RISK ASSESSMENT AND ACCOUNTING RATIOS

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Introduction

In recent years there have been some attempts to address the capacity of accounting information to explain a variety of phenomena that are characteristic of the corporate sector. There are for example, a number of studies which have focused on the ability of accounting information to explain the failure and acquisition phenomena.(1) The aim of this paper is to extend on this theme by examining the usefulness of accounting information in risk assessment.

The term 'risk' is defined in this paper as the non-diversifiable portion of the total risk of a security; it is generally referred to in the literature as the 'systematic risk' or, 'the beta' of a security. We focus on systematic risk because a lot has been written in the investment literature about its role in the pricing of securities and in portfolio performance measurement. The main implications of this literature for practitioners is the need to change the traditional emphasis of security analysis from the evaluation of individual securities to the 'portfolio approach'.(2)

There is nevertheless, one aspect which is common to both security analysis and the 'portfolio approach'. Namely, both approaches are 'forward looking' in that their main concern is with the prediction of the performance of individual securities and portfolios. The portfolio approach, for example, requires the prediction of the betas of individual securities when choosing a portfolio with a specified level of risk, or in portfolio revision. One therefore needs to derive a method for predicting betas in order to assist in this task.

The concern of this paper will be limited to the development and evaluation of a model that utilises only accounting information to predict betas.(3) Fundamental to the pursuit of this objective is the belief that there is a relationship between the financial characteristics of a firm and its beta, and that if one can identify this relationship, it can be used to explain and predict betas.

The purpose of focusing on the development and evaluation of an accounting-based model to predict beta, rather than on models that use stock market data, extends the scope and usefulness of the model beyond the bounds of portfolio management. For example, the model would allow, (i) an evaluation of changes in a firm's financing and investment policies on its beta; (ii) an assessment of the systematic risk of a private, or public unlisted firm so as to permit comparisons to be made with the systematic risk of listed firms operating in a similar industry, and (iii) an estimation of the flotation price for a private company considering public listing.

In the following sections of the paper, the sample selected, the data, and the method of developing and evaluating the accounting-based model for beta prediction are outlined.

The Experiment

The sample and data requirements of the study were selected from the A.C.D. Maxi File.(4) The sample of 140 firms were randomly selected listed Industrials, with June 30th balance dates,(5) and which were in continuous existence for the period, 1967 to 1976. The accounting information selected for the sample reflected measures of leverage, solvency, profitability, payout, interest coverage, growth and volatility in earnings, and size. These measures were computed in ratio form and are listed in Table (1).

Table (1): The List of Accounting Ratios

(V1)	:	Debt/Equity
(V2)	:	Debt/Total Assets
(V3)	:	Debt/Market Value
(V4)	:	Liquid Ratio
(V5)	:	Current Ratio
(V6)	:	EBIT/Total Assets
(V7)	:	Return to Shareholders' Funds
(V8)	:	Payout Ratio
(V9)	:	Interest Cover
(V10)	:	EPS Growth
(V11)	:	Log. Asset Size

The experimental work for the study was conducted in four stages. First, for all of the sample companies, the ratios listed in Table (1) were averaged over two five year periods, 1967 to 1971 (period 1); 1972 to 1976 (period 2), and the ten year period 1967 to 1976 (period 3). In addition, the sample companies' betas were estimated for the same three periods. Second, a statistical test of association (Spearman's rank correlation) was employed to examine the relationships between the ratio averages and the beta estimates. Third, a beta prediction model was developed[6] using the accounting ratios and betas of period 1. Finally, the predictive accuracy of the model was evaluated in period 2.

The Results

Table (2) summarises the results of the tests of association between the sample companies' betas and their accounting ratios for the ten year period 1967 to 1976.[7] The table demonstrates that there is a positive relationship between beta and the capital structure ratios (Debt/Equity; Debt/Total Assets; Debt/Market Value). In addition, there is a positive relationship between beta and the profitability ratios (EBIT/Total Assets, and Return on Shareholders Funds) and a positive relationship between beta and the growth in E.P.S. Finally, there is a negative relationship between beta and the variables, liquid ratio, current ratio, payout ratio and interest coverage. An unexpected result was the positive relationship between size and beta, as this suggests that large companies are riskier than small companies.[8]

Table (2): The Association Between Systematic Risk and the Accounting Ratios for the Period 1967-76.

VARIABLES	RANK CORRELATION
Debt/Equity	0.19
Debt/Total Assets	0.17
Debt/Market Value	0.02
Liquid Ratio	−0.09
Current Ratio	−0.03
E.B.I.T./Total Assets	0.09
Return on Shareholders' Funds	0.23
Payout Ratio	−0.10
Interest Cover	−0.10
E.P.S. Growth	0.27
Log. Asset Size	0.45

The Model

The model to explain beta was developed in period 1 and is given by,

$$\beta = +0.7136 + 0.0009\,(V1) + 0.0051\,(V2) + 0.0237\,(V7) - 0.0023\,(V8) + 0.0050\,(V10)$$

where the terms, (V1), (V2), (V7), (V8) and (V10) are defined in Table (1) and measured in the following manner,

$$(V1) = \frac{\text{Short Term and Long Term Financial Debt (incl. Bank Overdraft)}}{\text{Ordinary Shareholders Funds} - \text{Intangibles}}$$

$$(V2) = \frac{\text{Short Term and Long Term Financial Debt (incl. Bank Overdraft)}}{\text{Total Assets (incl. Intangibles)}}$$

$$(V7) = \frac{\text{Net Profit} - \text{Preference Dividend}}{\text{Ordinary Shareholders' Funds}}$$

$$(V8) = \frac{\text{Ordinary Dividends}}{\text{Net Profit} - \text{Preference Dividend}}$$

(V10) = The slope of the logarithmic trend line in a five year EPS series expressed as a percentage.

The model[9] is only applicable to Industrial companies, and accordingly, should not be applied to the data of companies involved in mining, banking, or finance and investment.

As an illustration of how the model may be used consider the following example. The 1977 Annual report of Arnotts Limited which has been summarised by The Statex Investment Service, provides the following data:[10]

(V1)	= 27.16%
(V2)	= 11.29%
(V7)	= 14.39%
(V8)	= 54.92%
(V10)	= 7.8%

The above ratios are substituted into the model to arrive at an estimate of Arnott's beta, viz.,

$$\beta \text{ (Arnott)} = 0.7136 + 0.0009(27.16) + 0.0051(11.29) + 0.0237(14.39) - 0.0023(54.92) + 0.0050(7.8)$$

$$\beta = 1.04$$

Arnott's beta based on market price information for the five year period ending June 30th, 1978 as published by The Statex Investment Service is 1.18.

The performance of the model was evaluated in period 2 with the sample of 140 firms using the following criteria, (i) the average difference between the actual and predicted beta values (mean error); (ii) the average of the square of the differences between the actual and predicted beta values (mean square error), and (iii) the average absolute value of the differences between the actual and predicted beta values (mean absolute error). These error measures are summarised in Table (3).

Table (3): Summary of Forecast Errors Between the Actual and Predicted Betas in Period 2 for the Sample

mean error	=	0.0296
mean square error	=	0.1833
mean absolute error	=	0.3234

Conclusion

The beta prediction model developed as a result of this study can be of assistance in a number of areas. First, it enables the investment analyst who adopts the 'portfolio' approach to evaluate the consequences of new financial information on the beta's of his individual securities and portfolio. Accordingly, the model provides for a relatively simple method of portfolio risk evaluation and revision. Second, management can use the model to evaluate the consequences of anticipated changes in their firm's capital structure, profitability, dividend payout and growth on their firm's beta. Third, given estimates of the return on riskless government securities, the expected return on the securities market, and a firm's predicted beta, one can utilise the capital asset pricing model to determine the expected return of a firm. This expected return is an estimate of a firm's cost of equity for capital budgeting purposes.[11] Fourth, the model can be used to estimate the systematic risk of a private, or public unlisted firm to enable comparisons to be made with the systematic risk of listed firms operating in a similar industry. Finally, the model can be used to estimate the flotation price for a private company considering public listing.

Footnotes

(1) For example, refer to Castagna and Matolcsy [3,4].

(2) For a review of the 'portfolio approach' refer to Ball [1].

(3) For an explanation of betas and their measurement refer to the Sydney Stock Exchange [7].

(4) The initial development of this file is explained in Castagna [2].

(5) This selection criterion was to ensure contemporaneity in the data.

(6) The model was developed using a stepwise regression technique. Stepwise Regression selects the independent variables to include in a regression model. The selection criterion for the inclusion of variables in the regression model is based on their contribution toward the maximisation of the co-efficient of determination.

(7) For a more detailed discussion on the justification for the ratios selected and the results of the association tests for period 1 and period 2 refer to, Castagna and Matolcsy [5].

(8) An explanation of the likely economic and statistical factors that contribute to this result are in Castagna and Matolcsy [5].

(9) The variable, asset size was 'forced out' of the stepwise estimation procedure because of the unexpected relationship between size and systematic risk.

(10) The Statex Investment Service refers to the numerator of (V1) as 'total non-trading debt'; the numerator of (V7) is referred to as 'earned for ordinary' by Statex. Finally, Statex's 2 year growth rate for Arnotts was used in this example to approximate (V10).

(11) This approach has been used to support the price increases of at least 3 companies in recent submissions to the Prices Justification Tribunal. For an explanation of the Capital Asset Pricing Model refer to Sharpe [6], Chapter 6.