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DETERMINANTS OF THE EQUITY RATE OF RETURN: A CROSS SECTIONAL ANALYSIS

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The purpose of this study is to examine empirically the extent to which changes in the equity rate of return across Greek companies can be explained by changes in those variables suggested by financial theories. Although there are some published empirical studies in a number of countries to the best of the present author's knowledge no published study has used Greek company data. The paper is divided into four sections. The first section briefly explains the theoretical constructs used to develop the economic model. The second is concerned with the statistical model and data while the third interprets the results found. The fourth and final section comments on the usefulness in general of empirical contributions.

Theoretical Constructs

The rate of return required by investors should be a function of the business and financial risks of a company. If one makes a number of simplifying assumptions then the rate of return expected from the company's stock should, in equilibrium, be equal to the rate of return required by the marginal shareholder.

Thus, within a static share valuation framework, the required rate of return (K) would be given by the following expression $K = \frac{\overline{eps}}{P}$ where $\overline{eps}$ is the expected annual constant and uniform earnings per share and **P** is

the current market price. Thus when computing K we would only have to obtain an estimate of eps since P is readily available. There is widespread agreement among financial analysts that K is an increasing function of a share's business and financial risks. Business risk includes the influences of all those variables associated with demand and supply conditions. Financial risk is the additional risk induced into earnings per share as a result of using debt capital to finance part of a company's assets.

Growth in earnings or dividends is a variable which should moderate shareholders demands for current income. As growth is not part of K we should expect a decreasing relationship between K and growth.

A company's liquid position represents its ability to service short term liabilities as they become due. Inability to meet these financial obligations may result in financial insolvency. We should, therefore, expect a decreasing relationship between K and liquidity.

Company size may affect K in as much as larger firms may be deemed to be less risky than smaller firms. This is attributable to the fact that larger firms are better suited for diversification and hence risk reduction. In addition larger firms may enjoy preferential financial treatment by the investing community. It would, therefore, appear that there is a decreasing relationship between K and size.

The above discussion suggests that K should be functionally related to Leverage (Lev), Growth (Gr), Liquidity (Liq), Business Risk (Br) and Size (Sz). One could express the above as follows.

$$\mathbf{K} = F\ (Lev, Gr, Liq, Br, Sz) \qquad \textbf{(1)}$$

Statistical specification

The paper hypotheses that K is linearly related to the variables mentioned above performs regression analysis using the following equation.

$$\frac{eps}{P} = a + b1\ Lev + b2Gr + b3Liq + b4Br + b5LogSz + U \qquad (2)$$

where eps represent earning per share for each company in the sample and P is the average of the low and high share price recorded in a given year. A, b_1 .. . b5 are the intercept the regression coefficients respectively, and U is the random component corporating all other factors not included in equation (2).

The independent variables employed

Leverage. This variable has been calculated by dividing the book value of the long term debt of each company by its net worth (defined as equity plus reserves). One may have used market values in computing leverage. It should be noted, however, that a variable of that nature may have biased the results in that both the dependent — and one of the independent variables (Leverage) would have included share market prices in the calculations.

Growth is net assets. This variable was calculated from the following formula :

$$\text{Growth} = \frac{\text{net assets (cross section year)} - \text{net assets (cross section year} - 1)}{\text{net assets in cross section year} - 1.}$$

Liquidity. This is the ratio of current assets to current liabilities.

Business Risk. This variable represents the coefficient of variation in gross profits (profits before interest and taxation) for each company. The coefficient of variation in profits is a ratio, the numerator of which is the standard deviation of profits over the past five years (including the cross section year) ; and its denominator is the arithmetic average of the profits over the past five years. One could have used an absolute measure of risk, say standard deviation. However, it being an absolute measure of risk would fail to discriminate between companies with significantly different profits. In addition standard deviation just like size may be responsible for heteroscedastic effects.

S|ize. In line with previous work the size variable was computed by using the book value of total assets of each firm. Furthermore, in an effort to avoid the possible effects of heteroscedasticity the total assets figure for each firm was converted into its (to the base 10) logarithmic value equivalent.

Data used

One would prefer to run regression on homogenous groups of firms. Given the smallness of the Greek market in general, such an approach would have meant that one was left with virtually no degrees of freedom for a number of industries. For this reason it was decided to pool all companies (except banks) quoted on the

Athens Stock Exchange. In order to obtain the required figures for standard deviations all companies were observed from 1972 to 1976 (inclusive). Regression analysis was performed for each of the following cross-section years 1976, 77, 78, 79, 80. All data were extracted from copies of the yearbooks issued by the Athens Stock Exchange and are expressed in drachmas. Companies that hap ceased to be members of the Athens Stock exchange from 1972 to 1980 were excluded from further consideration.

The results are shown in table 1 which contains the following information.

1. The constant term of each equation.
2. The regression coefficients.
3. The standard errors of estimate (the figures in brackets).
4. t-values, immediately below the standard error of estimate to which they correspond.
5. The adjusted coefficients of determination.
6. The Durbin—Watson test for positive (d*) and negative autocollection (4 - d*).
7. The F - values for the overall significance of the regression equation.
8. The critical values of the Durbin - Watson, t and F statistics.

Interpretation of the statistical results

The regression equation as a whole is statistically significant in 3 years and the explanatory power of the equation in the last two years could be said to be fairly high considering the cross - sectional nature of our data. None of the ceoefficients appears to be significant in all cross - sections. It should be mentioned that multicollinearity is partly responsible for the fact that the standard errors of the parameters are large.

Leverage has the expected sign in 4 years but it is significant in only one year. Growth appears to be an important variable but has the expected sign in one year only. Liquidity appears to be insignificant in its influence on the equity rate of return.

The usefulness of empirical Cost of Capital models

One could criticise the present paper (and a large number of other papers)[1,2,3,4,5]. because of its failure to experiment with a larger number of other varia-

bles.-One could also argue that the poor results were due to the inefficiency of the Greek stockmarket and probably due to the fact that investors do not use fundamental methods when buying/selling shares. This paper takes the view that the main problem is our inability to obtain good estimates of the variables advanced by cost of capital/valuation theories [6]. To see the significance of this let us remind ourselves that valuation theory assumes that all investors have identical exprectations of the annual expected earnings per share as well as the riskiness associated with each share [7]. Observed share prices are then the result of discounting eps, the constant and uniform annual return, by the rate of return required by the marginal investor. Thus empirically we can calculate K, if and only if, we can observe the earnings variable used by the market. In cross sectional statistical investigations though, researchers as a rule use the reported earnings per share for a given year or some average figure at times statistically normalised (which are almost equally unsatisfactory).

One should emphasise that if one removes the assumption of homogeneous expectations it would then be very difficult (if not impossible) empirically to test cost of capital models[8]. Identical comments could be made on all the other variables included in the regression equation. If one were to accept that investors, even institutional investors, when investing do not wholly use the rational methods expected of them by valuation theory, then one should be prepared to accept that calculation of the cost of capital through a valuation (or portfolio framework) framework would be of limited usefulness to companies. In addition it should be stated that in spite of the very large number of empirical papers on valuation and cost of capital models we have not really been able to capture the importance of the variables that effect values or cost of capital variables.

References

1. M. Davemport, Leverage and the cost of capital : some tests using British data, Economica, May 1971.

2. A. Rubickek, R. Higgens and M. Kinsman, The effect of Leverage on the cost of equity capital of electric utility firms, The Journal of Finance, May 1973.

3. F. Welton, A test of cost of capital propositions, The Southern Economic Journal, October 1963.

4. D. Winn, On the relations between rates of return, risk and market structure, Quarterly Journal of Economics, February 1977.

5. R. Wippern, Financial structuré and the value of the firm, The Journal of Finance, December 1966.

6. G. Karathanassis, Valuation models : How useful have they been ; forthcoming Accounting and Business Research, Autumn 1983.

7. H. Levy and M. Sarnat, Capital Investment and Financial Decisions, Prentice Hall, 2nd edition.
8. G. Peirson and R. Bird, Business Finance, McGraw Hill, 3rd edition.