



Corporate Risk-Taking Behaviour and Working Capital Management Efficiency: Evidence from Nigerian Manufacturing Firms

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Abstract

This study examines the impact of corporate risk-taking behaviour on the efficiency of working capital management of the listed manufacturing companies in Nigeria over the period 2015 to 2024. Data on 40 sample companies (400 firm-years) were used and analyzed by Data Envelopment Analysis (DEA) to determine the optimization frontier, and the model was estimated using Panel Corrected Standard Errors (PCSE), which can control serial correlation and corporate growth. The empirical results show that financial risk is positively and significantly influencing the working capital efficiency ($\beta = 0.457$, $p < 0.05$), operating risk is positively and significantly influencing the working capital efficiency ($\beta = 0.019$, $p < 0.05$) while the impact of capital intensity risk on working capital efficiency is insignificant. This study is an empirical contribution as it moves the discussion on working capital away from the linear ratios and to a multi-dimensional DEA optimization frontier directly connected to behavioral risk attributes. In practice, it is suggested that manufacturing corporate boards should establish a working- capital structure that provides for the least asset slacks and also has a strong liquidity cushion to avoid structural insolvency, while being adjusted to the level of risk associated with the business.

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JEL Classification: G32, M40, M41

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1. INTRODUCTION

In emerging markets, with the uncertainty of the macroeconomic environment, using financial means is vital for a company's survival for optimizing its use in the short term. WCME as an important strategic barrier (Adebimpe & Udo, 2025) in the Nigerian manufacturing sector with all these unpredictable changes in interest rates, high and persistent inflation rate and great fluctuations in foreign exchange rates is very important. In the past, empirical studies have measured this efficiency with linear and single ratio approaches such as Cash Conversion Cycle (CCC), Days Sales Outstanding (DSO) and Current Ratio (Umoren et al., 2024). However, these traditional measures measure the value of assets and liabilities individually, and do not reflect all the dimensions of the trade-off decisions of allocating resources. To overcome this drawback, modern financial studies use a non-parametric linear programming technique - Data Envelopment Analysis (DEA) that treats optimization of working capital as a frontier problem (Seth et al., 2024). Working capital efficiency, in the DEA context, is the ability of a firm to use its short-term resources (inventories, receivables and cash slack) as efficiently as possible to generate important short-term cash flows (cash flow from operations and revenues). The fact is that a company cannot be found in this DEA efficiency frontier in isolation; it depends on the strategic direction and risk-taking approach of the company's management. In Nigeria, the volatile environment of the economy presents executives with a tough dilemma of managing risk to the business, through operating risk, capital intensity risk and financial risk, which actually affects short-term resource structures. For example, high operating and financial risk taking can lead to aggressive, lean approaches that reduce holding periods but that can result in the company being in serious danger of running out of product when supply chains break down (Almazari, 2023). On the other hand, executives with a risk-averse mindset tend to save more cash and stock, so that much needed capital remains stuck in current assets that are not generating any returns, while the multi-dimensional resource efficiency (Allianz, 2024) drastically declines. With these risk dimensions not matching with structural liquidity requirements, manufacturing plants are hit with high level of financial distress, and consequently, they scale down production or withdraw completely from the Nigerian Exchange Group (NGX). Right now, there is no empirical evidence-based measure for boards to use when assessing how these risk propensities actually contribute to frontier efficiency, other than taking into account corporate growth. This operational difficulty shows that there are a number of deep and complex deficiencies in the current empirical literature. The analysis of the reviewed studies in Sub-Saharan region, revealed that most of the local studies are limited to direct correlation of working capital parameters with absolute profitability measures such as Return on Assets (ROA), and failed to address the operating parameters which precede such choices such as operating, capital intensity and financial risk (Barine, 2023). Moreover, literature examining corporate finance and corporate risk-taking behavior is almost exclusively on long-term capital structures or R&D intensity and neglects the short-term asset frontiers in firms (Aslam et al., 2025). In terms of methodology, the existing literature on manufacturing research in Nigeria is very simplistic, and it has been found that past manufacturing studies do not take into account the concurrent input-output slacks that exist in corporate manufacturing finance, resulting into a conspicuous lacuna

in the manufacturing research literature in the West African region in the use of advanced DEA in the manufacturing domain. The novelty and key contribution of this study is the pioneering synthesis of two fields, behavioral corporate finance and advanced operational research from a perspective of the emerging market. Secondly, this study is a departure from the restrictive linear ratios in financial literature of Nigeria, but uses a non-linear framework of analysis namely, a Slack Based Measure Data Envelopment Analysis (SBM-DEA) framework that allows for a robust multi-input, multi-output efficiency frontier, which is reflective of the realities of operations (Seth et al., 2024). Second, this is a very innovative empirical nexus that places corporate risk-taking behavior in three distinct categories (operating risk, capital intensity risk, and financial risk), as the key driving forces of this empirical DEA-derived efficiency frontier and controls for the confounding factor of firm growth. This study offers a sound empirical template for Chief Financial Officers, corporate boards, and institutional investors to use when designing a company's risk management strategy to optimize operating liquidity in times of systemic economic stress, going beyond tired, circular debates of "Liquidity versus Profitability".

2. LITERATURE REVIEW

2.1 Theoretical Framework

Risk-Return Trade-off Theory

The risk-return trade-off theory (Markowitz, 1952) and the pecking order theory (Donaldson, 1961; Myers & Majluf, 1984) are the two theories that are used to theoretically support this study because these theories jointly explain how a corporate's risk disposition affects the tactical optimization of resources. The classical corpus of corporate finance literature, popularly known as the Risk-Return Trade-Off (RRT) Theory, suggests that high returns to operations come at the cost of exposure to structural insolvency risks, which is a concern for executives (Aslam et al., 2025). The idea of this theory is that for a company, its operating risk tolerance and financial risk tolerance will dictate whether it will adopt an aggressive or conservative liquidity posture in the framework of working capital management. Aggressive structures involve using as little working capital as possible to maximize returns on the output and conservative structures involve use of more working capital in an effort to build a safety cushion for operations to maintain returns on output in the short term. This was supported by the pecking order theory, which suggests that firms would prefer to fund their activities from internal sources rather than by external funds, such as debt and equity funds, because such funds involve high cost of asymmetric information (Ibrahim & Yahaya, 2024). Internal working capital is an important buffer of finance for a manufacturing company if they are in volatile emerging markets such as Nigeria as it is the first available source of finance for company operations without disrupting companies' operations. This means that, due to high investments in long-lived assets, firms will have to take aggressive action to optimize their short-term asset structures to ensure they have enough liquidity, therefore directly affecting the firm's multi-dimensional technical efficiency frontier, and thus their capital intensity risk.

2.2 Conceptual Framework

This study incorporates the corporate risk-taking behavior and the efficiency of working capital management into a single multi-dimensional operational system with the conceptual framework. Corporate risk-taking behaviour is a result of management's strategic willingness to take decisions with uncertain outcomes and is fully captured by three different dimensions of risk – operating risk, capital intensity risk and financial risk (Alzugaiby, 2024). Operating risk is the natural fluctuation of a business's operating income; it is the volatility of a company's operating cash flows against market demand shocks or domestic cost pressures. Structural risk caused by the commitment of a high share of capital expenditures for fixed asset investments in total capital invested of a firm is called as capital intensity risk. Financial risk, on the other hand, segregates the risk of default from the vulnerability of a firm's leverage position since during economic downturns default risks are heightened by high levels of debt (Adebimpe & Udo, 2025). Typically, these risk factors are thought to linearly affect working capital using only a single indicator such as cash conversion cycle (CCC) (Banerjee & Deb, 2024). This study, however, takes a different approach to the concept of Working Capital Management Efficiency (WCME) by moving it from a simple time-based measure to a non-parametric optimization frontier (Seth et al, 2024). In the DEA approach, working capital management is regarded as a production system to optimize more than one short-term input (such as accounts receivable, inventory, accounts payable and cash balances) together to realize maximum financial output (such as revenue and operating cash flow), which is the objective (Charnes et al., 1978; Sunday & Joseph, 2017). The manufacturing firm is at its best efficiency when it operates on the DEA frontier that is it is part of the frontier where there are no resource slacks or waste of any kind at a given size of operation. Most importantly, the position on this efficiency frontier is constantly shifted by changes in corporate size, as it is a key control variable. Corporate growth is a confounding factor as it is part of the expansion rate of the firm and it has a significant impact on the scale economies, bargaining power over suppliers, and the structures of resource usage that directly affect the frontier without any influence of managerial risk configurations, as firms expand, they can expect to enjoy higher scale economies, bargaining power over suppliers, and resource usage structures that change independently of the managerial risk configurations (Aktas et al., 2015; Ujah et al., 2020).

2.3 Empirical Review

Previous research on the nature of the relationship between the firm's risk-taking behavior and the liquidity short-term horizons has been fragmented across the globe, with studies focusing on the long-term outcomes of investment or on R&D intensity (Alzugaiby, 2024; Aslam et al., 2025). In the literature, much attention is given to the impact of working capital policies on the organizational risk profile, as opposed to the other way around, for example Akbar et al. (2021) and Samaneh and Mohammad (2016) found that working capital policies have a significant impact on the risk management capacities of the organization in the aspects of operational,

market and institutional risk. Moreover, recent evidence indicates that the systemic shocks (e.g., the COVID-19 crisis) and inherent firm risks substantially affect the structure of the cash conversion components of executives, whether in an aggressive or conservative way (Tarighi et al., 2024).

For Sub-Saharan African and other contexts of development, the empirical literature is still methodologically narrow and restricted. A few regional studies have a financial service entity or an Saving Association as their focus that leads them to conclude that short-term asset configuration plays together with other associated risk protocols as a determinant of liquidity risk management and overall corporate performance (Namikoye et al., 2019; Setiyono & Ernawati, 2017). However, in the present days, the study of manufacturing in Nigeria always uses the basic linear ratio in the same manner as the average collection period as a measure of the impact of working capital on the profitability of the business, measured directly against other raw profitability ratios like the Return on Assets (ROA) (Umoren et al., 2024). The ratio-driven approaches are highly simplistic and do not consider the slacks of the inputs and outputs at the same time, therefore creating a significant gap in the literature in terms of the use of the more sophisticated optimization frontiers such as Data Envelopment Analysis, (DEA) in the manufacturing sector in West Africa. As a result, daily resource optimisation frontiers under volatile macroeconomic conditions have been neglected in the literature because of the lack of attention given to the strategic role of operating risk, capital intensity risk and financial risk as drivers of the optimisation frontiers (Barine, 2023).

This leaves a critical gap: There is a lack of empirical evidence that provides insight into how a manufacturing company's multidimensional risk-taking behavior affects its ability to reduce its operational slacks and increase its output efficiency when it is analyzed from an optimization perspective. Given the conceptual and empirical literature review, this study aims to fill the identified gap of literature creating a singular composite hypothesis to be tested in the relationship between the corporate risk configurations and frontier efficiency. As such, the null hypothesis was that:

H₀: Corporate risk-taking behavior has no significant effect on the working capital management efficiency of listed manufacturing firms in Nigeria.

3. METHODOLOGY

3.1 Research Design and Sample Selection

The method used for this study is ex post facto which is a method that examines the relationship between the variable of corporate risks and the efficiency of corporate working capital management after the fact. This design is very suitable because it takes the history (secondary data) from the audited financial statements of companies quoted on the Nigerian Exchange Group (NGX) which are free from manipulation. The population of the study is all 56 manufacturing companies listed on NGX for the past 10 years (2015-2024). The sampling technique used

was purposive sampling which was based on data availability, structural uniformity and activity of the trade of the manufacturing firm within the scope of the study and from this 40 manufacturing firms were selected. This results in a balanced panel data set of 400 firm-year observations, which is enough for determining the cross-sectional variations as well as the time-series dynamics in a very turbulent macroeconomic period.

3.2 Measurement of Variables and Model Specification

In this study, Data Envelopment Analysis is used to develop a more comprehensive working capital management efficiency index instead of relying on the traditional metrics, which are only capable of measuring the cash conversion cycle. DEA is a non-parametric linear programming method, which aims to assess the relative efficiency of decision-making units in terms of measuring multiple inputs and multiple outputs. The efficiency frontier is defined in this analysis assuming variable returns to scale (VRS) for the inputs. It is a reflection of the fact that in the current operation, the quantity of the production factors used are directly under the control of the corporate managers and the macro-economic outputs would be determined mostly by the market. The following four things enter into the model in the form of operational inputs: inventory (X1), accounts receivable (X2), accounts payable (X3), and operating expenses (X4). The three outputs of corporate performance (Y1, Y2, Y3) are compared to the following inputs: sales revenue, operating profit and cash flow from operations. This ratio will be between 0 and 1 and the closer the ratio is to 1, the more efficient the working capital structure is and the closer it is to the efficiency frontier.

The key independent variables are the different structural aspects of corporate risk and each is measured through different accounting measures. Capital intensity risk is calculated by fixed asset/total asset ratio that is used to measure the structural exposure of a firm to illiquid, long-term investment commitments (Harjoto & Laksmana, 2018). The measure of operating risk is the standard deviation of the return on assets in the analytical period reflecting the normal operational volatility and uncertainty of the basic corporate operations (Palomino et al., 2019). The total debt-to-total assets ratio is a measure of financial risk, which includes the contractual leverage obligations and exposure to severe liquidity constraints (Zhang et al., 2023). Lastly, the model controls the sales growth, which is a percentage change of the total sales revenue compared to the previous year (Alrahamneh et al., 2025). The input-oriented linear programming model is set up for each of the manufacturing firms as follows:

$$\min_{\theta, \lambda} \theta$$

$$\sum_{j=1}^n \lambda_j X_{ij} \leq \theta X_{io}, i = 1, 2, 3, 4$$

$$\sum_{j=1}^n \lambda_j Y_{rj} \geq Y_{ro}, r = 1, 2, 3$$

$$\sum_{j=1}^n \lambda_j = 1$$

$$\lambda_j \geq 0$$

In DEA model, λ_j can be considered as the intensity variables and θ is the score of efficiency. The efficiency score ranges from 0 to 1, where $\theta = 1$ indicates that the firm is at the efficient frontier and hence all the working capital resources are used optimally and a value less than 1 indicates that the WCM is not efficient. The derived DEA efficiency score is, therefore, the WCME, which is then used in the next econometric analysis (Charnes et al., 1978; Banker et al., 1984). The study uses the following panel regression model to explore the connection between CRTB and WCME:

WCME = f (CIR, FINR, OPR)

$$WCME_{it} = \beta_0 + \beta_1 CIR_{it} + \beta_2 FINR_{it} + \beta_3 OPR_{it} + \beta_4 GRT_{it} + \mu_{it} + \lambda_t + \varepsilon_t$$

Where:

WCME = Working Capital Management Efficiency (DEA Score)

CIR = Capital intensity risk

FINR = Financial risk

OPR = Operating risk

GRT= Sales growth

β_0 = Constant term

$\beta_1 - \beta_4$ = Coefficients of the explanatory variables

μ_{it} = Unobserved firm-specific effects

λ_t = Time-specific effects

ε_t = Error term

4. RESULTS AND DISCUSSION

4.1 Descriptive Statistics

Table 1: Descriptive Statistics

	WCME	CIR	FINR	OPR	GRT
Mean	0.566	0.330	7.822	0.175	4.452
Maximum	0.862	0.586	14.915	0.461	16.935
Minimum	0.133	0.171	0.284	-0.801	-14.659
Std. Dev.	0.834	0.135	5.091	0.351	9.759
Skewness	-0.815	0.738	-0.285	-2.431	-0.881
Kurtosis	3.331	2.556	1.801	7.446	2.631
Jarque-Bera	1.153	0.990	0.735	18.090	1.349
Probability	0.562	0.610	0.693	0.000	0.509

Source: Researcher's Computation, 2025

A descriptive statistical analysis was conducted to assess the distributional property of the variables for the 40 sampled manufacturing firms in Nigeria during the period 2015 to 2024 as shown in Table 4.1. The results show that the mean score of Working Capital Management Efficiency (WCME) is 0.566. This means that the firms have an average short-term resource efficiency of 56.6% and the gap between their operational efficiency is 43.4% due to the holding of capital in non-performing current assets. There is a significant difference between the maximum efficiency score (0.862) and minimum (0.133) and a relatively high standard deviation (0.834) highlighting the considerable variation in the tactical responses of manufacturing companies in meeting their liquidity requirements during times of economic uncertainty. As for corporate risk-taking proxies, the mean values are relatively stable, at 0.330 for Capital Intensity Risk, suggesting that the proportion of the firms' total asset base represented by fixed tangible assets is around 33.0%. On the other hand, Financial Risk (FINR) has a high leverage situation, with a mean debt/equity ratio of 7.822.

This is an unusually high level of leverage as it shows that external borrowing was required to a very high level of intensity, with some firms having reached an extreme maximum debt exposure of 14.915. Operating Risk (OPR), which indicates the volatility of earnings, has a mean of 0.175, but is as low as a distressed 0.175. Finally, the control variable, corporate growth (GRT), shows a modest mean growth rate of 4.452%, but it has a very high variance, ranging from a peak growth of 16.935% to a catastrophic decline of -14.659%, showing a very polarized business world. Both the skewness and the kurtosis of the dataset are highlighted by their respective formal tests, while the Jarque-Bera test for normality further reinforces these insights. Capital Intensity Risk (CIR) is the only variable with a positive skew (0.738) while the other variables (WCME, FINR, OPR, and GRT) are all negatively skewed and left tailed. The kurtosis statistics show that OPR (7.446) has very

peaked, fat tails and is a highly leptokurtic distribution, whilst the other variables are platykurtic or near-mesokurtic. Importantly, the Jarque-Bera normality tests confirm normality of WCME ($p = 0.562$), CIR ($p = 0.610$), FINR ($p = 0.693$) and GRT ($p = 0.509$) for the probability values that are higher than the 5% significance level. However, Operating Risk (OPR) cannot be considered a normal case ($p = 0.000$), which makes it more appropriate to use the Panel Corrected Standard Errors (PCSE) to ensure strong statistical inferences.

4.2 Correlation Analysis

Table 2: Correlation Matrix and Variance Inflation Factors

	WCME	CIR	FINR	OPR	GRT	VIF
WCME	1.000					
CIR	0.438	1.000				4.03
FINR	0.532	0.324	1.000			5.198
OPR	-0.196	-0.632	0.052	1.000		1.711
GRT	0.032	0.001	0.14	-0.52	1.000	1.619

Source: Author's Computation

The correlation co-efficient show different base level relationships between corporate risk taking and short-term resource optimization. Working Capital Management Efficiency (WCME) is positively correlated with Capital Intensity Risk ($r = 0.438$) and Financial Risk ($r = 0.532$) implying that the need to closely manage the liquid resources in the short run stems from the pressures that arise from structural capital and debt. On the other hand, Operating Risk (OPR) shows a negative correlation with WCME ($r = -0.196$), suggesting that increased volatility in the core operating earnings has a negative effect on the cycles of stable short-term resources planning. The base line correlation for efficiency ($r = 0.032$) is very low and positive with corporate growth (GRT).

The correlation coefficient and VIF values were checked for severe multicollinearity using the standard econometric benchmarks. The highest correlation among the independent variables is -0.632 between Operating Risk (OPR) and Capital Intensity Risk (CIR), which is safely below 0.70, the threshold level. In addition, the VIF values vary from 1.619 (GRT) to the highest value of 5.198 (the Financial Risk FINR). The values do not exceed the standard statistical value of 10, so the diagnostic results indicate that there is no severe multicollinearity, and the panel model is stable and valid for regression estimation.

4.3 Diagnostic Test

Table 3: Diagnostic Tests

Test	F-Statistics	Prob.	Remarks
Breusch -Godfrey Serial Correlation	1.1941	0.0109	Presence of serial correlation
Breusch-Pagan Heteroskedasticity Test	0.5159	0.7294	No presence of heteroskedasticity

Statistically, prior to interpreting the final regression coefficients, several diagnostic tests are required in order to make sure that the residuals of panel model satisfy the classical linear regression assumptions. The diagnostic suite primarily deals with two important threats to statistical inference: serial correlation or autocorrelation; and heteroskedasticity. The empirical results of these tests are presented in Tab. 4.3. The Breusch-Pagan test was used to test the assumption of homoskedasticity that implies that the variance of the error terms should be the same for all observations. An F-statistic of 0.5159 and a probability value of 0.7294 were produced from the test. This indicates that this p-value is much larger than the usual 5% level of significance, so the study does not reject the null hypothesis of homoskedasticity. This is a confirmation that the residuals have the same variance for all of the manufacturing firms sampled, so that heterogeneity is not a concern with the standard errors in the model. The Breusch-Godfrey test for higher order serial correlation was calculated, however, the F-statistic is 1.1941 with a probability value of 0.0109. As the p value is below the 0.05 level ($p < 0.05$), the null hypothesis that there is no serial correlation is rejected and there is first-order serial correlation in the panel data. When left uncorrected, traditional Ordinary Least Squares (OLS) or Fixed/Random Effects (FRE) standard errors will be substantially underestimated as well, and will result in exaggerated t-statistics and erroneous conclusions for hypothesis testing. This diagnostic result gives an econometric argument for the need to move away from the traditional panel estimators and adopt the Panel Corrected Standard Errors (PCSE) approach. The model explicitly accommodates the temporal dependency and the AR (1) serial correlation that were found in the residuals by using PCSE. This adjustment guarantees that the standard errors calculated are more robust, that the t-statistics are not inflated, and that the regression analysis that is performed that results in coefficients for the policy recommendations are stable, valid, and reliable.

4.4 Panel Corrected Standard Error

Table 4: Panel Corrected Standard Error (PCSE)

Variable	Coeff	Std. Err	Z	z p-value
Const	59.82	7.867	7.60	0.000
CIR	0.268	1.811	0.15	0.882
FINR	0.457	0.067	6.82	0.000
OPR	0.019	0.009	2.11	0.040
GRT	-0.389	0.270	-1.44	0.150
Adjusted R ²	0.530			
Wald Chi2	54.55			
p-value	0.000			
Obs.	400			

Source: Author's Computation

Since the serial correlation was previously identified, the model was estimated using Panel Corrected Standard Errors (PCSE) to correct for it in order to examine the empirical relationship between corporate risk-taking behavior and working capital management efficiency. The empirical results are summarized in Table 4.4. The overall diagnostic indicators show that the model is statistically sound and has high explanatory power. The Wald chi2 statistic value of 54.550 ($p = 0.000$) indicates that the explanatory risk factors jointly have a highly significant effect on short-term resource optimization and the Adjusted R2 rate of 0.530 indicates that the model explains 53.0% of the total variations across 400 firm-year observations in Working Capital Management Efficiency (WCME). Efficiency ($\beta = 0.457$, $Z = 6.82$, $p = 0.000$) and Operating Risk (OPR) ($\beta = 0.019$, $Z = 2.11$, $p = 0.040$) have positive and highly significant effects on Financial Risk (FINR) as well as on Operating Risk (OPR), respectively, on an individual basis. In contrast, the positive link between Capital Intensity Risk (CIR) and the efficiency frontier is statistically insignificant, with a $\beta = 0.268$, $Z = 0.15$ and $p = 0.882$, while the link between growth (GRT) and the efficiency frontier is statistically negative but still not significant ($\beta = -0.389$, $Z = -1.44$ and $p = 0.150$). The empirical findings are used in the evaluation of the composite null hypothesis (H_0) which hypothesized that the overall risk taking behavior of firm has no significant influence on the working capital management efficiency of manufacturing firms in Nigeria. The combined Wald chi2 probability is very significant ($p < 0.01$), and two of the three primary proxies for risk (financial risk and operating risk individually) have statistical significance lower than the 5% threshold, so the combined null hypothesis is rejected. The statistical decision reinforces the fact that corporate risk-taking practices, especially in the form of leverage structures and core earnings variance, are an important structural determinant that has a meaningful impact on a multi-dimensional working capital efficiency frontier of listed manufacturing companies in Nigeria.

4.5 Discussion of Findings

This research study presents the empirical results of the relationship between the empowerment of listed Nigerian manufacturing companies' working capital management efficiency frontier, measured by the Data Envelopment Analysis (DEA) and the corporate risk management behavior. The most significant finding is that Financial Risk (FINR) positively and significantly influences Working Capital Efficiency. On a macro-economic level, this suggests that greater leverage for manufacturing companies in Nigeria's difficult macro-economic setting is a strict discipline device. When interest rates are mounting, and the commercial banking system is tightening credit, highly leveraged companies can't afford to invest in expanding inventories or extending customer credit limits. Rather, because the cash flow constraint for fixed debt service payments determines the firm's cash flow, the managers are under pressure to aggressively cut resource slack, shorten collection times, and push back payables dates, moving the firm nearer to the DEA efficiency frontier.

The finding is supported by the Risk-Return Trade off Theory which proposes that the higher the risk level, the higher the demand for the managers to obtain the optimum returns from their operations and the more efficient they must be in order to prevent structural insolvency. It is also consistent with the Pecking Order Theory because managers' debt levels deplete the available financing opportunities and they have to depend heavily on the hyper-efficient restructuring of their short-term liquid assets. In recent empirical research, the positive association has been corroborated by works like those of Aslam et al. (2025) and Ibrahim and Yahaya (2024), who found that capital structure pressures provide the impetus for optimizing asset holdings in the short term in emerging markets. This finding, however, contradicts the arguments of Barine (2023) and Almazari (2023) that argue excessive financial risk results in liquid cash buffers being depleted, default risk and ultimately operational inefficiencies because of the disruption of smooth working capital cycles.

Likewise, the effect of Operating Risk (OPR) was positive and statistically significant on the working capital efficiency. The economic significance of this finding is linked with the defensive tactical responses taken by Nigeria manufacturing executives to volatile core earnings. If the firm is a company that has to manage with frequent and unpredictable swings and rising prices that are fueled by sudden increases in raw material prices and fuel costs, then management finds itself unable to adopt passive, routine liquidity management. Rather, they employ very flexible strategies of working capital, frequently altering their levels of inventories and tightening their credit terms to help ensure that cash flow remains stable in times of greater earnings uncertainty. This discovery is consistent with the Risk-Return Trade-Off theory, and indicates that when operating is unstable, there is a tendency to be aggressive with resource optimization.

This outcome is corroborated empirically by Alzugaiby (2024) and Banerjee and Deb (2024) who found that the more volatile the operating environment, the less slack resources will be available, and the more alert the management will be. On

the other hand, it directly contradicts the empirical work of Umoren et al. (2024), who showed that the operating risk of severe operating risk is responsible for the frictions in the supply chain and mismatches in cash flow, which drag firms away from optimal efficiency frontier. The results also showed that the Capital Intensity Risk (CIR) and corporate growth (GRT) had no statistically significant effect on the working capital frontier. The low capital intensity shows that high and low levels of fixed capital, by themselves, do not imply short run liquidity efficiency. In addition, the relative unimportance of growth indicates that, under extreme macroeconomic stress, an uptick in raw sales growth is no guarantee of multi-dimensional efficiency unless there is a systematic management of input slacks. The results of this study suggest a shift from liquidity guidelines that are one-size-fits-all to those that are specific to corporate boards and financial regulators. Rather, the Chief Financial Officers (CFOs) and manufacturing corporate boards need to adopt risk-adjusted working capital structures. In particular, it is important to actively track the performance of companies with lower financial and operating risk to counteract complacency and build-up of non-productive asset slacks, and of highly exposed companies to ensure that the efficiency drives are not overly aggressive, resulting in technical insolvency in the event of systemic economic shocks.

5. CONCLUSION

The findings of this study indicate that the corporate risk-taking behavior is one of the most important structural influences, which influences multi-dimensional short-term resource optimization in the manufacturing industry of Nigeria. The empirical evidence shows that increased financial and operating risks are not necessarily destabilizing for manufacturing companies, but rather are a very strong disciplinary and catalytic force to drive out operational slacks and to move operations towards the Data Envelopment Analysis (DEA) efficiency frontier. One point of limitation is however, that this study only covered listed manufacturing companies on Nigerian Exchange Group, excluding the large manufacturing enterprises which are not listed on the exchange group, but who are small and medium enterprises, and thus are even more constrained in the access to credit. Future research should build upon these results by adding unlisted firms to a comparison framework, and by using dynamic two-step System Generalized Method of Moments (GMM) estimations to explicitly consider any potential endogeneity problems with risk profiles and operational frontiers.

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