Cash Flow Variability, Leverage Structure and Financial Stability of Manufacturing Firms Listed at the Nairobi Securities Exchange, Kenya

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ABSTRACT

Financial stability is a fundamental enabler of sustained operational performance for every corporate entity. A firm's ability to remain financially stable depends on how well it anticipates, monitors and integrates variations in cash flows into its financial planning and decision-making process. Existing literature provides mixed findings on the direct influence of cash flow variability on financial stability, with limited evidence on whether leverage structure mediates the effect of cash flow variability on financial stability. The general objective was to determine the mediating effect of leverage structure on the relationship between cash flow variability and financial stability. Research hypothesis was derived from the objectives. The study was anchored on trade off theory. This study employed positivism philosophy and both descriptive research design were adopted as a framework to guide the study. The study adopted a census approach where only seven firms had 15-year observations and were selected for analysis resulting to 105 observations. Secondary data was obtained from the audited annual financial reports using a data collection sheet. Descriptive statistics were used to summarize the key characteristics of study data. Correlation analysis was conducted to examine the strength and direction of the relationships among variables. Prior to model estimation diagnostic tests were performed to establish data suitability and model reliability. Panel regression model was employed to estimate mediating effects, allowing for a comprehensive analysis of relationships while controlling for unobserved heterogeneity across entities and over time. Hypothesis was tested using t-test at 5% significance level using STATA version 18 and Eviews version 13 to ensure robustness of the estimated coefficients and significance levels. Data was presented in tables and graphs. The findings indicated that leverage structure had no mediation effect on the relationship between cash flow variability and financial stability ($\beta = 0.6238$, $p = 0.4823$). Regulatory frameworks should therefore promote responsible borrowing, transparent disclosure of debt obligations and financing practices that are consistent with firms' repayment capacities. Therefore, Kenya Association of Manufacturers should enhance policies that encourage proper cash flow forecasting and appropriate leverage levels that can improve manufacturing firms financial stability. Further, managers can integrate cash flow management and leverage structure to improve resilience and long-term sustainability.

Keywords: Cash flow variability, Leverage structure, financial stability, manufacturing firms, Nairobi Securities Exchange

INTRODUCTION

Financial stability provides firms with the capacity to withstand market fluctuations and adapt to changing business conditions (Kálmán, 2023), while supporting effective risk management, productivity and optimal allocation of financial resources (Risman *et al*., 2021). Cash flow variability can influence financial stability

either positively or negatively, depending on how firms respond to fluctuations in cash inflows and outflows (Barnabas & Oloyede, 2024; Przychocka *et al*., 2024). Variability in cash flows may encourage firms to strengthen liquidity management, maintain cash reserves, diversify financing sources and improve forecasting and risk management, thereby enhancing their capacity to absorb financial shocks (Kumar, 2025). Conversely, persistent adverse variability may create financing gaps, prompting firms to increase reliance on debt, which can alter their leverage structure and where repayment obligations exceed cash-generating capacity, weaken financial stability. Thus, leverage structure may provide an important pathway through which cash flow variability affects financial stability.

High variability means cash balances change unpredictably, creating risks for operational liquidity while low variability suggests stable, predictable cash flows (Kuti, 2011). This variability can arise from market volatility, changes in consumer demand, operational risks and economic conditions. Cash flow variability quantifies the extent to which fluctuations in prevalent market variables may influence prospective cash flow, while considering ongoing market variability and instability (Han *et al.,* 2014). Additionally, cash flow variability is the maximum expected shock to net cash generated relative to a specific objective, arising from the effects of market risk on a limited set of exposures within a specified disclosure timeframe and confidence interval (Beladi *et al.,* 2021).

In finance, leverage structure describes the composition of a firm's financing that involves the use of debt capital to increase the potential gains or magnify the potential risks and losses of an investment (Brown *et al.,* 2021). It may also refer to the use of borrowed funds to finance a firm's assets and operations, with the intention of enhancing returns to equity holders. While leverage can amplify gains by increasing asset bases and cash flow potential, it can equally magnify losses when performance deteriorates (Myers, 2001). The leverage structure of a firm denotes the composition and relative proportion of its financing mix specifically, the balance between debt and equity employed to support investment activities and operational needs (Brown *et al.,* 2021). Further, leverage structure may be viewed as the mix between **short-term debt** and **long-term debt** that a firm uses to finance its operations and investments (Moro *et al.,* 2009). The growing reliance on debt could eventually lead to difficulties in servicing the company's current loan obligations and may eventually result in loan default or bankruptcy.

Leverage structure is the path through which cash flow variability would influence financial stability. At higher levels of cash flow variability, firms often increase reliance on debt to bridge liquidity gaps (Ahmed *et al.,* 2018). Further, elevated leverage raises fixed interest obligations, which amplify financial distress risk during periods of volatile cash flows. Consequently, leverage structure amplifies the adverse impact of cash flow variability on financial stability by raising the likelihood of default and limiting a firm's operational flexibility. On the flip side, at lower levels of cash flow variability, firms tend to rely more on internally generated funds, thereby maintaining lower leverage levels. This prudent leverage structure reduces financial risk and strengthens overall financial stability. The mediating role of leverage structure is firmly grounded in Trade-Off Theory, which posits that firms balance the tax advantages of debt against the rising costs of financial distress. In environments characterized by high cash flow variability, excessive leverage can outweigh tax benefits, ultimately eroding financial stability (Kraus & Litzenberger, 1973; Shubita, 2023).

Across the world, manufacturing companies balance leverage to optimize tax efficiency and growth, with United Nations Industrial Development Organization (UNIDO) data showing global averages stabilizing near 60% debt-to-assets in 2025 (Rafael, 2025). Regionally, firms in Africa and Asia often face higher borrowing costs and weaker equity markets, pushing them toward debt-heavy structures. The World Manufacturing Foundation highlights that 90% of manufacturers in emerging regions are regionalizing supply chains, which requires upfront capital and increases leverage (Gereffi & Sturgeon, 2013). Kenyan manufacturers operate under tighter credit conditions, with studies noting debt-to-equity ratios above 2.0, driven by reliance on commercial bank loans and limited access to long-term capital markets (Barngetuny, 2025). This elevated leverage exposes them to interest rate volatility and policy variations but also reflects the financing realities of a developing economy where retained earnings and equity issuance are constrained. Further, manufacturing firms listed at NSE typically adopt conservative leverage ratios to protect shareholder value. According to Central Bank of Kenya (CBK) Prudential Guidelines, firms must maintain sufficient equity relative to debt to

ensure solvency, borrowing should not compromise the firm's ability to meet short-term obligations and loans and borrowings must undergo rigorous appraisal to minimize default risk (CBK, 2024).

Variations in future cash flows makes it harder for companies to meet their debt obligations, increasing the risk of default and financial distress (Nguyen & Nguyen, 2022). This heightened risk leads to a decrease in leverage, as firms become more cautious about taking on debt. Lenders will demand higher interest rates to compensate for the increased risk of lending to a company with uncertain cash flows. By increasing debt, companies may reduce the amount of free cash flow available to management, which help to align the interests of management and shareholders and reduce the risk of opportunistic behavior. Higher levels of debt raise a company's financial risk because it is required to meet regular interest and principal repayments, even during periods of declining earnings (Sunaryo *et al.,* 2025). When a company cannot meet its debt obligations, it could face financial distress or even bankruptcy, which results to a significant damage to the firm's value and reputation. Interest payments on debt are tax-deductible, reducing a company's taxable income and thus its tax burden. This tax shield increases the firm's cash flow and potentially its value. If a company generates earnings that exceed the cost of borrowing, the use of leverage amplifies returns to shareholders since the company is using borrowed capital to finance investments and the returns on these investments are then distributed to shareholders.

Leverage structure can be evaluated using Debt-to-Equity Ratio, Debt-to-Capital Ratio and Debt-to-EBITDA Ratio (Handayani *et al*., 2022). Leverage structure can also be evaluated using debt to equity ratio (D/E) since a steadily rising D/E ratio may make it harder for a company to obtain financing in the future (Nukala & Rao, 2021). Jain *et al.* (2018) analyzed leverage in Indian firms using debt-to-equity ratios, debt-to-assets ratios and long-term debt ratios, emphasizing how capital structure choices vary with firm characteristics and industry norms. Similarly, Ahmad *et al.* (2019), in their comprehensive review of financial leverage and corporate performance, highlighted measures such as total debt to total capital, debt-to-equity and interest coverage ratios, showing how moderate leverage can enhance returns while excessive debt increases financial distress. Unlike the debt-to-assets ratio, which focuses on the proportion of assets financed through debt and the debt-to-EBITDA ratio, which relates debt to operating earnings, the debt-to-equity ratio directly reflects the firm's capital structure and the extent to which it relies on creditors relative to owners' funds (Lukanima, 2023).

In this study leverage structure was measured using debt-to-equity ratio since it reflects the balance between a firm's reliance on borrowed funds and shareholders' equity in financing its operations. By showing the proportion of debt relative to equity, it provides insight into the firm's financial risk, capital structure sustainability, and potential vulnerability to insolvency (Swanson *et al.,* 2003). Investors and creditors often prefer this measure because it highlights the degree of financial leverage and the firm's capacity to absorb losses, while managers can use it to evaluate whether the company is maintaining an optimal mix of debt and equity. Moreover, since it normalizes debt against equity rather than total assets, the debt-to-equity ratio is particularly effective in assessing shareholder risk exposure and the firm's ability to generate returns without excessive dependence on external financing.

EMPIRICAL LITERATURE

Naser *et al*. (2024) examined the impact of cash flow variability on debt maturity structure, as well as the interaction effect of cash flow volatility and fixed assets on debt maturity structure. The study applied the two-step system generalized method of moments and analysed 1,672 non-financial publicly listed firms over a 10-year period from 2011 to 2020. The findings indicated a significant negative association between cash flow variability and the debt maturity structure of firms in Middle East and North Africa (MENA) and African countries. While fixed assets capture collateral value and asset structure considerations, the study did not incorporate leverage structure as a mediating variable. This created a conceptual gap because leverage structure was a critical firm-specific factor which can influence cash flow variability -financial stability nexus.

A quarterly COMPUSTAT data for U.S. manufacturing firms was used by Dudley and James (2015) to explore the relationship between variations in cash flow and capital structure choice. The study estimated volatility through the Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model and applied instrumental variable regressions, with tariff changes and trade-weighted foreign exchange rates serving as

instruments, to mitigate endogeneity between volatility and profitability. The findings indicated that variations was negatively related to leverage, especially among financially constrained firms, suggesting that capital structure choices are driven by financial flexibility. Standard GARCH models assume that positive and negative shocks affect variations equally. In reality, cash flow shocks often have asymmetric effects, which GARCH may fail to capture unless extended. Therefore, the current study sought to examine the mediating effect of leverage structure on the relationship between cash flow variability and financial stability.

A study by Kurnia and Riswan (2025) evaluated the impact of cash flow and sales variability and deferred tax expense on earnings persistence with financial leverage as a moderating variable in property and real estate sector companies listed on the Indonesia Stock Exchange (IDX) for the period 2021-2023. Purposive sampling was adopted to select the target population. Ordinary least squares model was adopted to test the direct and moderating effects of leverage on the relationship between variables. The results showed that leverage does not

directly moderate the relationship between the cash flow variability and earnings persistence, but the presence of leverage strengthens the overall regression model. The study used financial leverage as a moderating variable justifying the need for the current study to examine the mediating effect of leverage structure on the relationship between the cash flow variability and financial stability to assess whether the results would differ.

A study by Shubita (2023) examined the relationship between cash flow variability and leverage among non-financial Jordanian companies. Using a quantitative research design, the study analysed panel data from 72 firms listed on the Amman Stock Exchange covering the period 2009–2020 and applied a fixed-effects regression model to control for firm-specific effects. The findings revealed a significant positive relationship between CFV and leverage, indicating that firms experiencing higher cash flow instability tend to rely more on debt financing; firm size and tangibility were positively related to leverage, profitability was negatively related, and growth opportunities were insignificant. The results suggest that firms with volatile cash flows may increase borrowing to sustain operations, while profitable firms prefer internal financing, consistent with pecking order theory. This study examined the direct relationship between cash flow variability and leverage structure but did not consider whether leverage structure could act as a mediating mechanism through which cash flow variability influences financial stability.

Tripathi and Ahamed (2021) examined the relationship between fluctuations in operating cash flow and debt usage in the capital structure of non-financial firms in India the period 2002 to 2019. The study considered a sample of 22,798 firms. The findings showed that there was an inverse relationship between the debt component of capital structure and OCV. A positive relationship was also found between total debt which is adjusted for total market value of the firm and fluctuations of the OCF both in the full sample and the two highest quartiles. While the study provides valuable insights into the relationship between operating cash flow volatility and capital structure in non-financial Indian firms, several limitations constrain the generalizability and conceptual depth of their findings. This study focused on the impact of fluctuations in OCF on debt usage without examining the broader implications of mediating effect of leverage structure on the relationship between the variables.

Using a generalized linear model approach, Memon *et al.* (2018) investigated the influence of changes in cash flows on firms' leverage levels for the Chinese listed firms and measured changes in cash flow using a five-year rolling standard deviation of the cash flow from operations. The findings revealed that higher fluctuations in cash flows results in lower leverage levels, while the sub-sampling analysis revealed that there is no such inverse association in the case of Chinese state-owned enterprises (SOEs). The absence of this inverse relationship suggests that state ownership changes the dynamics. SOEs often enjoy implicit government guarantees and preferential access to credit. As a result, lenders perceive them as safer, even when cash flows are volatile. Managers in SOEs may also feel less pressure to reduce leverage because the state provides a safety net. The study examined the impact of fluctuations in cash flows on firms' leverage levels. However, it did not extend its analysis on the broader implications of cash flow variability on financial stability and the mediating effect of leverage structure on this relationship.

Gathara *et al.* (2019) investigated the effect of leverage on financial performance of selected companies listed in the Nairobi Securities Exchange, Kenya. Causal research design was employed in the study due to the nature

of problem and available. Multivariate tests using panel data model examined the effect of the independent variable on company's financial performance. The study found out that leverage had significant positive effect on financial performance of selected companies listed at NSE. This implies that reliance on leverage enhanced firms' leverage power to explain the variations in financial performance. Although this study established a positive effect of leverage on financial performance, it did not adequately account for trade off theory's proposition that firms balance the tax benefits of debt against the increasing costs of financial distress to determine an optimal level of leverage. In addition, the study examined the direct effect of leverage on financial performance but did not investigate whether leverage structure mediates the relationship between cash flow variability and financial stability. The current study therefore addressed this gap by examining the mediating role of leverage structure in explaining how cash flow variability influences financial stability.

Ding *et al.* (2025) examined how cash flow variability affects investment–cash flow sensitivity (ICFS) among Chinese listed firms. The study focused on 3,868 firms from 1998–2019.The study highlighted that cash flow variability significantly reduced ICFS, especially when internal funds and debt financing are complementary, indicating that cash flow sensitivity mainly affects investment indirectly through the debt financing channel rather than directly, and that ICFS reflects not only financial constraints but also the relationship between internal funds and external debt financing. The study was conducted in China, an emerging economy with strong state influence, bank-dominated financing systems and government interventions such as stimulus programs. Institutional characteristics such as state ownership, credit allocation policies and regulated capital markets may shape how variability affects financing and investment decisions. These structural features differ significantly from other emerging markets such as Kenya or other developing economies with less state-directed credit systems and different capital market dynamics. Hence the findings may not be fully generalizable to manufacturing firms operating in Kenya.

THEORETICAL FRAMEWORK

Trade off Theory

Trade-off theory considers the balancing of tax-shield benefits of using debt and increasing financial distress, such as bankruptcy costs produced by using more debt particularly bankruptcy risks arising from insufficient cash flows to sustain debt commitments (Kraus and Litzenberger,1973). The trade-off theory suggests that firm value is maximized by using debt financing over equity, as it provides tax shield benefits (Boateng *et al*., 2022).

The TOT theory assumes that firms operate in efficient markets, where investors and managers have access to relevant information to make rational financing decisions (Ai *et al.,* 2020) Another assumption is that the tax shield from interest payments provides a clear advantage to using debt over equity. The theory also presumes that the costs of financial distress are quantifiable and predictable, allowing firms to weigh them accurately against tax benefits. Additionally, TOT assumes that firms are risk-neutral and primarily motivated by value maximization, ignoring behavioral and managerial biases.

The Trade-Off Theory is associated with several limitations. In practice, determining the costs of financial distress is often difficult because such costs vary across firms, making it challenging to identify the optimal capital structure (Ai *et al*., 2020). Moreover, TOT assumes static conditions, yet firms operate in dynamic environments where risks, tax laws, and market conditions continuously change. Another limitation is that the theory overlooks managerial preferences and behavioral aspects, such as managerial conservatism or risk aversion, which influences financing choices (Baker & Wurgler, 2002). A major criticism of TOT is its inability to explain real-world financing behavior, especially among profitable firms. Myers (1984) criticized the theory by pointing out that many highly profitable firms with low bankruptcy risk still prefer to finance with internal funds rather than take advantage of the tax shield of debt. This behavior is inconsistent with the trade-off logic but is explained by the Pecking Order Theory, which emphasizes information asymmetry and internal financing preferences.

Shubita (2023) applied TOT to show that firms with higher cash flow variability face greater bankruptcy risk, which limits their ability to exploit debt tax shields. Additionally, Memon *et al.* (2018) relied on TOT to show

that Pakistani firms adjust leverage depending on profitability, asset tangibility and bankruptcy risk. Trade off theory is relevant in the current study because firms that experience moderate levels of cash flow variability and adjust their leverage conservatively, debt financing provides tax advantages and signal market discipline, thereby enhancing financial stability. However, under high cash flow variability, firms may either over-rely on leverage to compensate for limited internal funds or fail to reduce debt exposure in line with shrinking cash inflows. This imbalance amplifies bankruptcy risks, increases financial distress costs, and undermines financial stability.

METHODOLOGY

This study focused on manufacturing firms listed on the Nairobi Securities Exchange which the principal securities market in Kenya. Positivism is particularly relevant because cash flow variability can be translated into a composite index, financial stability measured through financial metrics such as financial stability index. The study adopted a descriptive research design within a longitudinal panel-data framework. A census approach was adopted where only seven firms had 15-year observations and were selected for analysis resulting to 105 observations. The study used a secondary data collection sheet as the research instrument for gathering information on cash and cash equivalent, total assets, total debt, total equity over 15 years period. The annual reports for the period between 2010 and 2024 were collected from the NSE website. The researcher collected data upon obtaining the necessary permits; ethical clearance from the Chuka University Ethics Committee and secure a research permit from the National Commission for Science, Technology and Innovation (NACOSTI). Secondary data was obtained from the published financial statements, annual reports and NSE website and was guided by secondary data collection sheet. The process of analyzing and presenting the data began with data processing, screening data for accuracy, completeness and free from error, editing and coding data in an excel sheet (Khan, 2022). This step involved detecting and correcting missing values, outliers and any errors in data entry. Once cleaned, the data was systematically coded and imported into Stata (Version 18) for statistical analysis. Data was analyzed using descriptive statistics and inferential statistics. Descriptive statistics such as mean, standard deviations, minimum, maximum, skewness and kurtosis was used to summarize key study variables and describe the characteristics of the data (Mishra *et al.,* 2019). Correlation analysis was employed to examine the strength and direction of the linear relationship among the study variables (Alford & Teater, 2025). It helped to determine whether variations in one variable are associated with changes in another. The correlation coefficient ranges from –1 to +1, where –1 indicates a perfect negative relationship, +1 indicates a perfect positive relationship and 0 indicates no linear relationship between the variables. Principal component analysis was used to calculate financial stability index. Data was presented using graphs and tables. To test the study hypotheses, panel ordinary least squares model was employed to assess the effect of the independent variables on the dependent variable. Diagnostic tests such as linearity, normality, heteroscedasticity, autocorrelation and multicollinearity were conducted to assess the appropriateness of the model. A Hausman test was conducted to determine the preference between fixed effects (FEM) and random effects (REM) models (Bollen & Brand, 2010).

RESULTS AND DISCUSSION

Cash flow Variability

Cash flow variability is the independent variable and was calculated using a 3-year rolling window standard deviation of cash and cash equivalent to total assets which reflects the consistency or volatility of cash holdings across consecutive periods rather than at a single point in time. Although the study period covered 2010 to 2024, financial data for 2008 and 2009 were also collected to facilitate the computation of the three-year rolling standard deviation required to generate the first cash flow variability observation for 2010.

$$\sigma CCEA = \sqrt{\frac{1}{t-1}\sum_{t=1}^{3}(CCEA_{it} - \overline{CCEA_{it}})^2}$$

Where: $\sigma CCEA_{it}$ =Rolling Window Standard Deviation of cash and cash equivalents Scaled by Total Assets

t-Time period

i-Manufacturing firms

CCEA-Cash and cash equivalent to total assets

Financial Stability

Financial Stability was measured using financial stability index based on the metrics of current ratio, solvency ratio and return on assets. The following steps were followed to construct the financial stability index. Kaiser-Meyer- Olkin (KMO) test was conducted to test suitability for index construction using Principal Component Analysis**.** The KMO measure assesses the adequacy of the sample for factor analysis by evaluating whether the variables share sufficient common variance to justify extraction of a common factor. KMO values range from 0 to 1, with values above 0.50 generally considered acceptable for factor analysis. Table 1 shows the Kaiser-Meyer-Olkin measure of sampling adequacy.

Table 1: Kaiser-Meyer-Olkin Measure of Sampling Adequacy

Variable	KMO
CR	0.667
SR	0.5556
ROA	0.5773
Overall	0.5831

Source: Researcher (2026)

The overall KMO value of 0.5831 as shown in Table 1 indicates that the three indicators; current ratio, solvency ratio and return on assets have an acceptable level of shared variance for factor analysis. Therefore, the overall KMO supports the suitability of using principal component analysis to construct the financial stability index. The current ratio recorded the highest KMO value of 0.6670, indicating a satisfactory level of common variance with the other indicators and suggesting that it contributes strongly to the underlying financial stability index. The solvency ratio had a KMO value of 0.5556 whereas return on assets recorded a KMO value of 0.5773. Both values exceed the recommended minimum threshold of 0.50, indicating that each variable shares sufficient common variance with the remaining indicators to be retained in the PCA. Although SR and ROA exhibit relatively lower sampling adequacy than CR, they still make meaningful contributions to measuring the latent construct of financial stability.

Table 2: Bartlett Test of Sphericity

Chi-square = 49.468
Degrees of freedom = 3
p-value = 0.000
H0: variables are not intercorrelated

Source: Researcher (2026)

Bartlett Test of Sphericity produced a statistically significant result (χ^2 (3) = 49.468, df=3, p =0.00< 0.05) leading to rejection of null hypothesis that the variables are not intercorrelated as shown in Table 2. The results confirm that there are sufficient relationships among CR, SR and ROA to justify application of PCA. The significant interrelationships among these indicators confirm the existence of common underlying variance, supporting their combination into a composite measure of financial stability through principal component. Principal component eigenvalues and contribution of each of the three components, CR, SR, ROA to the total FSI variance was calculated.

Table 3: Principal Component Eigenvalues

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp 1	1.7702	0.982	0.5901	0.5901
Comp 2	0.7881	0.3465	0.2627	0.8528
Comp 3	0.4417		0.1472	1

Source: Researcher (2026)

Table 2 presents the PCA results for the financial stability indicators. The findings show that the first principal component (Component 1) has an eigenvalue of 1.7702, which exceeds the Kaiser criterion of 1.0, indicating that it explains a substantial proportion of the common variance among the three indicators. Specifically, Component 1 accounts for 59.01% of the total variance, suggesting that it adequately summarizes the information contained in the current ratio, solvency ratio and return on assets. Since its eigenvalue is greater than one, this component was retained for constructing the composite financial stability index.

On the other hand, Component 2 has an eigenvalue of 0.7881, accounting for 26.27% of the total variance while Component 3 has an eigenvalue of 0.4417, explaining 14.72% of the variance. Both components have eigenvalues below the recommended threshold of one and therefore, do not satisfy the Kaiser retention criterion. Consequently, they were not retained in the construction of the financial stability index. The PCA results indicate that a single principal component is sufficient to represent the underlying financial stability construct. The retained component explains 59.01% of the total variation in the three financial stability indicators, demonstrating that the current ratio, solvency ratio and return on assets share a substantial amount of common information. The findings therefore justify combining these indicators into a single composite financial stability index for subsequent analysis.

Table 4: Principal Component Loadings

Variable	Comp 1	Comp 2	Comp 3	Unexplained
CR	0.4888	0.8338	0.2565	0
SR	-0.6439	0.1465	0.7509	0
ROA	0.5886	-0.5322	0.6086	0

Source: Researcher (2026)

Table 4 presents the eigenvectors showing the contribution of each indicator to the extracted principal components. Focusing on the retained first component, CR and ROA had positive coefficients of 0.4888 and 0.5886, respectively, while SR had a negative coefficient of −0.6439. In absolute terms, SR made the largest contribution to the first component, followed by ROA and CR. The negative coefficient for SR indicates that it contributes to the retained component in the opposite direction to CR and ROA. Accordingly, the first principal component can be represented as $PC_1 = 0.4888Z(CR) - 0.6439Z(SR) + 0.5886Z(ROA)$, where Z represents the standardized value of each indicator. The retained component therefore provides a parsimonious composite measure incorporating the information contained in the three underlying indicators

Correlation Analysis

Cash flow Variability, Leverage Structure and Financial Stability

Pearson product moment correlation coefficient was used in the correlational analysis of cash flow variability, leverage structure and financial stability and the findings are presented in Table 5.

Table 5: Correlation Analysis of the Mediation Effect

Variables	-1	-2	-3
(1) CFV	1		

(2) LEVERAGE	-0.211**	1	
	-0.03		
(3) FSI	0.074	-0.189*	1
	-0.454	-0.053	
*** p<0.01, ** p<0.05, * p<0.1			

Source: Researcher (2026)

The correlation results in Table 5 show the relationships among cash flow variability (CFV), leverage and financial stability (FSI). CFV has a negative and statistically significant correlation with leverage ($r = -0.211$, $p = 0.030$), indicating that firms with higher cash flow variability tend to have lower leverage levels. However, the magnitude of the correlation is weak, suggesting that the association between cash flow variability and leverage is relatively small. CFV has a positive but statistically insignificant correlation with financial stability ($r = 0.074$, $p = 0.454$). This suggests that higher cash flow variability is weakly associated with increased financial stability, but the relationship is not statistically distinguishable from zero at conventional significance levels. Finally, leverage has a negative and weak correlation with financial stability ($r = -0.189$, $p = 0.053$), which is statistically significant at the 5% level. This implies that firms with higher leverage tend to exhibit lower financial stability, although the relationship is relatively weak.

Cash flow Variability, Leverage Structure and Financial Stability

The study's second objective was to determine the mediating effect of leverage structure on the relationship between Cash flow variability and financial stability of manufacturing firms listed at the NSE.

Panel Model Estimation of CFV, LS and FS

The study sought to determine the mediating effect of leverage structure on the relationship between cash flow variability and financial stability of manufacturing firms listed at the NSE.

The analysis was guided by the following null hypothesis;

H_{O1}: Leverage structure has no statistically significant mediating effect on the relationship between cash flow variability and financial stability of manufacturing firms listed at the NSE

The following regression model framework was adopted;

$FS_{it} = \beta o + \beta_5 CFV_{it} + \boldsymbol{\varepsilon}_{it}$-path c
$LS_{it} = \beta o + \beta_6 CFV_{it} + \boldsymbol{\varepsilon}_{it}$ -path a
$FS_{it} = \beta_0 + \beta_7 CFV_{it} + \beta_8 LS_{it} + \boldsymbol{\varepsilon}_{it}$-path b and c′

Before fitting the panel regression model, a series of diagnostic tests were conducted to determine if the assumptions of panel regression were met.

Diagnostic Tests

In this section, normality test, heteroskedasticity, autocorrelation and Hausman test were assessed to test if the assumptions of the panel regression model were satisfied.

Normality Test

The normality of the residuals for model was done using Jarque bera is shown in Table 6. The null hypothesis of Jarque-Bera test is that residuals do not deviate from normality.

Table 6: Normality test for CFV, LS and FSI

Model 1	*Chi-square*	*P-value*
Path a (X, M)	*70.11*	*0*
Path b and c' (X, M, Y)	*70.11*	*0.0001*

Source: Researcher (2026)

The Jarque–Bera statistic of Path b Model was 70.11 with a p-value of 0.0000 as presented in Table 6 and indicates that the residuals from the mediator model are not normally distributed. This suggests substantial departures from normality due to skewness, kurtosis, or both. Similarly, for the outcome model (Path b and c′), the Jarque–Bera statistic was 70.11 with a p-value of 0.0001, leading to rejection of the null hypothesis of normality. These results suggest that the residuals of both mediation models exhibit significant departures from normality.

Heteroscedasticity Test

Modified Wald Test for Groupwise Heteroskedasticity was used to test the null hypothesis that the disturbance terms are homoscedastic at 5% level of significance. The results are presented in Table 7.

Table 7: Modified Wald Test for CFV, LS and FS

Model 1	*Chi-square*	*P-value*
Path a (CFV, LS)	*1.3*	*0.5226*
Path b and c' (CFV, LS, F)	*44.87*	*0*

Source: Researcher (2026)

The heteroscedasticity test produced mixed results across the mediation models as shown in Table 7. For Path a, which estimates the relationship between cash flow variability and the leverage structure, the Chi-square statistic was 1.30 with a p-value of 0.5226. Since the p-value was greater than the 5% significance level, the null hypothesis of constant error variance was not rejected. This indicates that Path a did not exhibit heteroscedasticity, and therefore the homoscedasticity assumption was satisfied. In contrast, the model estimating Paths b and c′, involving the CFV, LS and FS, produced a Chi-square statistic of 44.87 with a p-value of 0.0000. Since the p-value was below 0.05, the null hypothesis of homoscedasticity was rejected, indicating the presence of heteroscedasticity in the second model. Thus, PCSE was employed for the affected model to ensure reliable statistical inference.

Autocorrelation Test

Autocorrelation was tested using Wooldridge Test for autocorrelation in panel data and the results are presented in Table 8.

Table 8:Wooldridge Test for CFV, LS and FS

Wooldridge test for autocorrelation in panel data
Path b
H0: no first order autocorrelation
F(1,6) = 16.948
Prob > F = 0.0062
Path b and c′
H0: no first order autocorrelation
F(1,6) = 22.482
Prob > F = 0.0032

Source: Researcher (2026)

The Wooldridge test was conducted to determine whether first-order serial autocorrelation was present in the panel regression models as shown in Table 8. For Path a, the test produced an F-statistic of 16.948 with a p-value of 0.0062. Since the p-value was less than the 5% significance level, the null hypothesis of no first-order autocorrelation was rejected, indicating that serial autocorrelation was present in the Path a model. Similarly, for the model estimating Paths b and c′, the Wooldridge test yielded an F-statistic of 22.482 with a p-value of 0.0032. The null hypothesis was therefore also rejected, confirming the presence of first-order serial autocorrelation in the Paths b and c model. The findings imply that the error terms across successive periods are correlated, violating the assumption of independence of disturbances. Consequently, an estimation procedure that accounts for serial correlation should be employed to obtain reliable standard errors and statistical inference.

Breusch and Pagan Lagrangian Multiplier Test

The Breusch–Pagan Lagrange Multiplier (LM) test was conducted to determine whether the pooled OLS model or a panel regression model was more appropriate for the analysis (Kozhan, 2019). The Breusch Pagan LM test results are shown in Table 9.

Table 9: Breusch Pagan LM Test Results for Mediation

	Mediation
Chi-square test value	129.25
P-value	0

Source: Researcher (2026)

The results produced a chi-square test statistic of 129.25 with a p-value of 0.0000 as presented in Table 9. Since the p-value is less than the 5% significance level, the null hypothesis of no significant panel-level effects was rejected. This indicates the presence of significant firm-specific effects in the data and therefore, a panel regression model was preferred for estimating the mediation relationship.

Hausman Test

Hausman test for specification was used to choose between the Fixed effects model and random effects model. The results of the test are shown on Table 10.

Table 10: Hausman Test for Specification

	Path a	Path b and c′	Path c
Chi-square test value	1.5407	12.4428	0.2781
P-value	0.2145	0.002	0.5979

Source: Researcher (2026)

Table 10 shows the Hausman specification test for Path a which produced a chi-square statistic of 1.5407 with a p-value of 0.2145, which is greater than the 0.05 significance level. Therefore, the null hypothesis that the random effects estimator is appropriate cannot be rejected. This indicates that there is no statistically significant difference between the fixed effects and random effects coefficient estimates for this model. Consequently, the random effects model was considered appropriate for estimating the effect of the independent variable on the mediator. For Path b and c′, the Hausman test yielded a chi-square statistic of 12.4428 with a p-value of 0.0020, which is less than 0.05. Thus, the null hypothesis was rejected, indicating that the differences between the fixed effects and random effects estimators are statistically significant. This suggests that the random effects assumptions are violated because the unobserved individual effects are correlated with the explanatory variables. Therefore, the fixed effects model was adopted to estimate the simultaneous effects of the independent variable and the mediator on the dependent variable.

The Hausman test for the total effect model (Path c) produced a chi-square statistic of 0.2781 and a p-value of 0.5979, which exceeds the 0.05 level of significance. Accordingly, the null hypothesis was not rejected, implying that the random effects estimator is consistent and efficient. Hence, the random effects model was considered appropriate for estimating the total effect of the independent variable on the dependent variable.

Panel Corrected Standard Errors Model for Mediation Effect

In the presence of autocorrelation and heteroscedasticity, PCSE model makes it possible to address autocorrelation and heteroscedasticity problem. Panel Corrected Standard Errors Model was estimated and the results are shown in Table 11.

Table 11: PCSE for Path c

Variable	*Coefficient*	*Std. Err.*	*t-statistic*	*P>|t|*
CFV	*2.58944*	*1.04266*	*2.4835*	*0.0146*
Constant	*-0.1505*	*0.3338*	*-0.4453*	*0.657*
R-squared	0.0388			
F-statistic	4.1577			
p-value	0.04401			

Dependent Variable: Financial Stability
Source: Researcher (2026)

The results in Table 11 indicate that cash flow variability has a positive and significant effect on financial stability ($\beta = 2.5894$, p-value =0.0146<0.05). The model explains 3.88% of the variation in financial stability ($R^2 = 0.03880$). Therefore, the null hypothesis that cash flow volatility has no significant effect on financial stability was rejected at the 5% significance level. The results satisfy the requirement that Cash Flow Variability has a statistically significant effect on the Financial Stability Index in Path c. The second step was to establish the effect of cash flow variability on leverage structure and the results are presented in Table 12.

Table 12: PCSE Path a

Variable	Coefficient	Std. Error	t-statitsic	P>|t|
CFV	-0.7717	1.37709	-0.5604	0.5764
Constant	1.12823	0.3091	3.65004	0.0004
R^2=0.0028				
Wald Chi-square (1)=0.2930				
Prob > Chi-square=0.5894				

Dependent Variable: Leverage Structure
Source: Researcher (2026)

The overall model also provides little explanatory power, with an R-squared of 0.0028, implying that Cash Flow Variability explains only 0.28% of the variation in leverage as presented in Table 12. In addition, the Wald Chi-square statistic of 0.2930 (p = 0.5894) indicates that the model is not statistically significant overall, suggesting that CFV does not meaningfully explain variations in the leverage structure. From a mediation perspective, these findings indicate that the relationship between Cash Flow Variability and leverage structure is not statistically significant. Since a mediator should be significantly associated with the independent variable to support the mediation mechanism, these results provide no evidence that leverage mediates the relationship between Cash Flow Variability and Financial Stability Index (FSI) at this stage. The final step is to examine the mediation effect of leverage structure on the relationship between cash flow variability and financial stability as shown in Table 13.

Table 13: PCSE for Path b and c′

Variables	Coefficient	Std. Error	t-statistic	P-value	
CFV	2.81642	1.27335	2.21182	0.0294	
LS	0.28559	0.10697	2.66969	0.0089	
Constant	-0.4731	0.15928	-2.9703	0.0038	
Number of Observations			105		
Number of Firms			7		
Observations per Firm			15		
R-squared			0.604223		
Wald Chi-square (2)			18.32008		
Prob > Chi-square			0		

Dependent Variable: Financial Stability
Source: Researcher (2026)

The model demonstrates substantial explanatory power, with an R-squared of 0.6042, indicating that approximately 60.42% of the variation in the financial stability is jointly explained by cash flow variability and leverage structure while 39.58% of variations in financial stability is caused by other factors not in the model as presented in Table 13. Furthermore, the Wald Chi-square statistic of 18.3201 ($p=0.0000 < 0.05$) indicates that the model is statistically significant overall, confirming that the explanatory variables jointly provide a good fit to the data. The constant term is negative and statistically significant ($\beta = -0.4731$, $p = 0.0038$), indicating the expected value of the financial stability index when both cash flow variability and leverage are zero.

The results indicate that cash flow variability has a positive and statistically significant direct effect on the financial stability even after controlling for leverage structure. The estimated coefficient of 2.8164 implies that a one-unit increase in cash flow variability is associated with an average increase of approximately 2.8164 units in the Financial Stability, holding leverage constant. This relationship is statistically significant ($t = 2.2118$, $p = 0.0294$), indicating that cash flow variability independently contributes to improvements in financial stability. The findings further reveal that Leverage structure has a positive and statistically significant effect on the Financial Stability Index ($\beta = 0.2856$, $t = 2.6697$, $p = 0.0089$). This implies that a one-unit increase in leverage structure is associated with an average increase of approximately 0.2856 units in the Financial Stability, controlling for cash flow variability. The significance of leverage structure suggests that it is an important determinant of financial stability in the manufacturing firms.

The mediation panel regression equations are presented as follows.

Step 1 Total Effect path c

FS = -0.1505+ 2.5894CFV
Where c=total effect
c=2.5894

Step 2 Path a
LS = 1.1282 -0.7717CFV

Step 3 Path b and c′
FS=-0.4731 + $2.8164CFV_{it}$ + 0.2856LS

b=effect of leverage structure on FS

c′=direct effect after controlling for leverage structure

c=2.5894

a=-0.7717

b=0.2856

c′=2.8164

a*b= -0.2204

2.5894-0.2204≠2.8164

The final step compares the total effect (c) with the direct effect (c'). If mediation exists, the direct effect should be smaller than the total effect after the mediator is introduced into the model. In this study, however, the direct effect increased from (c = 2.5894) to (c' = 2.8164). This indicates that the inclusion of leverage structure did not reduce the effect of cash flow variability on financial stability. Instead, the relationship became slightly stronger. The direct effect may become larger after adding the mediator due to suppression or where there is multicollinearity between CFV and LS. Sobel test was conducted to determine whether the indirect (mediated) effect of an independent variable on a dependent variable through a mediator is statistically significant. The results indicated sobel z=-0.548 with a p-value of 0.584 implying that the indirect effect was not statistically significant at the 5% level. The null hypothesis that the indirect effect of the CFV on the FS through LS is not statistically significant was failed to be rejected. This implies that although cash flow variability may directly influence financial stability, its effect is not transmitted through changes in leverage structure. This implies that leverage structure does not constitute a significant mechanism through which cash flow variability affects the financial stability of the sampled manufacturing firms. Further, the researcher conducted bootstrapping to provide a robust and accurate test of the significance of the indirect effect by repeatedly resampling 5000 resamples at 95% confidence interval to estimate the sampling distribution of the indirect effect. This procedure generated an empirical sampling distribution of the indirect effect (a × b), from which confidence intervals are derived. Bootstrapping results are shown in the Table 14.

Table 14: Bootstrapping Results

Effect	Estimate	Bootstrap SE	t-statistic	p-value	95% CI	Decision
Path a: CFV → Leverage	-3.6693	2.1453	-1.7104	0.0872	(-7.4018, 0.9737)	Not significant
Path b: Leverage → FSI	-0.17	0.2049	-0.8297	0.4067	(-0.4781, 0.2897)	Not significant
Direct effect (c′)	0.5755	2.0737	0.2775	0.7814	(-3.0344, 7.0450)	Not significant
Total effect (c)	1.1993	2.7188	0.4411	0.6591	(-3.3939, 9.5657)	Not significant
Indirect effect (a×b)	0.6238	0.8879	0.7026	0.4823	(-0.9522, 2.5827)	Not significant

Source: Researcher (2026)

The bootstrapping results indicate that leverage structure does not mediate the relationship between cash flow variability and financial stability. The results show that the effect of cash flow variability on leverage structure (Path a) was negative and statistically insignificant (β = −3.6693, t = −1.7104, p = 0.0872) as shown in Table 14. Similarly, the effect of leverage structure on financial stability (Path b) was negative and statistically insignificant (β = −0.1700, t = −0.8297, p = 0.4067). The direct effect of cash flow variability on financial stability was positive but statistically insignificant (β = 0.5755, t = 0.2775, p = 0.7814), while the total effect was also positive and statistically insignificant (β = 1.1993, t = 0.4411, p = 0.6591). The indirect effect of cash flow variability on financial stability through leverage structure was 0.6238, with a bootstrap standard error of 0.8879 and a p-value of 0.4823. The 95% bootstrap confidence interval ranged from −0.9522 to 2.5827 and

included zero. This indicates that the indirect effect was not statistically significant. Therefore, the null hypothesis that leverage structure mediates the relationship between cash flow variability and financial stability was not rejected. The findings therefore, demonstrate that leverage structure does not significantly mediate the relationship between cash flow variability and financial stability among manufacturing firms listed on the Nairobi Securities Exchange. The cause of the difference in the coefficients for bootstrapping and PCSE could be that PCSE adjusts the covariance matrix to account for specified panel error structures, while bootstrapping estimates uncertainty through repeated resampling. The study relied mostly on bootstrapping results since bootstrapping provides a direct assessment of the statistical significance of the indirect effect through the estimation of its confidence interval.

The findings indicate that firms should not rely solely on adjusting their leverage structure to mitigate the effects of cash flow variability on financial stability. While maintaining an appropriate debt level remains important, managers should place greater emphasis on strengthening liquidity management, improving cash flow forecasting, enhancing working capital efficiency and implementing comprehensive risk management strategies. These operational measures are likely to have a more direct influence on financial stability than changes in leverage alone. Additionally, the results suggest that policies aimed at enhancing corporate financial stability should extend beyond promoting optimal capital structures. Financial institutions, investors and policymakers should recognize that firms' resilience to cash flow volatility depends on broader financial management capabilities rather than leverage decisions alone. Encouraging firms to improve liquidity management, operational resilience and financial flexibility may contribute more effectively to corporate stability, investment continuity and sustainable economic growth than policies focused exclusively on debt financing.

The absence of a mediating effect implies that managers should treat leverage decisions and cash flow risk management as related but independent financial strategies. Managers should continue maintaining prudent debt levels consistent with the Trade-off Theory, but they should not expect changes in leverage structure alone to reduce the impact of cash flow variability on financial stability. Instead, managerial efforts should focus on maintaining adequate liquidity reserves, strengthening internal cash generation, improving operational efficiency, diversifying funding sources and developing robust financial risk management systems. By emphasizing these areas, firms can enhance financial stability more effectively than by relying solely on capital structure adjustments. The findings contradict those of Dudley and James (2015) who found that variations in cash flows were negatively related to leverage, especially among financially constrained firms, suggesting that capital structure choices are driven by financial flexibility. Additionally, the findings differ from Shubita (2023) who revealed a significant positive relationship between CFV and leverage structure. The results contradict trade off theory since it postulates that firms determine an optimal capital structure by balancing the tax benefits of debt against the costs of financial distress. Under this proposition, leverage is expected to serve as an important mechanism through which cash flow variability influence financial stability.

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