

Assessing Systematic Risk through Accounting Information: Evidence from the Colombo Stock Exchange

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ABSTRACT

This study tests whether accounting information significantly influences systematic risk. To operationalization the relationship between the accounting information and systematic risk, a panel data analysis is conducted on stock analysis with a portfolio of higher beta stocks, moderate beta stocks, and lower beta stocks as well as overall stocks among the selected 154 listed companies in the Colombo Stock Exchange (CSE). Within this application, the present study seeks to present empirical evidence on the relationship between accounting information and systematic risk in the Colombo Stock Market. The study found that the accounting variables significantly influence systematic risk. While accruals were not significant in influencing systematic risk, moreover, the study suggests accounting variables are well explained in the systematic risk and recommends using accounting-based risk factors other than market-based risk factor models in the Sri Lankan context.

Keywords: Accounting information, Capital market, Market models, Systematic risk.

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1. INTRODUCTION

Since 1952, the development of capital market theories and the controversy over portfolio theories and market pricing models are still researchable. The main aspect of a capital market theory is security analysis. Single-factor models, as well as multi-factor models, are available to analyze the risk and return relationship of a security. Fama (1970) stated that assets replicate all information in the availability of an efficient market, and semi-strong efficient markets replicate only public information such as financial facts. Asset pricing models make evidence that greater risks earn a higher return (Sharpe, 1964). In the current era, the Capital Asset Pricing Model (CAPM), Fama and French Multi-Factor Models (1992, 1993), and Arbitrage Pricing (Ross, 1976) Models are used for the valuation of risky assets. Systematic risk denotes the fluctuations of a firm's price returns that cannot be diversified away. If the total risk of a security is the sum of the non-diversifiable risk and diversifiable risk, then the stakeholders efficiently diversify their nonsystematic risk, and then the systematic risk is the only component to assess the total risk of a security.

Thus, CAPM is the popular and vastly used theory to identify systematic risks of security. Though, there is a

controversy that CAPM does not prove any information regarding systematic risk or beta (Haken & Kaya, 2012). Also, the prior studies that examined the same relationship results were then argued to be amended for financial disclosure regulations in suggesting ensuring risk relativity for the financial information, thus assisting investors in asset allocation decisions (Brimble & Hodgson, 2007). To such arguments, the fact that empirical analysis of asset pricing models fails to predict return. Recent literature is evident that the applicability of alternative multifactor models by Fama and French (1993), Carhart (1997), Pastor and Stambaugh (2003), Fama and French (2015), and the Q theory by Hou *et al.* (2015) and there is a controversy where the results of the recent studies which rejects these alternative factor models, for an example Daniel *et al.* (2000) has rejected Fama and French three-factor model in Tokyo Stock Exchange in Japan. Fama and French (2015) study replicated a five-factor model that performed better than the three-factor model of Fama and French (1993). Further, the five-factor model is only successful in North America and Europe only and the model is weak perform in Japan and Asia Pacific (Fama & French, 2017). Under the development of capital market theories, the CAPM



(Sharpe, 1964; Lintner, 1965) is a vastly used theory to identify the systematic risk of a security, and also there are several other models, such as the Fama and French Factor Models (1992, 1993) and the Arbitrage Pricing Model (Ross, 1976). But these models are based on several assumptions, which do not represent reality and lead to mismatches with the actual scenario of an economy. Fama and French (2017) mentioned that “we are less confident that asset pricing models like the five-factor model can provide meaningful estimates of the cost of equity capital”. They further mention that “in short, estimates of the cost of equity capital from asset pricing models are quite imprecise and so arguably useless”.

Due to these unrealistic assumptions and the evidence of unrealistic results of the application of market models on frontier stock markets like Sri Lanka, we need an alternative model to determine the systematic risk. There is also a trend in developed countries to develop a model using accounting information instead of other popular market-based models (Majumder, 2006; Brimble & Hodgson, 2007). Brimble and Hodgson (2007) stated that there is a 67% association between accounting variables and systematic risk. So, having an alternative to measuring systematic risk is a way of solving problems in the context of the emerging market. Majumder's (2006) study also suggested a substitute method for asset pricing.

Though, substitute method to determine systematic risk is more desirable concerning Colombo Stock Exchange data. Due to the lack of empirical investigations on these Accounting Beta Models (systematic risk models that use accounting information), this study investigates the rationality of the accounting information in determining systematic risk in the Sri Lankan context.

2. LITERATURE REVIEW

Even though there is little research on the theoretical explanation, much empirical literature has discovered the association between accounting variables and beta. However, investors closely follow corporate decisions as managerial decisions have an effect on a firm's risk, and the results of these decisions are reflected in the firm's corporate report.

One of the first academic studies to examine if financial information in terms of accounting data is impounded to security prices is Ball and Brown (1968). Then, they found short-term inefficiencies and post-earnings announcement drifts. According to Berkowitz (1998), found to earnings variability and earnings beta were not significant. Brimble (2003) initiate that operating leverage and firm size were significant factors in explaining systematic risk for Australian firms. Brimble (2003) also found that accounting risk models outperform other forecasting models. Kongahawatte and Nimal (2015) indicate that apart from the semiannual holding period, macroeconomic variables subsume size and BM effects in explaining variation in stock returns, which showed insignificant beta. Randeniya and Wijerathna (2012) identified that a single factor alone is not sufficient to model the dynamics of the market, and the three-factor model works better than CAPM in Sri Lanka. Abeysekara and Nimal (2016) found that the four-factor

model performs better than the CAPM and the three-factor model. According to these studies, it is evident that there is mixed evidence on the suitability of the single factor model and multifactor models in the application of the Sri Lankan context.

Thus, it is apparent that the research findings of various studies are incorporated with a wide range of accounting variables. Further, this study attempts to fill the performance gap; the said models are contradictory in providing information to all their users. Hence, in real-world scenarios, there is controversy on the application of single-factor market models and multi-factor market models while pointing out the efficiency level of the models. As a theoretical gap, the study aims to provide an accounting model that includes novel accounting variables that have not been encountered previously for assessing systematic risk. Though this study focuses on applying the model in the context of Sri Lanka while filling the empirical gap. Further, this study seeks to conduct a fresh study of the relationship between accounting variables and systematic risk with evidence of Sri Lankan data.

3. METHODOLOGY

In line with the problem identified in this study, financial statements and share price data were obtained for the period of 2014/2015 to 2018/2019. The Colombo Stock Exchange in Sri Lanka has 289 companies representing 20 GICS industry groups, and 154 non-financial firms were selected for the study as the sample, while financial and consumer service firms were not considered for the study as high leverage is normal for the financial firms probably does not have the same significance as for non-financial firms. Consumer services firms were also excluded to make the dataset more homogeneous for the study.

3.1. Conceptual Framework

Based on the literature, the accounting information has an impact on systematic risk. It was grounded that the previous researchers, such as Ball and Brown (1968), Berkowitz (1998), and Brimble (2003), As well as Portella and da Rocha (2006), also researched the risk relevance of accounting data on market beta in developing economy. Most of the empirical literature has been built on different accounting models to analyze systematic risk for emerging countries. However, in this study, the researcher aims to show the ability to account for information using novel accounting variables in the Sri Lankan context where the frontier markets are not being analyzed, and there is no model using accounting variables.

The conceptual framework (Fig. 1) illustrates the link between the above theoretical explanations that are investigated by this study. The variables considered important in affecting systematic risk in the conceptual framework are shown in Fig. 1.

3.2. Selection of Variables

The dependent variable in the analysis is the market beta estimated for each company using Sharpe's market model (1964), where R_i is the return for firm i , R_m is the return of the market. Market return would be measured using the

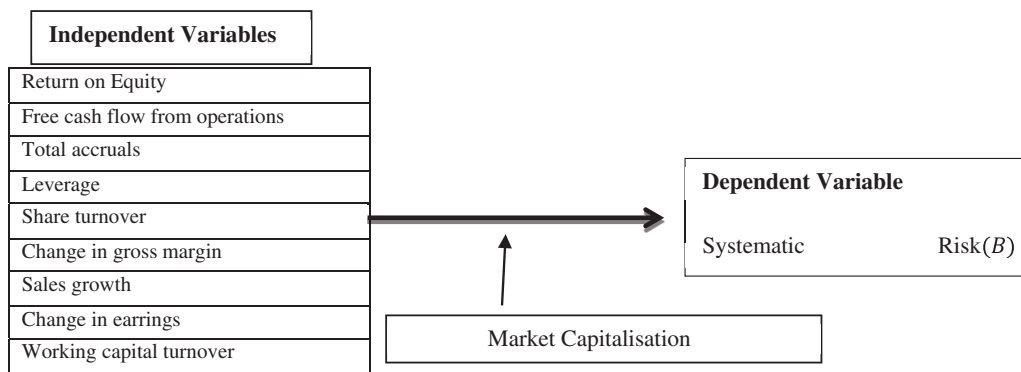


Fig. 1. Conceptual framework. Source: Developed by the researcher.

All Share Price Index in the Colombo Stock Exchange. Therefore, systematic risk for firms would be obtained by following the equation:

$$\beta_i = \frac{\text{Covariance}(R_i - R_m)}{\text{Variance } R_m}$$

where B_i is the systematic risk for firm i .

The selection of independent variables is selected based on variables that are successfully used in previous studies, frequently mentioned in the literature, and variables that are associated with accounting ratios.

3.3. Panel Data

In relation to this study, the multifactor model is estimated through traditional panel estimation techniques pooled ordinary least square, random effect model and fixed effect model following the best-fitted model using Pre estimation techniques of LM test and Hausman test.

Then, the fitted method will be used on the following regression equation to test the practical usefulness of accounting variables in assessing and predicting systematic risk as an accounting model in the context of Sri Lanka:

$$\begin{aligned} \beta_{it} = & \alpha_0 + \alpha_1 ROE_{it} + \alpha_2 FCFE_{it} + \alpha_3 ACC_{it} + \alpha_4 LEV_{it} \\ & + \alpha_5 SHTO_{it} + \alpha_6 CHGM_{it} + \alpha_7 SALEGR_{it} + \alpha_8 CHER_{it} \\ & + \alpha_9 WCTO_{it} + \alpha_{10} MKTCAP_{it} + e_{it} \end{aligned}$$

where α = Intercept, β = Systematic risk, ROE = Return on Equity, $FCFE$ = Free cash flow to Equity, ACC = Total accruals, LEV = Leverage, $SHTO$ = Share turnover, $CHGM$ = Change in gross margin, $SALEGR$ = Sales growth, $CHER$ = Change in earnings, $WCTO$ = Working capital turnover, $MKTCAP$ = Market Capitalisation, e = Error Term.

4. ANALYSIS AND DISCUSSION

4.1. Panel Data Regression for Single Stock Analysis

The performed results indicate a non-significant P value; thus, the test has rejected the alternative hypothesis of the fixed effect model is appropriate while accepting the null hypothesis of the random effects model is appropriate. Hence, the researcher selected the random effect model as the most fitted model to represent the data. The results of the panel data for the overall model are presented in Table I.

4.2. Panel Data Regression Analysis on Overall Model

Discussing the panel data regression refers to Table I random effect model on overall results indicates a positive significant relationship between systematic risk (beta) with free cash flow from equity and change in gross margin at 90% significance level because the P values of the variables respectively are 0.09 and 0.08. While other variables do not significant for systematic risk. Also, the model results of accrual, leverage and market capitalization indicate a negative relationship with Systematic Risk (beta) as the coefficient values of these variables correspondently are -0.103 , -0.107 , and -0.130 .

The adjusted R-squared is 19.5% explains the percentage of variation described by only the independent variables that affect the dependent variable. That measure the variation explained by only the significant variables on the dependent variable. The F-statistic is to compare the joint effect of all the variables together on the dependent variable without concern the significance level of the variables. Thus, F statistics of the results probability shows a 100% significance level. It decides whether the overall results are significant.

4.3. Panel Data Regression Beta Sorted Models

According to the article of Thilakarathne and Jayasinghe (2014), the overall sample of this study is classified based on the beta values. Then, the sample of the study is selected based on categorizing companies as high-risk, moderate-risk risk and low-risk companies and performing a specific regression model for each portfolio. The portfolio for higher beta stocks comprises the companies with the highest beta value ($\beta > 0.5$), the portfolio for lower beta stocks contains the companies with the lowest beta value ($\beta < -0.5$), and the portfolio for moderate beta stocks includes the companies which are having moderate beta values (beta closer to 1).

Discussing the panel data regression refers to Table I, the random effect model for higher beta stocks, moderate beta stocks, and lower Beta stocks results indicates a positive significant relationship between systematic risk (beta) with return on equity and market capitalization for higher beta stocks, with change in gross margin, sales growth for moderate beta stocks and with return on equity, free cash flow from equity, change in gross margin and working capital turnover for lower beta stocks at 95% significance level.

TABLE I: RANDOM EFFECT MODELS FOR BETA SORTED PORTFOLIOS

DV: Beta	Portfolio for higher beta stocks	Portfolio for moderate beta stocks	Portfolio for lower beta stocks	Overall model
Constant	0.1694*** (3.4176)	-0.0066 (-1.3099)	7.8676** (2.1631)	0.4149 (0.4252)
Beta(-1)	0.9001*** (27.979)	1.0054*** (382.69)	1.6159*** (18.1812)	0.2883** (2.2620)
ROE	0.0116** (2.0121)	0.0059 (1.5924)	5.3629** (2.5259)	0.7794 (0.4950)
FCFE	-0.0031 (-0.0418)	0.0001 (0.2184)	-0.5895** (-2.6068)	0.1405* (1.6975)
ACC¹	0.0005 (0.8097)	-0.0003 (-0.7984)	-	-0.1034 (-1.5908)
LEV	-0.0010 (-1.1779)	-	0.0214 (0.0880)	-0.1069 (-1.3806)
SHTO	-0.0010 (-1.3940)	0.0001 (0.3508)	-0.2780 (-1.5944)	0.0529 (0.1171)
CHGM	0.0050 (0.5663)	0.0000*** (3.1128)	-0.2775** (-2.1999)	0.0073* (1.7401)
SALEGR	-0.0023 * (-1.7574)	-0.0009 ** (-2.3925)	0.1271 (1.2829)	0.0003 (0.2176)
CHER	-0.0010 (-1.6086)	-0.0001 (-0.5115)	-0.1782 (-2.0293)	0.0030 * (0.3227)
WCTO	0.0020 * (1.8000)	-0.0000 (-1.5308)	0.0068 *** (3.0243)	0.0001 (0.8614)
LMKTCAP	-0.0049 *** (-3.6028)	0.0009 (1.6690)	-0.1571 (-0.3360)	-0.1296 (-1.0666)
Adjusted R²	99.3%	99.98%	94.4%	19.46%
F stat	979.45***	18942.18***	41.75***	4.56***
No of observations	508	182	80	770

Source: Constructed by the researcher using reviews 11.0.

Note: Beta(-1) = systematic risk in one period of lag, ROE = return on equity, FCFE = free cash flow form equity, ACC = accruals, LEV = leverage, SHTO = share turnover, CHGM = change in gross margin, SALEGR = sales growth, CHER = change in earnings, WCTO = working capital turnover, MKTCAP = market capitalization. *Statistically significant at 10% level, **Statistically significant at 5% level, ***Statistically Significant at 1% level, T statistics are in parenthesis.

According to the findings, the study hypothesis could be discussed as the alternative hypothesis on accounting variables significantly influencing systematic risk is accepted. The results confirm the findings by [Ball and Brown \(1969\)](#), [Beaver et al. \(1970\)](#), [Brimble and Hodgson \(2007\)](#), and [Mandelker and Rhee \(1984\)](#). Thus, the present study's selected accounting variables' overall model R² value is similar to the previous studies. While the present study had strong R² values when compared to beta-sorted portfolios.

This study positively confirms and goes against the findings of [St. Pierre and Bahri \(2006\)](#). The alternative hypothesis on free cash flow from equity is accepted as the results showed that the cash flow from equity is significant in the overall model, on the portfolio of lower beta stocks and portfolio big as a new variable which previous studies have not concerned the variable and concerned only the variable of cash flow from operations. The Accrual variable, which is selected based on [Piotroski \(2000\)](#), is not found to be significant in influencing systematic risk. Then, the null hypothesis on accruals is accepted, while the alternative is rejected. The present study results confirm that leverage is significant with systematic risk on portfolio medium and portfolio big and in parallel, while the alternative hypothesis accepted on leverage. Also, [Hamada](#)

(1971) concluded that there is an influence of the financial leveraging of the firms on systematic risk, as well as [Bowman \(1979\)](#). The study results showed that the variable share turnover explains systematic risk on portfolio small and accepted the alternative hypothesis on share turnover. The accounting variable sale growth is significantly influenced systematic risk on portfolio of higher beta stocks, portfolio of moderate beta stocks and portfolio of lower beta. [Brimble and Hodgson \(2007\)](#) also state that there is a strong association of growth variables. Thus, the alternative hypothesis is accepted. The Alternative hypothesis on change in gross margin is accepted, while the study on change in gross margin is significant with systematic risk on the overall model, portfolio of moderate beta stocks, portfolio of lower beta stocks, and portfolio small. [Ball and Brown \(1969\)](#) and [Beaver et al. \(1970\)](#) also state that types of profits explain the systematic risk. The study results confirm that change in earnings significantly influences systematic risk in portfolio of lower beta stocks, and portfolio medium. [Ball et al. \(1993\)](#) state that accounting earnings may be a proxy for market risk as it is positively associated with changes in risk and accepted alternative hypothesis on change in earnings. The study results showed that working capital turnover, which is a selected variable based on [Mohanram \(2005\)](#), significantly influences systematic risk in portfolio of higher beta stocks and portfolio

¹ For Lower Beta stocks the accrual variables is removed due to the higher collinear effects on the model.

of lower beta stocks. Thus, the alternative hypothesis on working capital turnover is accepted. Market capitalization as the control variable of this study also influences the systematic risk on portfolio of higher beta stocks and portfolio big. The study resulted in the acceptance of the alternative hypothesis on market capitalization. Therefore, this study represents the higher explanatory power of the accounting-based model on influencing systematic risk.

Finally, it could be stated that if diversification opportunities are widely available to investors, systematic risk is the only risk for which they must be compensated (Chew, 2008). Therefore, accounting information is more precise to make investment decisions in the Sri Lankan context.

5. CONCLUSION

This study examines systematic risk from an accounting perspective. Initial research in this area (Beaver *et al.*, 1970) suggests that investors do react directly to the accounting data. However, it is worthwhile stating that accounting data impound the events that affect a security risk. In this sense, the study findings provide important insight into the utility of accounting data. Conferring to the results indicate that there is a strong association between the accounting variables and systematic risk with up to 99% model fitness when grouping firms that range among similar beta values. Moreover, the statistically significant accounting variables were found to be diverse among the higher beta portfolio, moderate beta portfolio, and lower beta portfolio.

Based on these findings, it is suggested that investors focus on accounting information. Thus, the study's accounting information will be useful for investors where investments in listed firms, thinly traded firms, and unlisted firms in Sri Lanka, as well as in a case of unavailability of efficient market models because such models could not be used for decision making and evaluation of a security risk and return relationship.

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