Applicability of Identified Financial Determinants of Undiversifiable Risk to emerging markets: A Multi-sector analysis of non-Financial Listed Companies on the Ghana Stock Exchange

Abstract

Aim*: This study explores the influence of financial variables on undiversifiable risk in emerging markets.*

Methodology*: Eight financial variables are examined as determinants of systematic risk. Five years financial data, 2016-2020, of 14 multi-sector non-financial firms listed on Ghana Stock Exchange was used. A descriptive, regression analysis and multicollinearity analysis was performed to arrive at the study results.*

Results *based on the five years of financial data indicated that liquidity, leverage, operating efficiency, dividend payout and market value of equity have negative relationship while profitability, firm size and growth have positive relationship with systematic risk.*

Conclusion*: Except for profitability and growth, the significant relation of the other variables to beta shows that both investors and managers can utilize their movements to make sound financial decisions that will enhance value.*

Keywords: *Systematic risk (Beta), Financial variables, Ghana Securities Exchange*.

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Introduction

In estimating the value of financial securities and portfolio assets, systematic risk estimation, which was profoundly explained in financial theories and empirically tested, became imperative. Simply noted as Beta(**β**), systematic risk is a factor that links a company's investment decisions to its stock market value. According to [18], Beta answers investors' expectations of stock value; because it serves as a component for determining the investor's required rate of return (*ibid*). Therefore, an increasing systematic risk disturbs the value of the stock inversely and negatively impact stock investors.

Risk associated with investment defines the rate of return investors want from investing in any security [21]. Empirical evidence and literature confirms a direct relationship between risk and expected rate of return [33]; [27]; [24]. This implies that if uncertainty associated with any investment is higher so is the expected return of that particular investment [3]; [55]. Hence, information about systematic risk is paramount for investors to evaluate the nature of risk associated with investment [21]; and the source of such risks, in order to make sound investment decisions. Equally important is that the understanding of financial variables which impact systematic risk (beta) helps firm's executives to formulate the right financial policies and strategies that will maximize wealth for the investor. In this regard, [16] and [32] posit that management decisions regarding portfolio construction and management to ensure financial and operational efficiency reduce the uncertainty surrounding portfolio value and performance. Logue and Merville used capital-asset pricing model (CAPM) and found significant relationship between management decision and liquidity, investment and financing [33]. However, [26] suggested that management does have some control over business and financial uncertainties and thus makes decisions to enhance growth, barring any unforeseen exigencies.

Previous studies identified some specific financial indicators that influence the systematic risk factor of companies of different industries [9]; [31]; and [21]. The size of systematic risk factor is different from one industry to another. Using the same financial variables for each industry, the results indicated significant relationship between beta and the financial variables chosen. [31] focused US airline industries and concluded significant results with systematic risk. Similarly, other studies on casinos [45], banking system [11] and restaurant industry [21] have all shown significant relationship between beta and the specific financial variables. Other authors also found positive association between beta and international diversification [42].

The main objective of this current study is to identify and evaluate the impact of specific financial variables on systematic risk factor of multi-sector non-financial listed companies on Ghana Securities Exchange (GSE). The rationale is to provide some insight, at macro level, to enable management and corporate executives to identify those financial influencers that significantly impact corporate, investment and financing decisions and hence corporate value and shareholder's wealth. Thus, management has onerous task of ensuring that prudent financial policies and strategies to improve profitability and share value are adopted to achieve efficiency and company growth; which ultimately results in value maximization for the owners. Also,

shareholders seek to invest in businesses or portfolios that offer the maximum return at minimum risk [23]; [32]. The multi-sector approach, as in the case of [11], will thus help investors to focus on a minimum target for volatility when investing in a portfolio of socks [23].

Eight financial variables of liquidity, leverage, operating competence, profitability, and size of the firm, growth, dividend payout and market value of equity were examined by previous studies; and are adapted for this study. The rest of the paper is organized as follows: the next section provides literature on systematic risk and the financial determinants chosen for this study. This is followed by the model and methodology for this study. The analysis and discussion of results section is then presented and the last section concludes the paper; and with some recommendations.

Literature review

The theory of capital asset pricing model (CAPM) [48] was based on the precept that identified two types of risks that companies face: systematic risk, (otherwise known as market-wide risk) and individual firm-specific risk (unsystematic risk) [45]. The systematic risk, measured by beta(β) [25], which faces all firms in the market (industry) and uncontrollable by individual firms represents the influence of the market on a specific stock value [21]. Literature indicates that systematic risk is undiversifiable [36] and thus it cannot be eliminated by any diversification strategy management may adopt. Thus, β reflects the market's evaluation of the level of risk a firm takes on through management decisions [33]. The unsystematic risk is firm-specific and could be controlled by individual firms by adopting prudent management decisions regarding firm operations and financial management [7]; [21]; [53]. Empirical reviews generally indicated that this element of the CAPM is of less interest to investors as its impact on stock value is relatively less significant [41]; [13]. Consequently, the systematic risk of the CAPM is not a relevant factor in determining the required rate of return of an investor [21]. Algebraically, CAPM is representation as:

$$\mathbf{E(R_i) = R_f + \beta_i\,(R_m - R_f)} \qquad \text{(i)}$$

Where:

$E(R_i)$ = expected return
R_m = Market return
R_f = Risk free rate
β_i = systematic risk

Beta (β) indicates how the stock value responds or is sensitive to movements in the market [31]. That is, Beta (β) is a statistical measure of the volatility of a stock versus the overall market. This relationship is algebraically stated as:

$$\mathbf{R_i = \beta_0 + \beta_i R_m + e_i} \qquad \text{(ii)}$$

where:

$\mathbf{R_i}$ indicates return of a company that has linear function with market return ($\mathbf{R_m}$) and the disturbances in the market (e_i). Thus, β_i is systematic risk of $_i^{th}$ security, R_i as return from $_i^{th}$ security and R_m is market return. β_i in the above equation is computed by:

$$\beta_i = \frac{Cov\,(ri,rm)}{Var(rm)}, \text{ where:} \qquad \text{(iii)}$$

β_i is the market beta of asset *i*
Cov is measure of a stock's return relative to that of the market.
Var is the measure of volatility of an individual stock's price over time
r_m is the average expected rate of return on the market; and
r_i is the expected return on asset *i*

An important probe of Lee and Jang was whether the beta derived from historical returns, is appropriate to be the true representation of expected return and value of stock. To this, [16] observed that beta obtained from time series data presents unbiased consequences only, if predicted beta is stationary. However, [33] argued that predicted beta, though cannot be observed, is similar to the true beta. Hence, according to the authors, the predicted beta is suitable magnitude of systematic risk because it is derived from factors that impacts the firm's decision and policies [16]; [33].

Even though CAPM presents an important model to determine the required rate of return for investors, it is a product of some critical assumptions [13]. These critical issues which were challenged by some earlier authors [49]; [19]; [46] and called for extension of the market factor to other likely variables that may affect stock value are:

i. Investment decisions are based on the expected returns (E(R)) and variance of returns referred to Markowitz method of portfolio diversification; E(R) measures mean of asset return over time (mean-variance analysis);
ii. Investors accept risk only when returns are high to compensate for. That is, they are rational;
iii. Investors all invest for the same period of time;
iv. Investors have the same expectations about the expected return, correlations and variance of all assets.
v. There is a risk-free asset and investors can borrow and lend any amount at the risk-free rate;
vi. Capital markets are completely competitive and frictionless. No impediments and costs [56]; [37]

The assertion that investors are only rewarded for systematic risk (market risk) is re-echoed in [57]; [37]; [38]. According to the authors, variables that predict stock market returns should act as risk factors that help to price cross-section of ex-post average stock returns. Emanating from the above assumptions are that, the first four assertions help investors to make investment decision whilst the last two represent the characteristics of the capital market [37]; [46].

Determinants of undiversifiable risk

Logue and Merville and other previous authors identified some financial indicators [33]; [29]; [21]; [31]; [25]; [18]; [45] that influence management financial policies and hence impact systematic risk of the firm's market stock value [23]. Similarly, [26] from investors' perspective, studied liquidity, leverage, operating efficiency, profitability, dividend payout, firm size, growth and market value of equity to determine the systematic risk for non-financial firms listed on the Karachi Stock Exchange. Vongphachanh and Ibrahim used similar approach in their study across six industries in Thailand [54]. This study employs those same eight variables and studies their

influence on the market volatility of 14 firms, with full stock market data on the GSE, across multiple sectors from the period 2016 to 2020. Each of these variables is discussed as:

(i) Liquidity

Liquidity indicates the financial health of firms. Investors use liquidity indicator as a basic component in making their investment decisions; especially debt investors [5]; [1]; [17]. Jensen found positive relationship between systematic risk and firm liquidity [28]. Jensen used the agency costs of free cash flow hypothesis to arrive at his conclusion and posited that when managers have excess cash than is needed to fund viable projects there is an incentive for managers to waste the excess cash on unprofitable investments such as acquisitions. This is the behaviour that increases the firm's systematic risk exposure. However, [33]; [40], among other school of thoughts, argued that systematic risk rather decreases with increases in firm's liquidity position [22]; [31]; [18]. This study subscribes to these latter findings to hypothesize that firm liquidity and the systematic risk of its stock value are inversely related.
H_1*: There is inversely relationship between liquidity and Beta.*

(ii) Leverage

Firm leverage is explained by its capital structure [10]. Any financial policy aims at magnifying returns incentivize management to engage more debt to capital [2]. Consequently, any adverse market movement makes highly leveraged firms susceptible to financial risk as this tends to magnify their losses instead [31]; [12]. Studies by [21] confirmed the findings of [2] which found positive but nonlinear relationship between firm's capital structure and its systematic risk. Similarly, [29], [31], [42] and [39] posited positive relationship between leverage and beta. These findings were later confirmed by [25] who assert beta as increasing function of leverage.
H_2*: Leverage and Beta are positively related.*

(iii) Operating efficiency and firm profitability

Analysts measure a firm's operating efficiency in terms of how much sales its assets generate in specified period of time. Known as asset-turnover ratio, the level of operating efficiency therefore depends on quality and quantity of firm's assets and their management [43]; [51]. These assertions reflected the findings of [33], [47] and [21] who, with adequate and quality assets, posit that the more sales generated with given assets the more profit accrues, and other things being equal, the lesser is the systematic risk of the firm's stock value. Thus, [21] and [22] concluded on negative relationship between operating efficiency and the beta of firm's stock value.

Firm profitability, on the other hand, is a factor that affects the systematic risk of stocks [8]. The primary success indicator of any firm is its profitability ratio and profitable firms have high chances of reducing systematic risk [33]. [21], [31] and [45] also shared in the assertion that the relationship between profitability and systematic risk is negative [8]. But, other studies stated otherwise. For instance, [14] found a positive relationship between profitability and systematic risk in insurance companies and concluded that in finance companies the incentive for higher return demands adoption of credit risk. This assertion is in sync with the theoretical risk-return tradeoff.

H_3*: Operating efficiency relates inversely with Beta.*
H_4*: Profitability and Beta are positively related.*

(iv) Firm Size

Firm size, measured by total assets, was identified by [50] and [42], to have inverse relationship with systematic risk of a firm's stock value due to the advantages of economies of scale and of scope [52]. This may arguably be true with both financial and non-financial institutions [20]. However, financial institutions with large reserves and other assets can contain short to medium-term shocks in the economy and hence reduce their risk exposure.
H_5: *Firm size is inversely related to Beta.*

(v) Growth

The pursuit of excessive growth exposes institutions to higher risk [20], all things being equal. Rapid growth in companies increases systematic risk [21] and thus beta diminishes growth [25]. Roh confirmed this positive relationship between the need for growth and the required resources to support such level of growth [44]. The author posited that companies pursuing high growth attain their objective by engaging additional resources which need extra financing. The cost of financing the needed resources results in taking a greater risk.
H_6: *Growth is inversely associated with Beta of firm's stock value.*

(vi) Dividend payout

The level of dividend per share is a direct signal to the market and positively impact the market value of a firm's stock [34]. That is, high dividend payout reduced systematic risk because investors become more certain about future inflow of returns on investment; and also capital growth [33]; [32b]. Former studies, including [21], thus concluded that dividend payout negatively impacts [9]; [16]; [14] on systematic risk.
H_7: *Dividend payout negatively related with Beta of firm's stock value.*

(vii) Market value of equity

Even though studies from Mnzava showed an insignificant inverse relationship between beta and a firm's stock value [39], the equity value of a firm depends on the market value of its stock which value is influenced by the systematic risk of its industry or market [35]; [6]. Theoretically, a higher the beta (market risk) increases investors required rate of return and given this, the present value (price) of stock is lower because the investors demand a higher return to compensate them for the additional risk in investing in the particular stock. It can be, therefore, generalized that the level of beta pertaining to a stock directly affects its market value positively or negatively; based on its direction.
H_8: *Market value of equity is inversely related to Beta.*

Methodology

This study uses multi-sectoral data on companies listed in the GHSE. Data is obtained from all the non-financial listed companies with full stock market data due to the limited number of listed companies or otherwise the small size of the GHSE. Data used covered the period from 2016 to 2020 and was drawn from the S&P Capital IQ (Market Intelligence) website.

Model description

Beta for each firm has been estimated by linear regression equation for five years. Estimated beta is derived by substituting average monthly returns of companies against average monthly returns of market into the following regression equation:

$$Y = \beta_o + \beta_1 x \qquad \text{(iv)}$$

The average monthly returns of the market x is estimated as:

$$\text{Return } (x) = L_n(P_t/P_{t-1}) \qquad \text{(v)}$$

From the regression equation, Y is average monthly returns of company; x is average monthly returns of market while coefficient β_1 is estimated beta on yearly bases.

Data Analysis

The panel data used in this study combined effect of times series and cross sectional data. A common effect model was used to estimate the hypothesis as follows:

$$\beta_{it} = \alpha_0 + \alpha LQ_{it} + \alpha LV_{it} + \alpha OE_{it} + \alpha PROF_{it} + \alpha FS_{it} + \alpha G_{it} + \alpha DP_{it} + \alpha MVEit \qquad \textbf{(vi)}$$

where the independent variables in the model equation and their measurements are defined as:

Name of Variable	**Measurement**
Liquidity (**LQ**)	Quick Ratio = Current asset – Inventory / Current liability
Leverage(**LV**)	Debt ratio = Total Debt / Total Assets
Operating Efficiency (**OE**)	Asset Turnover = Total revenue / Total Asset
Profitability (**PROF**)	Return on Assets = Net income / Total Assets
Firm Size(**FS**)	LN(Total Asset)
Growth (**G**)	Percentage change in earnings before interest and taxes
Dividend Payout (**DP**)	Annual dividend payment / Net income
Market value of equity(Mve)	LN(Market value of equity)

These define the eight financial variables used to determine the systematic risk in this study.

Analysis: Descriptive Statistics

The study covers 14 firms across 5 industries. Five years of data spanning 2016 to 2020 was analyzed to determine the relationship between beta and the independent variables. The results from the data indicated a mean beta of 0.26 (Exhibit 1) against the market beta. Given this outcome, we conclude that the sample firms are collectively less risky relative to the market risk

of 1.0. Analysis on the individual variables, except for leverage, operating efficiency and profitability, revealed a standard deviation above all variable mean scores. The range of these variables (max – min values) explain their low standard deviation. The ranges are 120.23 (121.0 – 0.77) for leverage and 3.46 (3.60 – 0.14) and 17.18 (15.08 – [-2.0]) for operating efficiency and profitability respectively. Thus, these results collectively and across industry confirms that the market risk in general is higher than the risk each individual firm is exposed to, based on the mean beta (0.26).

Exhibit 1: ***Descriptive analysis of data drawn from GSE on SandP Market Intelligence Platform***

	LQ	*LV*	*OE*	*PROF*	*FS*	*G*	*DP*	*Mve*	*Beta*
Mean	1.41	59.91	1.25	5.15	1775.42	5.21	2.93	973.85	0.26
Standard Error	0.46	9.70	0.28	1.34	874.59	4.49	1.64	650.03	0.18
Median	0.62	60.50	1.11	5.01	423.98	0.26	0.07	236.27	0.04
Standard Deviation	1.73	36.31	1.04	5.02	3272.41	16.80	6.15	2432.18	0.67
Sample Variance	2.98	1318.32	1.08	25.22	10708692.29	282.26	37.83	5915511.86	0.45
Minimum	0.08	0.77	0.14	-2.00	4.29	-4.35	0.00	10.70	-0.06
Maximum	6.20	121.00	3.60	15.08	9462.80	62.06	17.54	9316.20	2.56
Count	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00
Confidence Level(95.0%)	1.00	20.96	0.60	2.90	1889.44	9.70	3.55	1404.30	0.39

Source: Data drawn from SandP Capital IQ on non-Financial listed companies on the GHSE

Correlation results

The Pearson correlation was used to detect multicollinearity among all variables. The result of 0.760959 between firm size (FS) and market value of equity (MVe) is the highest correlation. This implies that the variables measured have no problem of multicollinearity at correlation value of 0.9 or more. Exhibit 2 shows the correlation among all variables and it indicates that there is no problem of multicollinearity. Similarly, profitability positively correlated with most of the variables, except for liquidity and leverage. A typical observation from the data stream is that all the firms, except one, made negative returns in 2020; a common result exhibited globally due to the impact of the covid pandemic.

Exhibit 2: Multicollinearity ***between the variables and Beta***

	LQ	*LV*	*OE*	*PROF*	*FS*	*G*	*DP*	*MVe*	*5Y Beta*
LQ	1								
LEV	-0.50185	1							
OE	-0.15537	0.21132	1						
PROF	-0.02469	-0.02287	0.190126	1					
FS	-0.23406	0.187848	-0.03557	0.245657	1				
G	0.037612	-0.12302	-0.04483	0.112177	-0.11495	1			
DP	0.030585	-0.31529	-0.05768	0.263227	-0.19161	0.632743	1		
MVE	-0.20838	0.06637	-0.11067	0.5505	0.760959	-0.05969	-0.09876	1	
5Y Beta	-0.13375	0.193463	0.002396	-0.17361	0.671241	-0.13296	-0.15103	0.052782	1

Source: Data drawn from S&P Capital IQ on non-Financial listed companies on the GHSE

Results of regression analysis

The multiple regression analysis conducted on the eight variables and the beta indicated high R square and Adjusted R values at 0.983 and 0.967 respectively. This implies significant relationship between all the variables and systematic risk; with the adjusted R implying that factors other than examined in this study accounts for only nine per cent. The F-stat is also significant at 0.002582 indicating the combined strength and relevant of the all the variables examined in this study. These results simultaneously emphasize the reasonableness of model fitness and also confirm that though there may be other variables that can be included in the model, the current model is sound. Again, the p-values of firm size and market equity value of 0.0005 and 0.0035 are significant in all regards for this study. The outcomes for the other variables however explains insufficiency of data on those variables. This indicates that the GHSE can be described as nascent despite its existence for three decades. The size of the market is very small in terms of numbers and activities and hence there is less stringent regulations resulting in unavailability of full stock market and financial data. Also, it is the reason why there are large proprietary financial information which deprives access and limits available data.

Exhibit 3: Multiple *Regression analysis*

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.983564
R Square	0.967398
Adjusted R Square	0.915235
Standard Error	0.195881
Observations	14

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	8	5.692724	0.71159	18.54572071	0.002582
Residual	5	0.191848	0.03837		
Total	13	5.884571			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	0.064997	0.182704	0.355752	0.736543422	-0.40466	0.534654
LQ	-0.01868	0.039103	-0.47763	0.65306429	-0.11919	0.08184
LEV	-0.00033	0.001922	-0.1717	0.870403453	-0.00527	0.004611
OE	-0.07383	0.059216	-1.24685	0.267675603	-0.22605	0.078386
PROF	0.020169	0.016363	1.232548	0.272535115	-0.02189	0.062232
FS	0.000322	2.79E-05	11.52643	8.61846E-05	0.00025	0.000394
G	-0.00229	0.004252	-0.53842	0.613384387	-0.01322	0.008641
DP	0.00129	0.013453	0.095861	0.927354251	-0.03329	0.035873

MVE	-0.00034	4.7E-05	-7.32955	0.000741277	-0.00047	-0.00022

Source: Data drawn from S&P Capital IQ on non-Financial listed companies on the GHSE
Significant @ 0.05

Findings

The first hypothesis of this study is proven by the data in both relationship and in significance. A negative coefficient of -0.01868 and the associated *p*-value (Exhibit 3) confirms that liquidity is inversely associated with beta. Thus implying that a point increase in liquidity will decrease the systematic risk by -0.01868 points. [31] have also found negative coefficient between liquidity and systematic risk (beta) with *p*-value greater than the critical level. The second and the fourth hypotheses state positive relationship between leverage and beta, and negative correlation between profitability and beta respectively. However, the results indicate a negative coefficient for leverage and a positive coefficient for profitability. In the case of the second hypothesis, an increase in debt will decrease the systematic risk of the firms [2]. This outcome is in sync with the results of previous studies [25]; [29]; [31]; [42]; [39]. However, the result is highly insignificant, given its relative *p*-value (Exhibit 3). The positive regression co-efficient for profitability confirms the hypothesis that profitability associate positively with beta but the relevant p-value proves that the variable is insignificant for this study. Yet, the results bode well with the conclusions of earlier studies such as [15]; and the result can be associated with the market size and activities which result from the evolving nature of the market. The outcome for the third hypothesis, even though with lower p-value, is similar to the outcome of the first hypothesis. Hence the impact of a change in the operating efficiency variable will be negative for the beta; a result that is consistent with the findings of [21]. Firm size showed a positive sign which relates well with financial theory and was significant for the study. This means as firm size changes, its beta equally changes. Thus, activities leading to changes in the size of the firm equally impact the systematic risk of the firm. The result for the sixth hypothesis is positive as against the hypothesis that growth has inverse relation with the systematic risk but insignificant. Yet, this outcome agrees with [45] and [22] who also found positive coefficients for growth and they argued that high growth means more resources which demands greater financing need. This will increase leverage and increase systematic risk. The analysis for the study confirms with a negative coefficient for dividend payout. The seventh hypothesis is that dividend payout is inversely associated with systematic risk. The hypothesis is accepted, even though it is less significant. Various previous studies, including [15] came to the same conclusions in their study. Similarly, the last hypothesis is also accepted as market value of equity inversely related with systematic risk; and the variable being very significant. Per this outcome, if the firms increase or enhance their market value of equity, their systematic risk will decrease by (P=0.001) for each point or unit of improvement. The small applies to firm size with a P=0.000. Consistent with the findings of [39], systematic risk decreases when the market value of stock and hence corporate equity is enhanced.

Conclusion

Investors understanding of systematic risk enables them to create a portfolio of investment that will maximize their value. Similarly, a comprehensive grasp of undiversifiable risk factors enables managers to make strategic choices and control financial indicators to reduce the firm's

excessive exposure to avoidable risks. This way, value is created to satisfy the optimum objective of upping the bottom-line item and enhancing shareholders' wealth. This study examined the influence of eight financial variables or indicators on a firm's beta. A five-year financial data obtained from the Ghana Stock Exchange was used in the study. Regression model was used to estimate the common effect and the results, except for leverage, firm size and growth, confirmed the hypotheses of the study. Also, four variables: leverage, profitability, growth and dividend payout were detected less significant.

The GHSE is a nascent market with less restrictive regulations resulting in limited data on all the non-financial listed firms. Hence, data for this study was based only on the firms with full stock market data. Notwithstanding this limitation, the study, undoubtedly, provides useful information for investors and firm management alike. This study, unlike the previous studies that focused on individual sectors or industries, includes firms from multiple sectors or industries. Thus, this result sets the paces for future multi-sector analysis with large data on the variables studied by this study; or possibly consider the inclusion of other relevant financial variables.

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