuation/forecasting model in our study. See the appendix for a detailed explanation of the estimation of a firm's expected-return, $E(R_i)$, from the modified CAPM, incorporating the dispersion of analysts' forecasts as a proxy for a firm's ex ante systematic risk.

**D) HORIZON:**

Many studies focus on the near- or short-term (quarterly- and one-year horizons) when evaluating security returns, prices, and related variables. We employ a relatively longer horizon (five-year period) in our analysis. The justification for this is that financial markets seem to employ a multi-

[8] See Fama and MacBeth (1992) and Malkiel (1999).

[9] See Malkiel and Cragg (1982) and Friend, Westerfield and Granito (1978).

[10] See Malkiel (1981), and Carvell and Strebel (1984), Harris (1986) and Conroy and Harris (1987).

year horizon when estimating security returns and prices. Survey research[11] and empirical evidence[12] support this premise that financial markets utilise a multi-year horizon. The implication is that analysts, researchers, and investors may gain more insight into estimating intrinsic security value by focusing on a multi-year horizon.

## III) METHODOLOGY

Specifically, our approach is to employ the CAPM as a valuation model to generate simulated, ex ante forecasts of percentage-change in stock price over a five-year forecast horizon. The central idea is, the more accurate the forecasts of share-price performance, the more accurate the appraisals of firm-value.

For each firm in a given sample, we twice generate a forecast of the five-year growth-rate of price-per-share, using in turn the two alternative strategies mentioned above. Thus, for each sample of firms over a given five-year horizon two sets of share-price growth-rate forecasts are generated, each set reflecting an alternative strategy: One that employs actual dividends as determinant of value; another that utilises our above-defined measure of dividend-paying-ability.

For each firm and both alternative strategies, all other variables that are employed in the model are identical. Thus, any difference between the pair of outcomes for each firm is due solely to the choice of employing actual dividends or employing our more precise, standardised measure of dividend-paying-ability to generate forecasts of share-price growth.

Our valuation/forecasting model is formulated using a technique established by Rozeff (1983) and modified by Terregrossa (1999). Suppressing the time subscript for simplicity, the expected one-period rate of return of security i is given by:

[11] See for example Moizer and Arnold (1982) and Arnold, Moizer, and Noreen (1983)
[12] See for example Brown, Foster, and Noreen (1985)

$$E(R_i) = \frac{P_{i1} + D_{i1} - P_{i0}}{P_{i0}}$$

$$E(R_i) = \frac{D_{i1}}{P_{i0}} + \frac{P_{i1} - P_{i0}}{P_{i0}} \qquad \text{EQ 1}$$

where

$E(R_i)$ = expected one-period return of stock i;

$P_{i1}$ = expected end-of-period price per share;

$D_{i1}$ = expected dividend per share during the period;

$P_{i0}$ = current price per share;

$D_{i0}$ = current dividend per share

Hence,

$$\frac{D_{i1}}{P_{i0}} + \frac{P_{i1} - P_{i0}}{P_{i0}} = \frac{D_{i0}(1+g_{id})}{P_{i0}} + g_{ip} \qquad \text{EQ 2}$$

where

$g_{id}$ = growth rate of dividends;

$g_{ip}$ = growth rate of price.

Assuming $g_{id} = g_{ip} = g_{ie}$ , where $g_{ie}$ = growth rate of earnings

then,

$$E(R_i) = \frac{D_{i0}(1+g_{ip})}{P_{i0}} + g_{ip} \qquad \text{EQ 3}$$

Then, solving EQ 3 for $g_{ip}$, we formulate our share-price growth forecasting model which employs the strategy of utilising actual dividends ($D_{i0}$) as a major value-determining parameter:

$$g_{ip} = \frac{E(R_i) - \frac{D_{i0}}{P_{i0}}}{1 + \frac{D_{i0}}{P_{i0}}} \qquad \text{(Model 1) EQ 4}$$

The CAPM enters into the model by using it to derive an estimate of $E(R_i)$.[13] We insert this CAPM derived value of $E(R_i)$, along with current dividend, $D_{i0}$, and current price, $P_{i0}$, into EQ 4 (Model 1) and generate a forecast of the five-year growth of price-per-share of firm i from our first forecasting model (EQ4), based on actual dividends. The percentage-price-change, $g_{ip}$, is considered then as the price-change implicit in the CAPM.

The percentage price-change we extract from our forecasting model is considered to be the percentage change over the next five years for the following reason: A five-year risk-free rate (taken as the yield-to-maturity on a five-year U.S. government security) is entered into the CAPM to estimate $E(R_i)$. Doing so gives our forecasting model the desired five-year forecast horizon, following the technique established by Rozeff (1983). We then formulate our alternative percentage price-change forecasting model by substituting our precise measure of dividend-paying-ability, $(NE_{i0}(.45))$, for actual dividends, $(D_{i0})$, in EQ 4:

$$g_{ip} = \frac{E(R_i) - \dfrac{NE_{i0}(.45)}{P_{i0}}}{1 + \dfrac{NE_{i0}(.45)}{P_{i0}}} \qquad \text{(Model 2) EQ5}$$

We then generate our alternative forecast of the five-year percentage change in share price of firm i from model 2 (equation 5), based on dividend-paying-ability. To do so we again estimate $E(R_i)$ from the CAPM, calculate normalised earnings $(NE_{i0})$ from historical data, set the dividend pay-out-ratio at the historical average of .45, and observe current price, $P_{i0}$.

The extraction of a single percentage-change from each of our alternative models requires the equality of the growth rates of dividends-, price-, and earnings-per-share. In EQ4 (Model 1) this equality holds by assuming that each firm's pay-out ratio is held constant over a given horizon.

In EQ5, (Model 2), the equality of the growth rates of dividends-, price-, and earnings-per-share is ensured by setting the pay-out ratio at the (historical average of) .45 for all firms over each horizon. In this manner, actual pay-

[13] See the appendix for a description of the estimation process by the CAPM.

out policy for each individual firm is allowed to vary over a given horizon. Therefore, the results from this part of the experiment can be considered relatively more robust, since they are based on a less restrictive assumption regarding actual pay-out policy.

## TEST OF HYPOTHESES: SAMPLES AND TEST PROCEDURES

### A. Samples:

The experiment is conducted four times, each time with a different cross-sectional sample over a different five-year horizon: January 1982-1987; January 1983-1988; January 1984-1989; and January 1985-1990, respectively.

The criteria for choosing a sample of firms from the Center for Research of Security Prices (CRSP) tape for each forecast horizon is as follows:

(a) Return data available for the five-year period preceding a given forecast horizon to allow conventional (traditional) estimation of the firms' beta (systematic-risk index) coefficients, for use in the CAPM in conjunction with dispersion-of-analysts'-forecasts as a proxy for ex ante systematic-risk.

(b) Actual (or realised) share price available for January 1987; 1988; 1989; and 1990, respectively, to allow the computation of forecast error of each of the models' forecasts.

(c) Security price, dividends and historical earnings (previous five-year annual average) available as of January 1982; 1983; 1984; and 1985 for each replication, respectively, to allow the computation of each of the two versions of the valuation-model share-price forecasts, for each firm.

(d) Each sample includes only dividend-paying firms, in order to control the experiment.

Historical earnings, security price, standard deviation of analysts' forecasts, and dividend information are obtained from International Brokers' Estimate System (I/B/E/S) Inc.[14]

[14] International Brokers Estimate System Inc. (I/B/E/S Inc.) is an information service that delivers data on earnings forecasts on nearly all publicly traded corporations followed by security analysts.

**B. Test Procedures:**

1) The first test procedure is to compare the forecast errors of the two alternative methods (Model 1, based on actual dividends and Model 2, based on dividend-paying-ability). This comparison is accomplished as follows:

Let

$a_i$ = actual five-year growth rate of price-per share for firm i ;

and

$g_{ij}$ = forecasted five-year growth rate of price-per-share for firm i by method j (method j ranges over the two alternate forecast models). j = 1, 2.

In each test period a vector of forecast errors,

$$|a_i - g_{ij}| = e_{ij} \quad \text{EQ 6}$$

is calculated for each method j. $e_{ij}$ is the absolute value of the difference between the forecasted and realised growth-rates of share-price for each firm in a given sample. The mean absolute forecast error (MABE), defined as the sample average of $|a_i - g_{ij}|$, is then computed. This measure best reflects the overall forecasting performance of each of the two alternative methods since it takes into account the average error size. For hypothesis tests of the two alternative forecasting methods, we utilise the procedure of match-pairs case for each firm. The members of each pair are the mean absolute forecast errors (MABE) from the two forecasting models. Each pair can be reduced to a single observation by taking the difference in MABE. The Wilcoxon sign rank test is used as a non-parametric test of the mean difference, i.e., a test of the average difference between the mean absolute forecast error of Model 2 and the mean absolute forecast error of Model 1. Thus, our first null hypothesis to be tested: that the percentage price-change forecasts generated by the valuation model which employs a measure of dividend-paying-ability (Model 2), are no more accurate, on average, than forecasts generated by the valuation model which utilises actual dividends (Model 1).

2) The second employed test procedure is an analysis of variance in which we investigate the informational content of the predicted growth-rates of share-price generated by our two forecasting models. As noted above, the only source of difference in the informational content between the two models is that Model 1 uses actual dividends as a parameter, while Model 2 uses a precise measure of dividend-paying-ability. To the extent that .45($NE_{i0}$) is different than $D_{i0}$, the dividend-paying-ability measure of Model 2 will embody information concerning firm i prospects that the dividend variable of Model 1 will not, as explained above. All other information contained in the forecasts of each of the two models reflects an otherwise identical common set of inputs.

Actual values are regressed against predicted values, using cross-sectional data, as follows:

$$a_{it} = \alpha + \beta\,({}_{t-5}g_{i1t}) + \gamma\,({}_{t-5}g_{i2t}) + \mu_t \qquad \text{EQ 7}$$

where,

$a_{it}$ = actual 5-year percentage share-price change of firm i at time t;

${}_{t-5}g_{i1t}$ = forecast of the 5-year percentage share-price change of firm i made from Model 1 (based on dividends), using information available at time t-5 and using the model's estimation procedure and forecasting method each period;

${}_{t-5}g_{i2t}$ = forecast of the 5-year percentage share-price change of firm i made from Model 2 (based on dividend-paying-ability), using information available at time t-5 and using the model's estimation procedure and forecasting method each period;

| | | |
|---|---|---|
| $m_t$ | = | error term; |
| a | = | constant term. |

We estimate equation 7 for the two forecast models and test the null hypothesis that b = 0 and the null hypothesis that g = 0. The former hypothesis is that Model 1's forecasts contain no information, relevant to forecasting, not in the constant term and in Model 2. The latter hypothesis is that Model 2's forecasts contain no information not in the constant term and in Model 1.

## DIAGNOSTIC ANALYSIS AND CORRECTIVE PROCEDURES

Non-normality is not an issue, due to our large, random samples and the Central Limit Theorem. Serial correlation is not a concern, as our regressions are cross-sectional. However, we do find evidence of heteroskedasticity, using White's (1980) test.

It may be that firms with higher growth-rates of share-price may have different variances of forecast error than firms with smaller growth-rates of share-price. Therefore, errors in predicting share-price growth-rates may be associated with one of the right-hand variables. The Newey-West (1987) procedure corrects for heteroskedasticity related to right-hand variables. This procedure produces a heteroskedasticity- and autocorrelation-consistent covariance matrix with the benefit that the estimator is guaranteed to be positive semi-definite. Thus, we use the Newey-West procedure of generating a heteroskedasticity-consistent covariance matrix to construct the required significance tests.

## IV) EMPIRICAL RESULTS

### A) Comparison of Forecast Errors:

In three out of four test periods (with the first test period being the exception), we find that the forecasts of five-year price-per-share growth rates generated by Model 2 (based on dividend-paying-ability) are superior, on average, to the forecasts generated by Model 1 (based on actual dividends). Over each of the last three test periods the mean absolute forecast error (MABE) of the Model 2 forecasts is lower than that of the Model 1 forecasts. (See Table 1.)

**Table 1:** Mean Absolute Forecast Error (MABE)

(In Percentages)

| | 1982-87 | 1983-88 | 1984-89 | 1985-90 |
|---|---|---|---|---|
| MABE (MODEL 2) | 15.975 | 14.016 | 14.976 | 18.217 |
| MABE (MODEL 1) | 15.735 | 15.046 | 16.090 | 19.114 |

Note:

Model 1 forecasts are based on actual dividends;

Model 2 forecasts are based on dividend-paying-ability.

Using the Wilcoxon sign-rank test, we test the significance of the average difference between the mean absolute forecast errors of the forecasts generated by Model 2 and Model 1, respectively. Significantly negative differences imply superior forecasting by Model 2. In each of the last three test periods, the mean difference is negative and we are able to reject a null hypothesis of a mean difference equal to zero at the 0.0001 level of significance. (See Table 2.)

**Table 2:** Average Difference in Mean Absolute Forecast Error

**E[MABE(MODEL2) - MABE(MODEL1)] ***

(In Percentages)

| 1982-87 | 1983-88 | 1984-89 | 1985-90 |
|---|---|---|---|
| 0.240 | -1.031 | -1.115 | -0.897 |

***:** Each value represents the average difference in mean absolute forecast error across all firms in a given sample for a given forecast horizon.

Therefore, in three out of four test periods, we are able to reject our first null hypothesis, namely, the fact that the forecasts generated by Model 2 are no more accurate than forecasts generated by Model 1.

Thus, in three out of four test periods, the Model 2 forecasts of share-price growth (based on a valuation model employing dividend-paying-ability) were found to be significantly better, on average, than the Model 1 forecasts (based on a valuation model employing actual dividends). Greater accuracy in prediction of share-price performance results implies greater accuracy in firm-value appraisal.

**B) Analysis of Variance:**

Turning to our regression analysis, in three out of four test periods (with the fourth test period being the exception) the estimated regression coefficients (b) of the Model 1 forecasts (based on actual dividends) are not significantly different from zero, each with a t-statistic less than 2.00.

Therefore, in three out of four test periods we are unable to reject the null hypothesis that the Model 1 forecasts contain no information, relevant to forecasting, not in the constant term and in the Model 2 forecasts (based on dividend-paying-ability). (See Table 3.)

**Table 3:** Informational Tests Using the Newey-West Procedure

$$a_{it} = \alpha + \beta\,({}_{t\text{-}5}g_{i1t}) + \gamma\,({}_{t\text{-}5}g_{i2t}) + \mu_t$$

**Horizon:** January 1982-87 **Sample Size:** 360

| | α | β | γ |
|---|---|---|---|
| estimated coefficients | 12.478 | 0.155 | -10.252 |
| standard error | 1.044 | 0.135 | 10.398 |
| (t - statistic) | (11.956) | (1.162) | (-0.987) |
| prob. | 0.000 | 0.246 | 0.325 |

**Horizon:** January 1983-88 **Sample Size:** 375

| | α | β | γ |
|---|---|---|---|
| estimated coefficients | 10.894 | -2.323 | 21.000 |
| standard error | 0.816 | 2.056 | 10.148 |
| (t - statistic) | (13.344) | (-1.127) | (2.281) |
| prob. | 0.000 | 0.260 | 0.039 |

**Horizon:** January 1984-89 **Sample Size:** 399

| | α | β | γ |
|---|---|---|---|
| estimated coefficients | 8.182 | 0.598 | 46.667 |
| standard error | 0.995 | 2.253 | 15.243 |
| (t - statistic) | (8.227) | (0.277) | (3.266) |
| prob. | 0.000 | 0.790 | 003 |

**Horizon:** January 1985-90 **Sample Size:** 455

| | α | β | γ |
|---|---|---|---|
| estimated coefficients | 12.779 | 6.102 | 41.248 |
| standard error | 1.010 | 1.816 | 16.871 |
| (t - statistic) | (12.649) | (3.361) | (2.546) |
| prob. | 0.000 | 0.001 | 0.014 |

In contrast, in three out of four test periods (with the first test period being the exception) the estimated regression coefficients (g) of the Model 2 forecasts (based on dividend-paying-ability) are significantly positive, each with a t-statistic greater than 2.06. Therefore, in three out of four test periods we are able to reject the null hypothesis that the Model 2 forecasts contain no information, relevant to forecasting, not in the constant term and in the Model 1 forecasts (based on actual dividends). (See Table 3.)

As mentioned above, these findings from our regression analysis result from an autocorrelation-heteroskedasticity-consistent estimate of the least- squares covariance matrix. As such, these regression results may be considered autocorrelation-heteroskedasticity-robust.

Based on the above regression findings we may reasonably argue that, Model 2 forecasts (based on a valuation model employing dividend-paying-ability) generally have greater informational content and therefore greater explanatory power regarding movements in share price performance than Model 1 forecasts (based on a valuation model employing actual dividends).

## SUMMARY AND CONCLUSIONS

The results of our empirical analysis indicate that in three out of four test periods, a valuation model incorporating dividend-paying-ability significantly outperformed, on average, a valuation model incorporating actual dividends in forecasting share-price performance. The implication is that the dividend-paying-ability approach to valuation may lead to better appraisals of firm value.

Our findings also indicate that share-price growth forecasts generated by a valuation model based on dividend-paying-ability have greater informational content and therefore greater explanatory power, generally speaking, than the forecasts manufactured by a valuation model based on actual dividends, regarding movements in share price performance. In our controlled experiment the only source of difference is in informational content and therefore, explanatory power, is the use of a precise dividend-paying-ability measure versus the use of actual dividends in the valuation model.

The implication is that modelling dividend-paying-ability in stock valuation implicitly captures one or more factors influencing firm value that modelling dividends does not, and thus may lead to more accurate appraisals of firm value. In our study modelling, dividend-paying-ability, when compared to modelling dividends in stock valuation, led to more accurate appraisals of firm value in a majority of cases.

## APPENDIX

**Deriving $E(R_i)$ from the CAPM:**

The Capital Asset Pricing Model states that in equilibrium, an individual security's expected return is a linear function of it covariance of return with the market portfolio. This relationship is depicted in ex-ante form by the equation:

$$E(R_i) = R_f + B_i[E(R_m) - R_f] \qquad \text{EQ 8}$$

A firm's expected return, $E(R_i)$, is calculated via the CAPM in the following manner:

First, we generate a characteristic line to manufacture a conventional (traditional) estimate a firm's index of systematic risk (beta), $B_{Ti}$. We regress actual, monthly security returns, $R_{i,t}$ , (thirty-day geometric mean) against actual, monthly market returns, $R_{m,t}$, (thirty-day geometric mean) over the 60-month period prior to a forecast horizon. This regression in equation form is:

$$R_{i,t} = B_{Ti} (R_{m,t}) \qquad \text{EQ 9}$$

The monthly market return, $R_{m,t}$, is a value-weighted measure of the returns of all stocks on the Center for Research of Security Prices (CRSP) tape, a relatively broad measure of the market portfolio. All returns (firm and market) include both dividends and price changes.

Once we estimate a firm's traditional beta ($B_{Ti}$), we then combine it with the dispersion (standard-deviation) of analysts' earnings forecasts to form a more reliable and useful measure of a firm's ex ante systematic risk, $B_{Ni}$, by implementing the Carvell and Strebel (1984) method:

$B_{Ni} = (B_{Ti}^2 + B_{Ei}^2)^{0.5}$, where

$B_{Ti}$ = traditional or conventional beta estimated from a characteristic line based on historical information (as shown in equation 9);

$B_{Ei} = \sigma_{im}(\sigma_a/\sigma_m)$;

$\sigma_{im}$ = historical correlation coefficient between the return of security i and the return of the market portfolio;

$\sigma_a$ = standard deviation in analysts' forecasts;

$\sigma_m$ = historical standard deviation in the return of the market portfolio;

$\sigma_i$ = historical standard deviation in the return of security i.

$\sigma_{im}$, $\sigma_i$, and $\sigma_m$ values are obtained from the conventional beta ($B_T$) regressions.

$\sigma_a$ is obtained from the IBES data source.

We then insert this forward-looking proxy of ex ante systematic risk, $B_{Ni}$, into equation 8 (in place of $B_i$) to solve for the firm's expected rate of return, $E(R_i)$. In equation 8 the risk-free rate, $R_f$, is taken as the yield-to-maturity on a five-year U.S. government security prevailing at the beginning of a forecast horizon. The data source is Moody's Municipal and Government Manual. The mean market return, $E(R_m)$, is estimated as the average of the monthly market returns over the 60-month period prior to a forecast horizon. This measure is a value-weighted index of all stocks on the CRSP tape.[15]

## REFERENCES

[1] Abdel-Khalic, A. and T.F. Keller, 1979, Earnings or cash flows: an experiment on functional fixation and the valuation of the firm, Studies in Accounting Research 16.

[2] Brown, P., G. Foster and E. Noreen, 1985, Security analyst multi-year earnings forecasts and the capital market, Studies in Accounting Research 21.

[3] Chang, L. and K. Most, 1980, Financial statement and investment decisions, Manuscript, (Florida International University, Miami).

[4] Clayman, M.R. and R.A. Schwartz, 1994, Falling in love again - analysts' estimates and reality, Financial Analysts' Journal 50, 5, 66-68.

[5] Gordon, M., 1959, Dividends, earnings and stock prices, Review of Economics and Statistics, May, 96-105.

[6] _________. , 1962, The investment, financing and valuation of the corporation (Irwin, Homewood, ILL.).

[7] Jacques, W. and D. Rie, 1994, Valuation factors across countries, in: The Handbook of Corporate Earnings Analysis (Probus Publishing).

[8] Lintner, J., 1965, The valuation of risk assets and the selection of risky investments in stock portfolios and capital budgets, Review of Economics and Statistics 47, 13-37.

[9] MacDonald, R. and D. Power, 1995, Stock prices, dividends, and retention: Long-run relationships and short-run dynamics, Journal of Empirical Finance 2, 2, 135-151.

[10] Malkiel, B., 1970, The valuation of public utility equities, The Bell Journal of Economics and Management Science, Spring, 143-160.

[11] _________. and J. Cragg, 1970, Expectations and the structure of share prices, American Economic Review 60, 601-617.

[12] Markowitz, H., 1959, Portfolio selection: Efficient diversification of investments (John Wiley and Sons, New York).

[13] Michaud, R. and P. Davis, 1982, Valuation model bias and the scale structure of dividend discount returns, Journal of Finance 37, 1, 562-573.

[14] Newey, W. and K. West, 1987, A simple positive semi-definite, heteroskedasticity and autocorrelation consistent covariance matrix, Econometrica 55, 703-708.

[15] Rozeff, M.S., 1983, Predicting long-term earnings growth, Journal of Forecasting 2, 425-435.

[16] Sharpe, W.F., 1964, Capital asset prices: A theory of market equilibrium under conditions of risk, Journal of Finance 19, 425-442.

[17] Sorensen, E. and D. Williamson, 1985, Some evidence on the value of dividend discount models, Financial Analysts Journal 41, 6, 60-69.

[18] Vander Wiede, J. and W. Carleton, 1988, Investor growth expectations: Analysts vs. history, Journal Portfolio Management, Spring, 78-82.

[19] White, H.,1980, A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity, Econometrica 48, 817-838.

[20] Williams, J.B., 1938, The theory of investment value (Harvard University Press, Cambridge, Massachusets).