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Long-term Debt, Profitability and Stock Market Volatility at the Nairobi Securities Exchange, Kenya.

Vivyanne Omira, Isaac Linus Ochieng', Gordon Opuodho

Jomo Kenyatta University of Agriculture and Technology

ABSTRACT: *This study examines the effect of long-term debt on stock market volatility among firms listed on the Nairobi Securities Exchange (NSE) in Kenya from 2013 to 2022. Using a positivist research paradigm and a causal design, the research employs panel data analysis and a Generalized Autoregressive Conditional Heteroskedasticity (GARCH 1,1) model. Data from 60 active NSE-listed firms are analyzed annually, with the Random Effects Model (REM) identified as the most suitable, controlling for firm size and including profitability as a moderator. The findings show a statistically significant and positive relationship between long-term debt and stock market volatility within the controlled and moderated REM. This indicates that higher levels of long-term debt contribute to increased market fluctuations at the NSE, despite its importance for corporate growth. The study concludes by recommending that investors consider long-term debt in risk assessments, companies adopt strategic debt management, and the Capital Markets Authority (CMA) closely monitors this dynamic to maintain market stability.*

KEYWORDS: Long-term debt, Stock market volatility, Firm size, Profitability, Nairobi Securities Exchange, Capital Markets Authority

BACKGROUND OF THE STUDY

The Nairobi Securities Exchange (NSE) is a crucial part of Kenya's financial infrastructure, acting as a platform that encourages the raising of capital and promotes investment opportunities both domestically and internationally (CMA, 2020). Its role in ensuring liquidity and transparency is essential for economic progress, as a well-operating stock market can attract foreign direct investment and enhance the efficiency of resource distribution (Makeni, 2018). A stable stock market boosts investor confidence, which is vital for sustainable economic growth, particularly in emerging markets where financial systems are still evolving (Owidi & Mugo, 2016). However, stock markets are naturally volatile, with swings caused by company-specific factors, macroeconomic conditions, investor sentiment, and external shocks, making market stability an ongoing challenge (Ngugi & Jagongo, 2021).

Heightened volatility on the Nairobi Securities Exchange (NSE) has been a well-documented concern. The Capital Markets Authority (CMA) reported in 2020 that increased volatility led to a substantial exodus of investors, mainly foreign participants (CMA, 2020). This finding aligns with earlier research. Owidi and Mugo (2016) identified the presence of persistent and clustered high volatility on the NSE. Rugut (2021), when forecasting volatility on the NSE, also found evidence of increased and enduring volatility. Excessive market volatility hampers the efficient functioning of the markets and negatively impacts the performance of the NSE. Furthermore, Ongeri et al. (2022) revealed that high volatility levels on the NSE diminish investor confidence in the market. Recognising these dynamics, policymakers and market participants alike endeavour to understand the determinants of volatility to foster a resilient financial environment that promotes long-term investment and growth.

Within this complex environment, firm-specific factors such as capital structure significantly influence stock market behaviour. Of particular interest is the level and composition of debt financing, especially long-term debt, which firms employ to fund investments and expansion projects (Vuong et al., 2023). Long-term debt, with maturities exceeding one year, provides firms with stability and the capacity to undertake large projects, but it also introduces financial risks associated with fixed obligations, especially during periods of economic uncertainty (Jensen & Meckling, 1976). While leverage can amplify returns during favourable conditions, excessive debt may increase the likelihood of financial distress, thereby contributing to stock market volatility (Vuong et al., 2023). Understanding how such debt influences the stability of the stock market is crucial for both corporate managers and investors, as it informs risk assessment and strategic decision-making within the Kenyan context.

The relationship between long-term debt and stock market volatility is especially relevant in emerging economies like Kenya, where financial markets often exhibit distinct characteristics compared to developed economies. Factors such as limited access to diverse funding sources, greater macroeconomic volatility, and different corporate governance practices shape financing behaviour and market responses (Owidi & Mugo, 2016). Empirical studies into how long-term debt impacts stock market volatility can provide valuable insights into risk management and policy development aimed at stabilising the market. This study aims to address this gap by analysing the specific effects of long-term debt on NSE volatility, thereby enhancing understanding of financial stability in Kenya's evolving market environment.

Existing literature on Kenyan stock market volatility has mainly focused on macroeconomic factors and external influences, such as exchange rate movements, inflation, and global financial shocks (Ochieng et al., 2020). While these studies underline the significance of broader economic variables, they often neglect the micro-level financial strategies of companies, notably their capital structure decisions. The impact of long-term debt on stock market fluctuations remains insufficiently explored, despite its potential to directly influence firm stability and investor confidence, as stock market volatility is affected by both macro-economic conditions and firm-specific elements, particularly capital structure (Otaify, 2015). Addressing this gap is crucial for developing a comprehensive understanding of the factors driving market volatility in Kenya, especially given the increasing dependence of firms on long-term borrowing to fund growth. By empirically investigating the relationship between long-term debt and market volatility, this research aims to guide policy and corporate financial decision-making that enhance market resilience and safeguard investors within the Kenyan context.

Empirical research in other markets shows a mixed picture regarding the impact of long-term debt on stock market volatility. Vuong et al. (2023) found a negative relationship in Chinese listed firms, suggesting that long-term debt can have a stabilising effect. However, other studies indicate a positive association, where higher long-term debt increases financial risk and, consequently, volatility (Ahmed & Hla, 2019; Andow & Wetsi, 2018; Echekoba & Ananwude, 2016).

Within the Kenyan context, research on the direct link between long-term debt and stock market volatility remains limited. However, studies examining related aspects offer some insights. Shikumo et al. (2023) discovered a positive effect of long-term debt on the financial performance of Kenyan non-financial firms, which could indirectly influence market perceptions of stability. In contrast, Harrison et al. (2021), focusing on Kenyan commercial banks, found the effect of long-term debt on financial performance to be significant. Ochieng' et al. (2020), while analysing foreign equity flows, emphasise the sensitivity of the Kenyan market, where long-term financial decisions could be influential. Studies on broader capital structure and firm characteristics also provide context.

Mwangi (2016) and Kutto (2020) explored the influence of financial leverage (including long-term debt) on firm performance, which can have implications for stock volatility. Mwangi et al. (2014) investigated factors affecting stock return volatility, potentially including aspects of long-term financing. Research on macroeconomic factors and market volatility (Ochieng et al., 2020; Serem et al., 2020; Otajah, 2020; Kemei, 2021; Mbaabu, 2018; Mwai, 2013) provides a backdrop against which firm-level long-term debt decisions operate. Overall, the direct and isolated impact of long-term debt on stock market volatility within the unique environment of the NSE remains a significant area for empirical investigation.

STATEMENT OF THE PROBLEM

Stock market volatility, which indicates risk, hampers market efficiency and perfection. Owidi and Mugo (2016) argued that ideal markets should be efficient and perfect; however, increased volatility introduces risk and inefficiency, deterring risk-averse investors. The Nairobi Securities Exchange (NSE) has experienced notable volatility. The Capital Markets Authority (CMA) reported in 2020 a significant exodus of investors, particularly foreign participants, due to this heightened volatility. This trend aligns with earlier research, which identified persistent and clustered high volatility on the NSE (Rugut, 2021). Rugut (2021) argued that excessive volatility hinders the efficient operation of the market and negatively impacts the performance of the NSE, while Ongeri et al. (2022) found that high volatility reduces investor confidence in the market.

Previous research on stock market volatility has produced mixed results regarding the influence of long-term debt on volatility (Ahmed & Hla, 2019; Andow & Wetsi, 2018; Bayeh, 2013). In Kenya, studies on long-term debt have mainly concentrated on its influence on financial performance (Harrison et al., 2021; Echekoba & Ananwude, 2016; Mwangi, 2016; Kutto, 2020), whereas volatility research has largely focused on macroeconomic factors such as interest rates, exchange rates, inflation, and GDP (Ochieng et al., 2020; Serem et al., 2020; Otajah, 2020; Kemei, 2021; Mbaabu, 2018; Mwai, 2013). Although Yatich (2022) explored the relationship between long-term debt and stock market volatility, their focus was mainly on listed non-financial firms on NSE, not all listed companies. This reveals a research gap in understanding how long-term debt affects stock market volatility on the NSE, especially when considering the moderating role of profitability and controlling for firm size.

OBJECTIVE OF THE STUDY

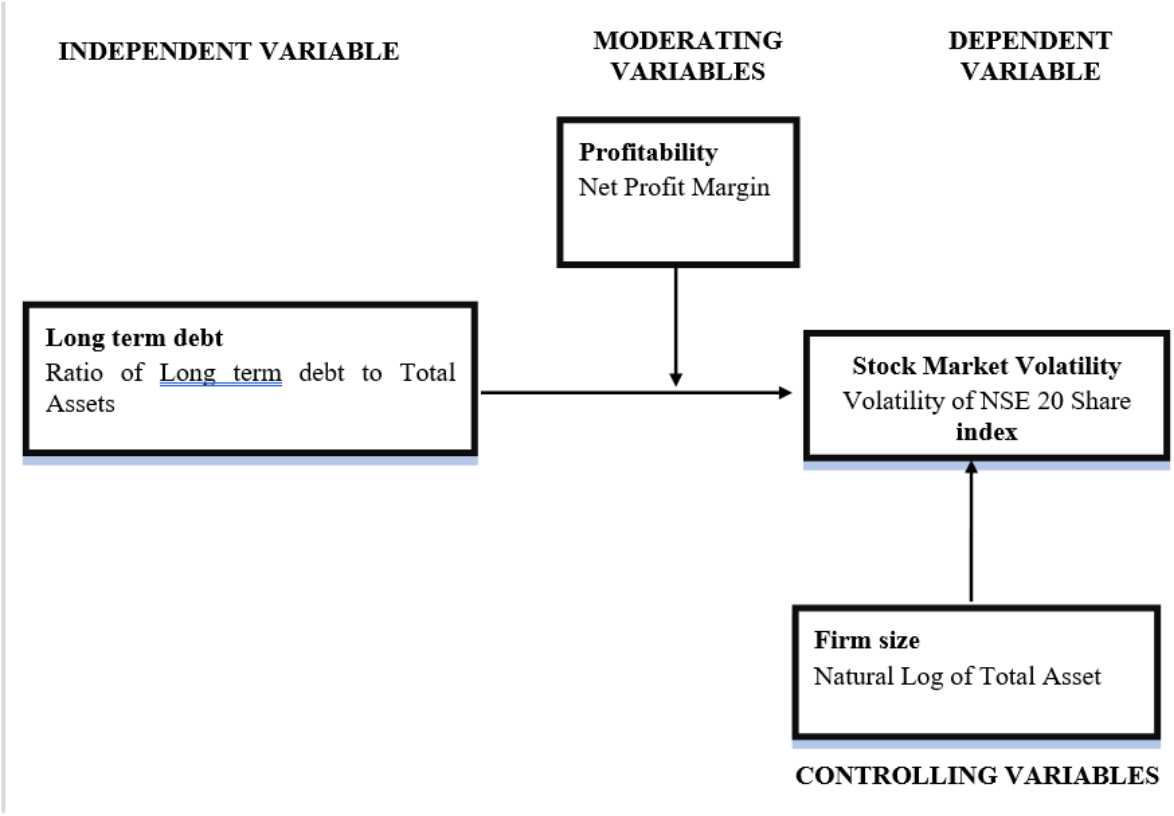
1. To determine the influence of long-term debt on stock market volatility at the Nairobi Securities Exchange (NSE), Kenya.
2. To investigate the moderating effect of profitability on the relationship between long-term debt and stock market volatility at the Nairobi Securities Exchange.

THEORETICAL REVIEW

The study is based on trade-off theory. The trade-off theory of capital structure, originating from Modigliani and Miller's (1958) work and further refined by Kraus and Litzenberger (1973), offers a fundamental understanding of how firms decide on their optimal levels of debt. This theory suggests that firms carefully weigh the benefits of debt, primarily the tax deductibility of interest which reduces the cost of capital and increases firm value (Modigliani & Miller, 1963), against the associated drawbacks. These include a

higher likelihood of financial distress, potential bankruptcy costs, and agency conflicts between shareholders and debtholders (Jensen & Meckling, 1976; Myers, 2001). Regarding long-term debt and stock market volatility, the theory indicates an initial phase where tax benefits exceed costs, possibly leading to higher firm value and reduced volatility due to the perceived stability of long-term financing compared to short-term options (Titman & Wessels, 1988). However, as firms surpass an optimal debt level, the increasing marginal costs, particularly the elevated risk of financial distress, begin to outweigh the benefits, thereby increasing financial risk and stock market volatility (Warner, 1977).

CONCEPTUAL FRAMEWORK



EMPIRICAL REVIEW

The causes of stock market volatility have been extensively studied in finance due to their significant implications for market participants. However, despite considerable scholarly attention, these investigations have yet to yield universally conclusive explanations. Empirical studies exploring how companies finance themselves and the resulting stock market volatility provide diverse insights. For instance, Vuong et al. (2022) found that long-term debt had a negative but insignificant impact on stock market volatility for Vietnamese small and medium-sized enterprises (SMEs), suggesting that while theoretical capital structure models propose debt can reduce volatility through tax shields, its actual stabilising effect might be limited. Conversely, Chen et al. (2014) observed a significant positive relationship between a firm's overall leverage and its stock price volatility in Taiwan, particularly for companies with strong growth prospects, indicating that while debt can support expansion, it also heightens financial risk and market swings for dynamic firms, thus refining the trade-off theory by emphasising that the risk-increasing aspect of leverage becomes more pronounced when firms have substantial growth opportunities. Ahmed and Hla (2019) further revealed that the positive impact of financial leverage on stock return volatility is amplified in economically unstable countries, demonstrating that debt's inherent financial risk provokes more volatile market reactions in vulnerable economic environments.

In the Kenyan context, local studies offer additional perspectives. Mohamed (2017) identified a positive and significant relationship between total debt-to-assets and stock return volatility for firms listed on the Nairobi Securities Exchange, suggesting that higher debt levels can increase market fluctuations by raising perceived default risk. This indicates that the cost of financial distress in emerging markets might substantially outweigh the benefits of debt. Similarly, Yatich (2021) observed a statistically significant positive relationship between long-term debt and stock market volatility among Kenyan non-financial firms, implying that even seemingly stable long-term financial commitments can contribute to market turbulence due to factors such as refinancing risk or perceived inflexibility. These findings urge capital structure theories to consider how specific debt maturities are interpreted by

investors in different market environments. Collectively, these diverse results highlight the ongoing debate in capital structure theory, underlining the need for models that can explain how leverage influences market stability across various firm characteristics, economic conditions, and national contexts, moving beyond universal assumptions to more detailed, context-specific explanations.

RESEARCH GAP

Despite extensive scholarly examination of the causes of stock market volatility, the literature remains inconclusive, especially regarding the role of long-term debt in influencing market dynamics. Empirical studies from different contexts have yielded differing results. For example, Vuong et al. (2022) found an insignificant negative relationship between long-term debt and volatility among Vietnamese SMEs, while Chen et al. (2014) and Ahmed & Hla (2019) reported a significant positive link between leverage and volatility in Taiwan and economically unstable countries, respectively.

In Kenya, studies by Mohamed (2017) and Yatich (2021) offer initial evidence of a positive link between debt and stock market volatility among non-financial firms listed on the Nairobi Securities Exchange (NSE). However, these studies are limited in scope, concentrating on specific sectors and shorter time periods. There remains a substantial gap in understanding how long-term debt influences stock market volatility across all listed companies at the NSE, particularly given the exchange's unique features—such as limited liquidity, evolving regulatory frameworks, and increased sensitivity to economic shocks. A broader, more comprehensive analysis is necessary to capture the full range of firm behaviour in Kenya's capital market.

Existing studies often depend on cross-sectional data, focus on sector-specific samples, and neglect interaction effects that could reveal deeper insights. Furthermore, few have used panel data techniques that consider both firm-level heterogeneity and temporal dynamics. There is a methodological gap in applying random effects panel models or moderated regression frameworks that include firm-level moderators such as profitability and control for variables like firm size. Addressing this gap would enable a more robust and nuanced understanding of how long-term debt impacts stock market volatility in the Kenyan context.

RESEARCH METHODOLOGY

Using a positivist research paradigm and causal research design, this study employed secondary data from 2013 to 2022 for 60 active firms listed on the NSE. Yearly data on long-term debt, profitability, and firm size were collected, alongside monthly NSE-20 share index data. Panel data regression models were used for analysis, with Hausman tests guiding the choice of the most suitable model. To address volatility dynamics, a Generalized Autoregressive Conditional Heteroskedasticity (GARCH 1,1) model was implemented. Firm size served as a control variable throughout the analysis. The robustness and validity of the models were confirmed through various diagnostic tests, including assessments for linearity, normality, multicollinearity, and heteroscedasticity at 5% level of significance. A linearity test using the RESET test ensured that the relationship between the independent and dependent variables was appropriately specified as linear. The Jarque-Bera test was then used to evaluate the normality of the residuals, a suitable approach given the sample size of 600 observations. To check for potential multicollinearity, the Variance Inflation Factor (VIF) was calculated; values above 5 would have indicated problematic intercorrelation among the predictors. Additionally, the Breusch-Pagan test was employed to assess for heteroscedasticity, with a p-value greater than 0.05 confirming the assumption of constant variance. Finally, serial correlation was examined using both the Durbin-Watson and Breusch-Godfrey tests to detect any autocorrelation in the residuals, which would have violated a key regression assumption. The Random Effects Model (REM) was identified as the primary and most effective model for analysing the impact of long-term debt on stock market volatility in Kenya.

$$Yi_t = \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 Z_i + \beta_4 (X_{1it} * Z_i) + \beta_5 (X_{2it} * Z_i) + u_i + \epsilon_{it}$$

Y_{it} dependent variable for entity i at time t
$\beta_0, \beta_1, \beta_{2....} \beta_5$ Beta Coefficients
X_{1it} Long-term debt
X_{2it} Firm size (control Variable)
Z Profitability (Moderator)
u_{it} individual-specific random effect
ϵ_{it} idiosyncratic error term

RESEARCH FINDINGS AND DISCUSSION

Descriptive Statistics

Table 1: Descriptive Statistics

Variable	Long Term Debt	Firm Size	Profitability	Stock Market Profitability
Mean	0.197	16.553	0.322	0.374
Standard Deviation	0.435	2.399	4.775	0.032
Variance	0.189	5.756	22.806	0.001
Minimum	0.000	8.850	-34.22	0.340
Maximum	9.29	12.99	119.75	0.440
Skewness	15.77	-0.814	23.42	0.603
Kurtosis	316.34	-0.511	561.42	-0.859
Observation	600	600	600	600

Descriptive statistics for long-term debt and stock market volatility on the Nairobi Securities Exchange reveal contrasting patterns. Long-term debt exhibits considerable variability, with a mean of 0.197, a significant standard deviation of 0.435, and a wide range from 0 to 9.29, indicating that some firms carry no long-term debt while others are highly leveraged. Its strongly positive skewness (15.77) and extreme kurtosis (316.34) suggest a heavily right-tailed, non-normal distribution, implying a concentration of data at lower values but with occasional, exceptionally high debt levels. In contrast, stock market volatility is much more contained, with a mean of 0.374, a small standard deviation of 0.032, and a narrow band between 0.340 and 0.440. This suggests market fluctuations remained relatively stable during the observed period, reflecting a consistent level of risk. Its slight positive skewness (0.603) points to a minor tendency towards higher volatility, while negative kurtosis (-0.859) indicates a flatter distribution with fewer extreme outliers than a normal distribution. This aligns with the NSE's 2022 report, which noted the NSE 20 share index fluctuating around 35.38% since 2010.

TREND ANALYSIS

Long-Term Debt Trend Line

Figure 1 illustrates that long-term debt among NSE-listed firms fluctuated moderately from 2013 to 2019, starting at 0.19 and remaining relatively stable. A sharp spike occurred in 2020, reaching near 0.34, followed by a steep decline in 2021 and stabilization in 2022. The overall trend indicates stability interrupted by a temporary surge during 2020–2021.

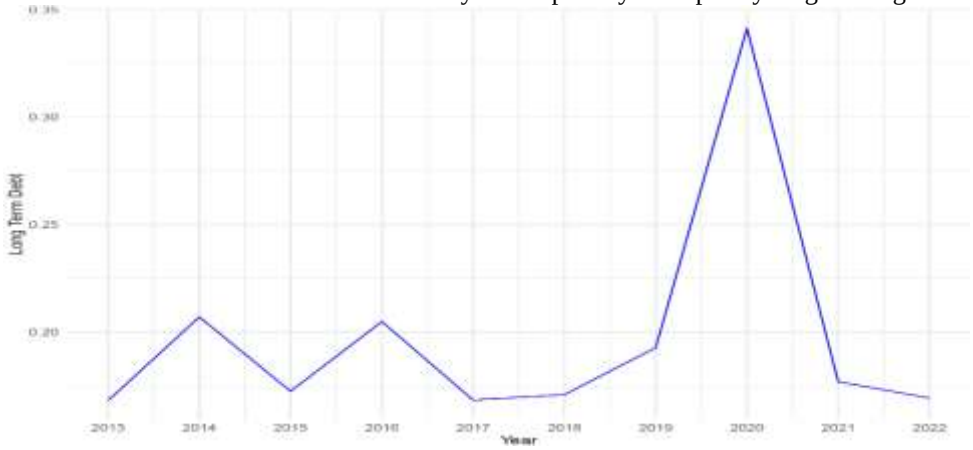


Figure 1: Long Term Debt Trend Line

Stock Market Volatility Trend

Figure 2 illustrates a consistent decline in stock market volatility from 2013 to 2022. Beginning at roughly 0.42, the trend line shows a steady decrease over the decade, reaching approximately 0.36 by 2022. This overall downward movement, with only minor interruptions between 2017 and 2019, suggests a period of increasing market stability and reduced fluctuations.

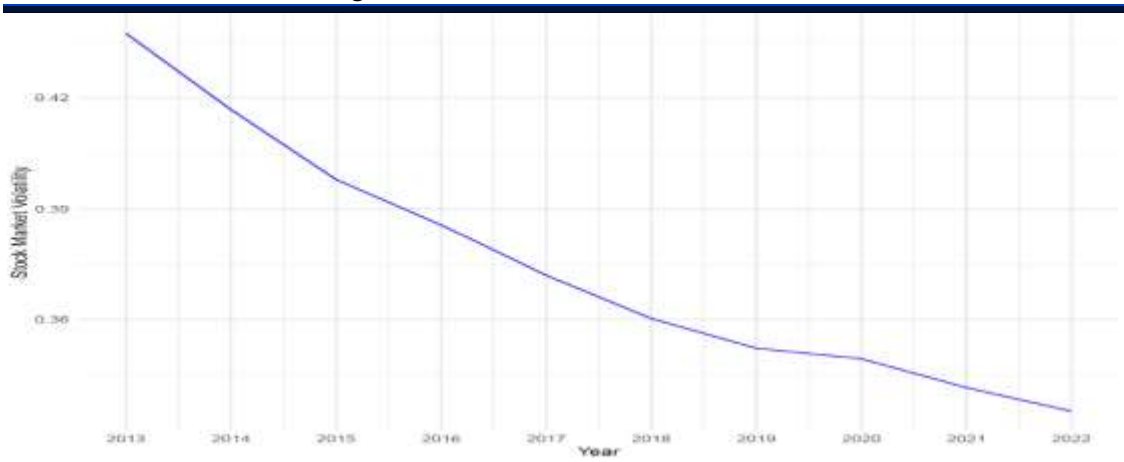


Figure 2: Stock Market Volatility Trend Line

Firm Size Trend

Firm size, as charted in Figure 3, shows an overall upward trajectory from 2013 to 2022. It began at roughly 16.3, climbing steadily until 2015 before leveling off and then dipping slightly in 2019. The growth then resumed from 2020 onward, reaching a new high of around 16.8 by 2022. This demonstrates a consistent pattern of expansion, despite a brief stall in the middle of the period.

Figure 3: Firm Size Trend Line

Profitability Trend

A review of the profitability trend in Figure 4 reveals a flat performance from 2013 to 2022, primarily hovering near zero. The single exception was a dramatic, short-lived increase that peaked around 2.0 in 2019. After this brief surge, profitability quickly declined and reverted to its low baseline for the remainder of the period.

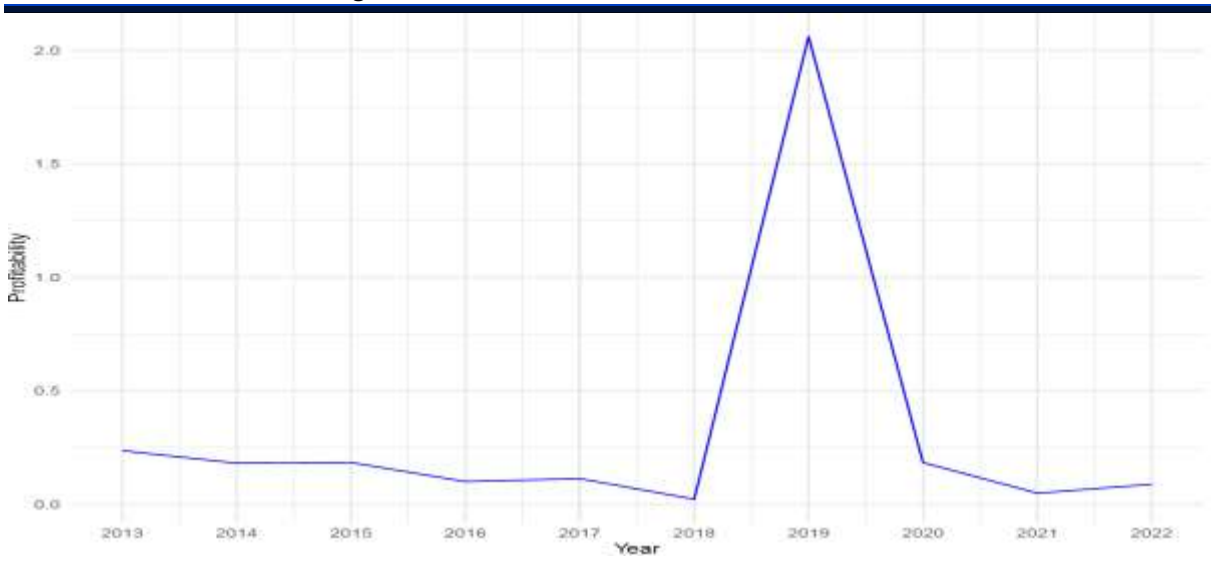


Figure 4: Profitability Trend line

DIAGNOSTIC TESTS

At 5% level of significance, the data met all the key assumptions of the regression model, thus permitting the use of a panel regression model.

Table 2: Normality Test: Jarque–Bera Test

Variable	p-value
Long Term Debt	0.063
Firm Size	0.825
Profitability	0.084
Stock Market Volatility	0.484

Assuming a 5% significance level, all variables had a p-value greater than 0.05. This result leads to the conclusion that the variables are normally distributed.

Table 3: Multicollinearity

Variable	VIF	1/VIF
Long Term Debt	1.02	0.982
Profitability	1.02	0.982
Total Assets	1.00	0.996

Based on the collinearity statistics, the data showed no multicollinearity, as the Variance Inflation Factor (VIF) for all variables was less than 5.

Table 4: Heteroscedasticity: Breusch – Pagan Test

H0: Constant Variance
chi2 = 10.39
Prob > chi2 = 0.209

Given that the p-value is greater than 0.05, we fail to reject the null hypothesis of homoscedasticity, which assumes that the error terms have a constant variance. This finding suggests that a regression model is suitable for the study.

Table 5: Autocorrelation

Wooldridge test for autocorrelation in panel data H0: no first-order autocorrelation
F(1,35) = 7.087 Prob > F = 0.699

Because the p-value is greater than 0.05, we do not reject the null hypothesis, which suggests there's no evidence of serial correlation in the data.

Table 6: Panel Unit Test: Levi Lechun Test

Variable	Test Statistic	P-value
Long Term Debt	-170.00	0.000
Profitability	-27.230	0.000
Firm Size	-64.300	0.000
Stock Market Volatility	-18.100	0.000

At a 5% significance level, the results of the unit root test showed that the variables were stationary. Since the p-values were less than 0.05, the null hypothesis of a unit root was rejected. This confirms that the data is not erroneous and is suitable for use in a panel regression model.

INFERENTIAL STATISTICS

Table 7: Correlation Analysis

Variable	**Y**	**X_1**	**X_2**	**Z**
Y	1			
X_1	0.024 (0.654)	1		
X_2	0.054 (0.000)	-0.13 (0.000)	1	
Z	0.019 (0.000)	-0.03 (0.000)	0.047 (0.000)	1

Where X_1 is Long Term Debt, Z is Profitability, X_2 is Firm Size, and Y is Stock Market Volatility.

The research findings show a positive but statistically insignificant link between long-term debt and stock market volatility for NSE-listed firms (r = 0.024, p = 0.654). This contrasts with the significant inverse relationship reported by Vuong et al. (2022) in the China Security market at the 5% significance level. However, our results agree with the findings of Ayuba et al. (2019) and Ahmed and Hla (2019), who suggest a notably positive effect of long-term debt on firm value and stock market volatility. The results imply that long-term debt may raise volatility, although this effect was not statistically significant in our sample of NSE-listed firms during the study period.

Since the series is stationary at d = 0 and the cointegration test shows no cointegration, indicating that no long-term relationship exists between the variables, the study chooses to fit and determine the best model among the pooled OLS, random effects model, and fixed effects model to capture the short-term relationship between the variables.

RESEARCH MODEL SPECIFICATION

The research identified the optimal model among pooled OLS, random effects, and fixed effects to effectively capture their short-run dynamics.

Lagrange Multiplier Test

The null and alternative hypothesis for the Lagrange Multiplier test is:

Ho: Pooled OLS model is sufficient

Ha: Random Effects model is sufficient

The results are tabulated in Table

Table 8: Lagrange Multiplier Test

Value	df	p-value
1940.2	1	0.000

The null hypothesis was rejected because the p-value fell below 0.05, leading to the selection of the random effects model as the most suitable. To confirm this, a Hausman test was further conducted.

Hausman Test

H_0: Pooled OLS is appropriate
H_a: Random Effects is appropriate

Table 9: Hausman Test for Pooled OLS and Random Effects

Chi-square	df	p-value
123.85	1	0.000

The null hypothesis was rejected once more.

The study then used the Hausman Test to decide whether to fit a pooled model or a fixed effects model. model. The hypothesis tested is

H_0: Pooled OLS is appropriate
H_a: Fixed Effects is appropriate

Table 10: Hausman Test for Pooled OLS and Fixed Effects

Chi-square	df	p-value
124.27	1	0.000

The null hypothesis is rejected with a p-value of 0.000 (below 0.05), confirming the suitability of the Fixed Effects model. After dismissing the pooled OLS model, the study then compared the Fixed Effects and Random Effects models.

H_0: Random effect is appropriate
H_a: Fixed effect is appropriate

Table 11: Hausman Test for Random and Fixed Effects

Chi-square	df	p-value
0.5474	1	0.4593

At a 5% level of significance, the null hypothesis was accepted. Therefore, the random effects model is the most preferred.

Random Effects Model

$$Y_{it} = \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \cdots + \beta_k X_{kit} + u_i + \epsilon_{it}$$

PANEL REGRESSION ANALYSIS

Long-term debt was examined using a random effects panel regression model to assess its relationship with stock market volatility. The results, shown in Table 4.2, evaluated whether a significant link exists between long-term debt and volatility.

Table 12. Panel Random Effects Regression Analysis Model before controlling and moderating

Stock Market Volatility	Coefficient	Std. err.	z	P>z	[95% conf.	interval]
Long Term Debt	0.500	0.1109	4.52	0.000	0.283253	0.717561
Constant	0.37518	0.001445	259.58	0.000	0.372351	0.378017
R-Squared	0.209					
Wald Ch2(1)	8.95					
Prob	0.002799					

The fitted model from the result is:

$$Y = 0.37518 + 0.5001X_2$$

The fitted regression model shows that long-term debt significantly and positively influences stock market volatility at the Nairobi Securities Exchange (β = 0.500, p = 0.000), accounting for 20.9% of the variance in volatility. This finding contradicts studies by Vuong et al. (2022), Ahmed and Hla (2019), and Keefe and Yaghoubi (2016), which reported a negative impact. The positive association at the NSE may occur because higher long-term debt can signal increased financial risk (Bayeh, 2013), impact financial leverage by making firms more sensitive to interest rate and market fluctuations (Nam et al., 2003), and be viewed as a sign of potential financial distress by investors, all of which contribute to greater stock price volatility.

Panel REM with Control variable and unmoderated

Controlling for firm size, the panel random effects regression analysis showed that the model explained a significant 68.36% of the variance in stock market volatility ($R^2 = 0.6836$), indicating a strong relationship between the variables.

Table 13: Controlled REM on the impact of Long-term debt on stock market volatility at NSE controlled by firm size before moderation.

Source	SS	DF	MSS	Number of Observations	600	
Model	58.057	2	29.029	F(2,598)	646.1	
Residual	26.872	598	0.04494	Prob > F	0	
Total	84.929	600	0.14155	R-Squared	0.6836	
				Adj R Squared	0.6819	
R-Sq:	Within		0.6769	Root MSE	0.2120	
	Between		0.7365			
	Overall		0.6836			
Stock Market Volatility	**Coef**	**Std. err.**	**t**	**P>t**	**[95% conf.**	**interval]**
Long Term Debt	1.428	0.761	-1.88	0.061	-2.920	0.0639
Firm Size	0.0204	0.0005	35.88	0.000	0.019	0.0215
Constant	0.5471	1.2071	0.45	0.650	-1.818	2.913

According to the data, long-term debt had a notable and positive effect on stock market volatility across all industries ($\beta = 1.428$, $p < 0.05$), suggesting that a one-unit increase in long-term debt resulted in a 1.428-unit rise in stock market volatility.

The REM is given as:

$$\mathbf{Y_t = 0.5471 + 0.428X_{1t} + 0.0204X_{2t}}$$

Y is stock market volatility, X_1 is long term debt, and X_2 is the firm size.

While long-term debt initially accounted for 20.9% of stock market volatility, including firm size as a control variable increased the model's explanatory power to 68.36%. This notable rise highlights firm size's significant role in explaining stock market volatility at the NSE, providing a more precise understanding of its relationship with long-term debt. The improved R2 aligns with Vuong et al. (2022) and Chen and Zhang (2014) studies emphasising the importance of controlling for firm size.

Moderated and Controlled Panel REM

Table 14: Moderated REM on impact of Long term debt on stock market volatility at NSE

Source	SS	DF	MSS	Number of Observations	600
Model	58.816	5	11.763	F(11,596)	268.13
Residual	26.114	595	0.0438	Prob > F	0.000
Total	84.93	600		R-Squared	0.6923
				Adj R Squared	0.6975
				Root MSE	0.2096
R-Sq:	Within		0.6885		
	Between		0.7231		
	Overall		0.6923		

Stock Market Volatility	Coef	Std. err.	t	P>t	[95% conf.	interval]
Long Term Debt	1.7709	2.480	-0.71	0.475	-6.632	3.909
Profitability	-11.269	20.384	-0.55	0.580	-51.22	28.68
Total assets	0.0207	0.0017	11.59	0.000	0.0208	0.0222
Long Term Debt*Profitability	2.267	13.240	0.17	0.864	-23.68	28.21
Total assets*Profitability	-0.0026	0.0091	-0.29	0.773	-0.020	0.0159
Constant	0.8232	3.9541	0.71	0.475	-4.926	10.573

The analysis indicates that long-term debt has a significant and positive impact on stock market volatility across all industries (β = 1.7709, p = 0.000). This implies that any increase in long-term debt would lead to a 1.7709-unit rise in stock market volatility.
The REM is given as:

$$\mathbf{Y_t = 0.8232 + 1.7709X_{1t} + 0.0207X_{2t} - 11.269Z_t + 2.267X_{1t}Z_t - 0.0026X_{2t}Z_t}$$

Y is stock market volatility, X_1 is Long term debt, Z is profitability(moderator) and X_2 is log of natural assets the control variable. Introducing the control variable caused the R-squared to increase from 20.9% to 68.36%, indicating a much stronger explanation of stock market volatility. A further rise to 69.23% occurred when the moderator was added. These improvements confirm that firm size and profitability are key factors significantly influencing the relationship between long-term debt and stock market volatility.

DISCUSSIONS

The first null hypothesis (H_0), which stated that long-term debt has no significant effect on stock market volatility at the NSE, was rigorously tested using multiple linear regression analysis. The results showed a statistically significant and positive relationship between long-term debt and stock market volatility (β = 0.5001, p < 0.001, R^2 = 0.209). Because the p-value is below the usual significance level of 0.05, the null hypothesis (H_0) was rejected. As a result, the alternative hypothesis, claiming that long-term debt significantly impacts stock market volatility at the NSE, was accepted. This indicates that changes in the long-term debt levels of firms listed on the Nairobi Securities Exchange are linked with systematic shifts in stock market volatility. The positive coefficient (β = 0.5001) shows that an increase in long-term debt correlates with a rise in stock market volatility, while the R^2 value of 0.209 suggests that long-term debt accounts for about 20.9% of the variation in stock market volatility, implying that other factors also have a considerable influence. Furthermore, profitability influenced the relationship between long-term debt and stock market volatility at NSE.

CONCLUSIONS

Long-term debt makes up a smaller part of listed companies' financial structures at the NSE compared to short-term debt, although it rises significantly during uncertain periods such as 2020. Our research revealed a positive and significant relationship between long-term debt and stock market volatility, with profitability and firm size serving as moderating and controlling factors, respectively. This finding is vital for understanding risk dynamics in the Kenyan stock market, indicating that a company's long-term financing choices, especially its use of long-term debt, directly affect price fluctuations. This link likely results from investors' perceptions of increased financial risk associated with greater leverage over extended periods.

RECOMMENDATIONS

Recognising that increased long-term debt can signal heightened financial risk to investors, leading to market volatility, NSE-listed companies are advised to improve their transparency and communication regarding long-term financing decisions. During periods of increased long-term debt accumulation, especially in times of uncertainty, firms should proactively inform investors about their debt management strategies, cash flow projections, and profitability outlooks. This approach, alongside strong financial performance

(profitability) and consideration of firm-specific characteristics (firm size), can help manage investor perceptions and stabilise stock price fluctuations, thereby fostering greater market confidence.

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