Association between Accounting Information and Systematic Risk of Manufacturing Industry in Bangladesh

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Abstract: This research delves into the associative link between accounting information and systematic risk, measured through βM. The investigation focuses on 71 manufacturing companies listed on the Dhaka Stock Exchange market from 2000 to 2020. The null hypothesis posits that accounting variables lack a noteworthy correlation with systematic risk (β). The study identifies systematic risk and eight accounting risk-related variables based on both theoretical and empirical foundations. Employing a stepwise regression with a backward elimination approach, the results reveal that, among the eight accounting variables, only four-Interest Coverage Ratio, Asset Size, Market to Book Value Ratio, and Dividend Payout Ratio-demonstrate a significant relationship. Notably, the study aligns the observed directions of the relationship between accounting variables and beta with the initial hypothesis. These findings contribute to investors' and managers' decision-making processes by highlighting the significance of these accounting variables, in conjunction with market beta, for assessing corporate risk.

Keywords: Systematic risk; accounting information; manufacturing industries; and DSE

Introduction

The decision-making process in investments holds paramount significance in financial management. Consequently, financial economists are dedicated to enhancing the modeling of financial markets to facilitate more informed investment decisions. Central to investment decision parameters is the concept of risk. The beta coefficient, β_M, which was introduced by Sharpe (1964) and Lintner (1965) as a key component of the Capital Asset Pricing Model (CAPM), is widely respected and serves as an important metric for evaluating risk. The Capital Asset Pricing Model (CAPM) asserts that risk-averse investors construct portfolios, with the only relevant risk being the systematic risk that is quantified by the systematic beta. Within the framework of the CAPM, beta represents the covariance between the return of a stock and the market portfolio, which is then standardized by the variance of the market portfolio. However, the CAPM itself does not offer any insights into the underlying factors that influence beta. Researchers have long been fascinated by understanding the economic factors that impact beta ever since the introduction of the CAPM. Since accounting data is generally believed to capture these underlying economic factors, the exploration of the relationship between beta and accounting variables has been a central focus for researchers since the work of Beaver et al. (1970).

Understanding the association between accounting variables and systematic risk, as evaluated through β_M, is of utmost importance for multiple reasons. To begin with, the volatility of market betas over time undermines their efficacy as dependable predictors of future risk. The identification of the relationship between accounting variables and market beta contributes to the enhancement of predictive models for future risk. Furthermore, our comprehension of risk determination remains incomplete without an understanding of the exogenous variables or non-price data embedded in stock prices and their fluctuations. By investigating the connection between accounting variables and market beta, we are able to uncover significant

non-price factors, thereby contributing to a more comprehensive understanding of risk. Lastly, if accounting variables can provide insights into market-determined risk measures, investors and managers have a viable alternative in accounting-based risk measures during periods of market instability or when market risk measures are not available. This highlights the practical significance of establishing a link between accounting variables and systematic risk in order to make informed decisions in various market conditions.

The existence of the relationship between sytematic risk and accounting information has been observed in previous studies such as Alessandra, et al. (2023), Xuejing, et al. (2019), Fitriasari, et al. (2017), Rasool, et al. (2018), Sadka. (2011), Yaqin, et al. (2022), Kachecha & Strydom (2011), Chei, et al. (2007), Nekrasov and Shroff (2009), Darush, et al. (2013), and Postnikova, E. (2016). Whereas some literature shows insignificant relationship between accounting information and systematic risk such as Ned, et al. (1980), Michael, et al. (2009), and Ahmed, and Belkaoui. (1978). Previous studies on this issue in both developed and developing markets have shown differences in the models employed, variables examined, findings obtained, and conclusions drawn. These variations cannot be universally applied as insights relevant to Bangladesh. Therefore, this study aims to investigate the association between accounting variables and the systematic risk of manufacturing firms listed on the Dhaka Stock Exchange (DSE) in Bangladesh.

Materials and Methods

This study was based only on secondary data wich has covered manufacturing companies listed on DSE for 2000 to 2020. Using Yaro Yamani's technique the derived sample size is ascertained through the employment of the aforementioned formula: $n = N / [1 + Ne^2]$,

Where: n = sample size, N = Listed Manufacturing in DSE; e = 0.05 (95% confidence level).

In line with this approach, the total sample comprises 71 publicly listed manufacturing companies on the Dhaka Stock Exchange (DSE), selected based on data availability. The data primarily originates from the annual reports of the sampled companies and the DSE database.

Researcher extensively examined various published works both domestically and internationally concerning the present study. The literature review facilitated the identification of diverse variables associated with accouting variables and syatematic risk. Subsequently, the study acquired the necessary secondary data from multiple sources, including publications from the Dhaka Stock Exchange (DSE), reports from the Bangladesh Bank, annual reports of sampled companies, and the DSE database.

In relation to previous literature (Alessandra, et al. , 2023 ; Xuejing, et al. , 2019; Fitriasari, et al., 2017: Rasool, et al., 2018: Sadka, 2011; Yaqin, et al. , 2022; Chei, et al., 2007; Bergesen., et al., 1996; and Nekrasov and Shroff, 2009) multiple regression model was used to examine the relationship between accounting information and systematic risk on panel data. Within the analysis, the functional relationship model was assessed using a multivariate OLS regression technique, outlined as follows:

Model : $\beta_{it} = \alpha_{it} + \beta_1(CR)_{it} + \beta_2(Op.L)_{it} + \beta_3(FL)_{it} + \beta_4(DPR)_{it} + \beta_5(ICR)_{it} + \beta_6(Gth)_{it} + \beta_7(AS)_{it} + \beta_8(MrktBk)_{it}$

Table 1. presents a comprehensive summary of the operational variables utilized in all the estimated model of the study.

Table 1. List of Operational Variables

IVs	Justification
Systematic Risk ($\beta_{M)}$	The β_M values are determined through a regression analysis involving the returns of the company and the average returns of the market portfolio.
Current Ratio (CR)	The division of current assets by current liabilities, as posited by Er and Kaya (2012), is regarded as a measure of the liquidity for each individual company.
Operating Leverage (Op.L.)	EBIT divided by net sales, as explicated by Er and Kaya (2012) and Weston & Brigham (2000), constitutes the basis for assessing fixed costs that engender augmented risk for companies.
Financial Leverage (FL)	The ratio obtained by dividing total liabilities by total assets (Er & Kaya, 2012) is postulated to have a positive correlation with the beta.
Dividend Payout Ratio (DPR)	The division of the dividend per share by the average earnings per share (Er & Kaya, 2012) is postulated. The hypothesis suggests a positive correlation with beta due to the assumption that companies with higher earnings volatility will likely distribute lower dividends or refrain from distributing dividends altogether.
Interest Coverage Ratio (ICR)	The hypothesis posits a negative correlation between the beta and the ratio obtained by dividing the sum of earnings before interest and taxes (EBIT) and interest by interest expenses (Er & Kaya, 2012) and Amorim, et al., 2012).
Growth (Gth_{it})	Change in logarithm of total assets over the period (Amorim, et al., 2012).
Asset Size (AS)	The natural log of total assets (Er & Kaya, 2012) and Amorim, et al., 2012). The magnitude of assets is assumed to have an inverse correlation with beta, given that companies with substantial asset sizes are more inclined to mitigate risks associated with their assets.
Market-to-book ($MrktBk_{it}$)	The closing market value of the firm divided by the end of period book value (Brimble and Hodgson, 2007 and Amorim, et al. , 2012).

Results and Discussion

This section of the study is organized around four primary analyses: descriptive statistics, correlation analysis, OLS regression analysis, and stepwise regression analysis. Table 2 presents the descriptive statistics for all variables considered in the analysis, including mean values and their expected signs. Upon reviewing Table 2, it is observed that the mean systematic risk value of 0.3604 indicates that, on average, the investments in the sample exhibit a moderate positive correlation with the overall market. Furthermore, the Current Ratio of 2.032, as presented in Table 2, suggests that, on average, the sample firms maintain current assets that are more than twice the value of their current liabilities. This ratio is commonly interpreted as a positive indicator, signifying a relatively healthy liquidity position. It implies that these companies possess a comfortable buffer of current assets to fulfill their short-term liabilities.

Table 2. Descriptive Statistics for the Pooled Data Set

Variables	Mean	Expected Sign
Beta (β)	0.360	N/R
Current Ratio (CR)	2.032	-
Operating Leverage (Op.L.)	0.208	+
Financial Leverage (FL)	0.782	+
Interest Coverage Ratio (ICR)	26.402	-
Growth (*Gth*)	0.090	+
Asset Size (AS)	20.454	-
Market to Book Value Ratio ($MrktBk_{it}$)	13.099	-
Dividend Payout Ratio (DPR)	0.143	-

(Source: Author's calculation)

With a mean value of 0.208, operating leverage suggests that, on average, the sample firms exhibit a relatively low level of operating leverage. This implies that these companies may not undergo significant changes in operating income in response to fluctuations in revenue, indicating a proportionally lower fixed cost component in their cost structure. In contrast, a mean value of 0.782 indicates that, on average, the sample firms utilize financial leverage to amplify their returns. This implies that a substantial portion of their assets is financed through debt, contributing to a higher Return on Equity (ROE). However, it also implies heightened financial risk, as changes in interest rates or financial market conditions can impact the profitability of the company. Regarding the Interest Coverage Ratio (ICR), with a mean value of 26.4026, it suggests that, on average, the sample firms possess a relatively robust capacity to cover their interest payments. This indicates that their operating income is substantial enough to meet their interest obligations over a given period.

The mean value of Asset Size (AS) for the sample firms, which stands at 20.454, offers insights into the average scale or magnitude of assets held by these companies. Asset Size, a metric reflecting the total value of a company's assets, serves as an indicator of the scope of its operations and investments. Concerning the Market to Book Value Ratio, which exceeds 1 at 13.099 in this case, it generally implies that the market values the firms at a premium compared to their book value. Investors exhibit a willingness to pay more for a share than its accounting value per share, signaling positive market sentiment. As for the Dividend Payout Ratio (DPR) of 14.37%, it indicates that, on average, the selected firms tend to adopt a more cautious approach to their dividend policy. In such a scenario, a substantial portion of earnings is retained rather than being distributed as dividends. This retained earnings strategy often involves reinvesting funds back into the company for purposes such as growth, debt reduction, or other strategic initiatives.

Table 3 illustrates the pairwise correlations among all variables utilized in this study. The table encompasses a range of variables: independent variables such as Current Ratio (CR), Operating Leverage (Op.L.), Financial Leverage (FL), Interest Coverage Ratio (ICR), Growth (Gth), Asset Size (AS), Market to Book Value Ratio ($MrktBk_{it}$), and Dividend Payout Ratio (DPR); dependent variables associated sytematic risk. The correlations were assessed at a significance level of 5%.

Table 3. Correlation among Variables

	β	CR	Op.L.	FL	ICR	Gth	AS	MrktBk	DPR
β	1								
CR	.010	1							
Op.L.	-.027	.002	1						
FL	-.033	-.013	.020	1					
ICR	.053	.031	.000	-.032	1				
Gth	.022	.015	.035	-.140*	.035	1			
AS	.075*	-.011	.034	-.123*	-.016	.127*	1		
MrktBk	-.118*	.030	.120*	-.017	.061**	.034	.324*	1	
DPR	.096*	-.005	-.004	-.007	.018	-.013	-.026	-.016	1

(Source: Author's calculation)

The observed positive correlation between systematic risk and asset size indicates that, on average, larger-sized companies in the sample tend to demonstrate higher systematic risk. This implies that as a company's asset size increases, its sensitivity to overall market movements also rises. Additionally, the positive correlation between systematic risk and dividend payout ratio suggests that, on average, companies with higher systematic risk are linked to a greater proportion of earnings being distributed as dividends. This correlation might be interpreted as a potential strategy employed by riskier firms to share returns with shareholders through dividends, even in the presence of elevated overall risk. This strategic choice may reflect a balance between the company's risk profile and its commitment to returning value to shareholders through dividend distributions.

Conversely, the negative correlation between systematic risk and the market to book value ratio indicates that investors might be undervaluing companies with higher systematic risk. This undervaluation could stem from apprehensions about the potential repercussions of broader market fluctuations on these firms. Such investor behavior may reflect a risk-averse approach, where investors assign lower market values to companies perceived as more susceptible to the impacts of overall market movements.

Table 4. Regression Result

Dependent Variable: Beta (β)				
Variables	Coefficient	Std. Error	t-statistic	Prob.
C	0.473	0.165	2.860	0.00
Current Ratio (CR)	-0.071	0.001	-0.464	0.64
Operating Leverage (Op.L.)	0.022	0.009	0.022	0.98
Financial Leverage (FL)	0.0085	0.005	0.167	0.86
Interest Coverage Ratio (ICR)	-0.016	7.000	-2.295	0.02
Growth (Gth_{it})	0.011	0.024	0.046	0.96
Asset Size (AS)	-0.011	0.008	-1.382	0.16
Market to Book Value Ratio ($MrktBk_{it}$)	-0.018	0.004	-4.392	0.00
Dividend Payout Ratio (DPR)	0.018	0.009	1.995	0.04
R^2		0.030		
Adjusted R^2		0.024		
F Statistic		6.969*		0.000

(Source: Author's calculation)

Prior to conducting the regression analysis, several assumptions were evaluated, including linearity, normality, homoscedasticity, and independence of errors. The results revealed no issues with linearity, normality, homoscedasticity, or independence of error terms. In other words, it was established that all the necessary statistical assumptions for multivariate statistical techniques were met. The fulfillment of these assumptions ensures the validity and reliability of the obtained results. The significance levels are represented by the denotations of *, or ** at 1%, and 5%, respectively. Table 4 demonstrates that solely the four variables exhibit statistical significance: Interest coverage ratio, Market to Book value ratio, and Dividend payout ratio. Meanwhile, the β_C values of all variables have small coefficients.

The higher the value of the interest coverage ratio, the greater a company's capacity to make dividend payments will be, leading to a decrease in risk. The findings indicate that an increase in liquidity results in a reduction of systematic risk, and this outcome is statistically significant at a 5% level.

According to Brimble and Hodgson (2007), there exists a positive correlation between the market-to-book ratio and the company's ability to generate wealth. The assumption is made that companies with a higher market-to-book ratio will possess larger βm values, due to the trade-off between risk and return. However, the findings indicate that an increase in the market-to-book ratio leads to a decrease in systematic risk, with statistical significance at the 1% level.

Er & Kaya, (2012) have deduced that there is a direct association between systematic risk and dividend payout ratio, as it is postulated that companies with more unstable earnings will tend to offer lower dividends or no dividends at all. The outcome reveals that an increase in the DPR amplifies the systematic risk, with statistical significance at the 1% level.

The R-square value, representing the proportion of variance in market return explained by the independent variables, is remarkably low at 0.030. This implies that only 3.00% of the variation in market return can be clarified by each individual independent variable. However, the model demonstrates a fitting quality, supported by the significant F-statistics at the 1% level. This suggests that the overall performance of the model is considered acceptable, as reflected in the F-statistics.

The following model has been obtained from the regression:

$\beta = 0.473 - 0.071CR + 0.022\ Op.L. + 0.0083\ FL - 0.011\ ICR + 0.011\ Gth - 0.0113\ AS - 0.019\ MrktBk + 0.018\ DPR$

Table 5. The Results of the Stepwise Regression

Step	1	2	3	4	5
Constant	-0.719	-0.726	-0.727	-0.722	-0.746
CR	0.001	0.001	0.001		
t	0.511	0516	0.516		
P value	0.609	0.606	0.606		
Op.L.	-0.006	-0.006			
t	-0.424	-0.413			
P value	0.672	0680			
FL	-0.004	-0.005	-0.005	-0.005	
t	-0.566	-0.609	-0.618	-0.626	
P value	0.572	0.542	0.536	0.531	

Step	1	2	3	4	5
Constant	-0.719	-0.726	-0.727	-0.722	-0.746
ICR	0.001	0.001	0.001	0001	0.001
t	2.251	2.263	2.267	2.283	2.307
P value	0.025	0.024	0.024	0.023	0.021
Gth	0.012				
t	0.308				
P value	0.758				
AS	0.055	0.055	0.055	0.055	0.056
t	4.332	4.393	4.396	4.386	4.502
P value	0.000	0.000	0.000	0.000	0.000
MrktBk	-0.004	-0.004	-0.004	-0.004	-0.004
t	-5.493	-5.498	-5.585	-5.573	-5.593
P value	0.000	0.000	0.000	0.000	0.000
DPR	0.005	0.005	0.005	0.005	0.005
t	3.492	3.490	3.492	3.490	3.497
P value	0.000	0.000	0.000	0.000	0.000
R	0.206	0.206	0.205	0.205	0.204
R^2	0.042	0.042	0.042	0.042	0.042
Adjusted R^2	0.036	0.037	0.037	0.038	0.039
F statistic	6.999	7.991	9.301	11.114	13.801
P value	0.000	0.000	0.000	0.000	0.000

(Source: Author's calculation)

Table 5 summarizes step-wise regression (using backward elimination procedure).

The optimal model comprises of four variables: ICR, AS, MrktBk, and DPR. Its R-squared value stands at 4%, thereby indicating a relatively low magnitude of explanatory capacity.

Conclusion

This study investigates the link between accounting information and systematic risk within the manufacturing industries of Bangladesh. To address this, the study starts with a null hypothesis asserting that accounting variables do not have a significant relationship with systematic risk (β). Subsequently, systematic risk and eight accounting risk-related variables are chosen based on both theoretical frameworks and empirical evidence. While previous studies, often conducted in developed markets, have consistently highlighted a robust correlation between accounting variables and beta, our examination of the Bangladesh stock markets reveals a comparatively reduced explanatory power (R^2 = 4%) in the relationship between accounting variables and beta. Employing stepwise regression, specifically the backward elimination procedure, this research unveils that out of the eight accounting variables considered, only four-Interest Coverage Ratio, Asset Size, Market to Book Value Ratio, and Dividend Payout Ratio-demonstrate a statistically significant relationship. The findings presented in this study carry relevance not only for investors in the capital market but also for company managers, governmental bodies, and regulatory agencies. In addition to updating prior research, the empirical evidence puts forth a model that offers a means to estimate systematic risk based on accounting data. This model proves valuable in scenarios where market data is inaccessible, such as in the case of privately held companies. Understanding this relationship becomes crucial not only in the absence of systematic risk data but also as a way to complement and validate the risk calculated by this coefficient.

A significant limitation of this study is its small sample size. Additionally, the study did not account for certain external and internal factors that may have potential impacts. Therefore, it is advisable for future researchers to concentrate on exploring the association between accounting variables and overall risk. Furthermore, they should examine the interplay between economic, social, and political crises and their influence on systematic risk.

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