

## Cost Drivers and Financial Algorithm in the Nigerian Capital Market

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### Abstract:

*This study examines the interaction between cost drivers and financial algorithms in shaping capital market outcomes in Nigeria. Using a balanced panel dataset of fifteen listed deposit money banks over the period 2018–2023, the study employs panel econometric techniques, including fixed effects, random effects, and Hausman specification tests. Findings reveal that operating and financing costs exert significant negative effects on market performance, while strategic expenditure and financial algorithms positively influence valuation efficiency and investor responsiveness. The Hausman test confirms the suitability of the fixed effects model, indicating the presence of firm-specific heterogeneity. The study concludes that effective cost management combined with algorithmic financial integration enhances capital market efficiency in Nigeria. Policy implications emphasize improved cost control, increased digital investment, and strengthened regulatory frameworks to support algorithmic trading systems.*

**Keywords:** Cost Drivers, Financial Algorithm, Capital Market, Nigeria, Market Efficiency

### 1. Introduction

The Nigerian capital market has undergone significant transformation in recent years, driven by rapid digitalisation, financial innovation, and evolving cost structures within firms. The contemporary financial environment is increasingly characterised by algorithm-driven investment decisions and heightened sensitivity to cost dynamics in determining firm value and market performance. Within this evolving landscape, cost drivers particularly operating and financing costs remain critical determinants of firm performance and investor perception. Traditionally viewed as internal accounting variables, cost drivers are now recognised as strategic factors shaping financial outcomes and competitive positioning in capital markets (Hilton, 2005). In parallel, the emergence of financial algorithms, including algorithmic trading systems, predictive analytics, and data-driven valuation models, has fundamentally reshaped how market information is processed and reflected in asset prices. These algorithmic systems enhance the speed, accuracy, and efficiency of financial decision-making by enabling investors to analyse large datasets, identify patterns, and optimise portfolio allocation (Boukherouaa et al., 2021). Consequently, financial algorithms have become central to modern capital market operations, influencing liquidity, price discovery, and overall market efficiency. However, the effectiveness of these algorithms depends significantly on the quality, reliability, and structure of financial information, particularly cost-related data embedded in corporate disclosures.

Within emerging markets such as Nigeria, the capital market plays a pivotal role in mobilising long-term funds, supporting corporate expansion, and facilitating economic development. The Nigerian Exchange Group (NGX) serves as a key platform through which firms access equity financing while providing investors with opportunities for wealth creation. Despite its strategic importance, the Nigerian capital market continues to face structural challenges, including cost inefficiencies, market volatility, weak governance frameworks, and limited adoption of advanced financial technologies (Toby & Dibiah, 2021). These

challenges create a complex environment where rising operational costs, inflationary pressures, exchange rate instability, and regulatory constraints interact with emerging algorithmic financial systems. Firms listed on the NGX are increasingly confronted with the need to manage diverse cost drivers such as administrative overheads, financing costs, production expenses, and compliance-related expenditures. These cost components significantly influence profitability, firm valuation, and investor confidence. At the same time, the growing deployment of financial algorithms introduces new dynamics in how market participants interpret financial information and respond to performance signals. Algorithmic systems rely on structured and high-quality data inputs; thus, inconsistencies or inefficiencies in cost structures may distort algorithmic outputs and reduce predictive accuracy (Kou et al., 2021).

Despite the global advancement of algorithmic finance, the Nigerian capital market remains characterised by structural inefficiencies and persistent cost-related constraints. Many listed firms experience unstable cost patterns driven by macroeconomic challenges such as inflation, high energy costs, elevated borrowing rates, and infrastructural deficits. These factors adversely affect firm profitability, market valuation, and investor confidence (Ogunleye & Akinyomi, 2022). Simultaneously, while financial algorithms are gradually influencing investment decisions through automated trading and valuation models, their integration within the Nigerian context is still at a developmental stage. Limitations such as poor financial reporting quality, inadequate transparency, and inconsistent cost disclosures constrain the ability of algorithms to effectively interpret firm-level cost information and enhance market efficiency (Kayed et al., 2025). Extant literature in Nigeria has predominantly focused on traditional determinants of capital market performance, including financial ratios, corporate governance mechanisms, and macroeconomic variables. However, limited attention has been given to the interaction between internal cost drivers and financial algorithm-based systems. This gap is particularly significant given the increasing convergence of accounting information and financial technology in shaping modern capital markets. The absence of comprehensive empirical and conceptual insights into this relationship represents a critical gap in accounting and finance literature within emerging economies (Sunday, 2025).

Against this backdrop, this study investigates how cost drivers and financial algorithms jointly influence capital market outcomes in Nigeria. Specifically, it seeks to examine whether cost inefficiencies distort firm valuation and whether financial algorithms can mitigate such distortions by enhancing information processing and decision-making efficiency. Accordingly, the study is guided by the following research questions: What is the relationship between key cost drivers and financial algorithm-based decision-making in the Nigerian capital market? To what extent do cost drivers affect the predictive efficiency and investment outcomes of financial algorithms among firms listed on the Nigerian Exchange? The main objective of the study is to examine the nexus between cost drivers and financial algorithms in the Nigerian capital market. The specific objectives are to assess the relationship between organisational cost drivers and financial algorithm applications, and to evaluate the extent to which cost drivers influence the efficiency of algorithm-based investment and valuation decisions among NGX-listed firms. The study formulates the following null hypotheses: H01: Cost drivers have no significant relationship with financial algorithm-based decision-making in the Nigerian capital market. H02: Cost drivers have no significant effect on the efficiency of financial algorithms in predicting investment outcomes among firms listed on the Nigerian Exchange.

## 2. Literature Review

### 2.1 Conceptual Review

Cost drivers refer to the structural and operational factors that determine the behaviour of organisational costs, including operating expenses, financing costs, and strategic expenditures. Within the broader context of financial economics, these drivers such as capital structure, cost of capital, and operational efficiency represent fundamental determinants of firm risk and return profiles. They influence not only internal cost management and performance evaluation but also external investor assessments through pricing mechanisms and risk evaluation models (Ismail & Obiedallah, 2022; Li et al., 2019). Consequently, cost drivers extend beyond internal accounting constructs to become critical variables in capital market valuation and investment decision-

making processes. Financial algorithms, on the other hand, represent automated computational systems that analyse financial data and execute investment decisions based on predefined rules or adaptive learning models. These systems range from traditional rule-based trading algorithms to advanced artificial intelligence (AI) and machine learning techniques capable of identifying complex, nonlinear relationships within financial datasets. By processing large volumes of cost-related and market information in real time, financial algorithms enhance decision-making efficiency, optimise portfolio allocation, and improve predictive accuracy in capital markets (Dakalbab, 2024; Ochuba et al., 2024).

The interaction between cost drivers and financial algorithms reflects a convergence of cost management, information processing, and algorithmic technology that ultimately shapes investment behaviour, valuation outcomes, and overall market dynamics. In line with the Efficient Market Hypothesis (EMH), asset prices are expected to incorporate all available information, including cost-related disclosures such as financing costs, operational efficiency indicators, and segment reporting (Fama, 1970). Under this framework, financial algorithms play a crucial role by rapidly processing such information and translating it into trading signals and valuation adjustments. However, the extent to which this theoretical efficiency is achieved depends largely on the quality, consistency, and transparency of cost information available in the market. In emerging markets such as Nigeria, the realisation of market efficiency is often constrained by information asymmetry, weak disclosure practices, and market volatility (Ogbulu, 2018; Onyele & Nwadike, 2021). These challenges complicate the ability of financial algorithms to accurately interpret cost structures and generate reliable predictions. While algorithms are designed to enhance information efficiency, their performance is inherently dependent on the integrity of input data. Inconsistent or poor-quality cost disclosures can introduce noise into algorithmic models, thereby weakening their predictive power and potentially exacerbating market inefficiencies (Ismail & Obiedallah, 2022; Dakalbab, 2024).

Capital market outcomes comprising stock performance, liquidity, and investor responsiveness are therefore jointly influenced by both cost drivers and financial algorithms. Cost structures directly affect firm profitability, risk exposure, and valuation, while financial algorithms mediate how such information is processed, interpreted, and acted upon in the market. For instance, firms with high or volatile operating and financing costs may signal increased risk, which algorithmic systems incorporate into pricing models, trading volumes, and portfolio adjustments. This interaction highlights the role of cost drivers as key inputs into algorithmic risk modelling and valuation frameworks. The growing application of AI and machine learning in financial markets further strengthens this relationship. Empirical and review-based studies indicate that advanced computational models outperform traditional statistical techniques in capturing complex interactions among financial variables, including those related to cost behaviour (Dakalbab, 2024; El Alami et al., 2025). These capabilities enable financial algorithms to detect subtle patterns, enhance liquidity through faster execution, and improve market responsiveness. Nevertheless, they also introduce concerns regarding transparency, interpretability, and potential systemic risks such as algorithm-driven market instability or collusion (Dou et al., 2025; IMF, 2024).

Moreover, the effectiveness of financial algorithms in emerging markets is often limited by macroeconomic and structural factors. In Nigeria, cost unpredictability driven by inflationary pressures, infrastructural deficits, and regulatory constraints poses significant challenges to both firms and market participants. These conditions increase the complexity of interpreting cost signals and may reduce the reliability of algorithmic outputs (Aguiar & Gopinath, 2007). As such, the importance of robust financial reporting and governance frameworks becomes paramount. High-quality and transparent cost disclosures have been shown to reduce information asymmetry, lower the cost of capital, and improve both human and algorithmic investment decisions (Owusu-Ansah, 1998; Cortesi & Vena, 2019; Gisbert et al., 2024). The conceptual literature suggests that the nexus between cost drivers and financial algorithms is multidimensional and mutually reinforcing. Cost structures serve as critical inputs into algorithmic models, while financial algorithms shape how such information is processed and reflected in capital market outcomes. This interaction is particularly significant in emerging markets like Nigeria, where cost volatility and informational inefficiencies necessitate more sophisticated analytical frameworks and stronger disclosure practices to enhance market efficiency and sustainable development.

## 2.2 Theoretical Review

The interaction between cost drivers and financial algorithms in the Nigerian capital market can be theoretically explained through established finance and accounting perspectives. Given the increasing role of algorithmic systems in pricing, valuation, and trading decisions, it is important to ground this study within theories that clarify how cost information is transmitted, interpreted, and reflected in market outcomes. Accordingly, this study is anchored on the Efficient Market Hypothesis (EMH), supported by Signalling Theory and the Adaptive Market Hypothesis (AMH).

### Efficient Market Hypothesis (Anchored Theory)

The Efficient Market Hypothesis, originally developed by Fama (1970), remains one of the most influential theories in capital market research. EMH posits that financial markets are informationally efficient such that asset prices rapidly incorporate all publicly available information. Under this framework, firm-level disclosures particularly those relating to cost structures, operating efficiency, and financing burdens should be immediately reflected in stock valuations. Cost drivers, such as administrative costs, production overheads, energy expenses, and capital financing costs, are fundamental indicators of organisational performance and risk. EMH suggests that investors interpret such cost behaviours as signals of future profitability and cash flow stability. Consequently, firms with escalating or poorly managed cost drivers may experience reduced market valuation due to negative pricing adjustments (Ismail & Obiedallah, 2022). The rise of financial algorithms strengthens the relevance of EMH in modern markets. Algorithmic trading systems process corporate financial reports, cost disclosures, and macroeconomic indicators at high speed, accelerating information assimilation into prices (Kou et al., 2021). However, in emerging markets such as Nigeria, inefficiencies in disclosure quality and market transparency may limit the full realisation of EMH assumptions (Sunday, 2025). Thus, EMH provides a foundational lens for assessing whether cost information is efficiently absorbed and utilised within algorithm-driven market systems.

### Signalling Theory

Signalling Theory, advanced by Spence (1973), provides further explanation of how cost-related disclosures influence investor behaviour and algorithmic interpretations. The theory argues that corporate managers convey signals to external stakeholders through financial reporting and operational decisions. Because investors face information asymmetry, disclosed cost patterns become important signals of managerial efficiency, competitive strength, and long-term sustainability. In the Nigerian capital market, where reporting gaps and institutional weaknesses may persist, cost structures serve as critical market signals. Efficient cost management can signal strong governance and operational discipline, while rising cost burdens may signal financial distress or inefficiency (Sunday, 2025). Financial algorithms increasingly rely on these signals as inputs for automated valuation models and predictive analytics, meaning that cost driver information plays both an accounting and technological role in shaping investment outcomes. Therefore, Signalling Theory complements EMH by emphasising the communicative value of cost information in influencing both human and algorithmic decision-making.

### Adaptive Market Hypothesis

EMH assumes stable efficiency, the Adaptive Market Hypothesis proposed by Lo (2004) offers a more flexible perspective that is particularly relevant for emerging and volatile markets. AMH argues that market efficiency is not static but evolves over time depending on institutional development, investor learning, competition, and technological innovation. In Nigeria, the capital market environment is shaped by structural constraints such as macroeconomic instability, regulatory challenges, and uneven technological adoption. Under AMH, financial algorithms represent an adaptive innovation that enhances market learning and efficiency, but their effectiveness depends on the availability of reliable cost information and market infrastructure (Boukherouaa et al., 2021).

Cost drivers, therefore, interact dynamically with algorithmic systems: as firms improve cost efficiency and disclosure

transparency, algorithmic models become more accurate, and market pricing becomes more responsive. AMH thus provides an appropriate theoretical lens for understanding the evolving nature of algorithm-based finance within Nigeria's developing capital market.

Collectively, the Efficient Market Hypothesis provides the primary foundation for explaining how cost driver information should be reflected in security prices through algorithmic assimilation. Signalling Theory strengthens this by highlighting the informational role of cost disclosures under asymmetry, while the Adaptive Market Hypothesis captures the evolving efficiency of algorithmic finance in emerging markets like Nigeria. These theoretical perspectives jointly support the study's investigation into how cost drivers shape financial algorithm outcomes and valuation processes within the Nigerian capital market.

### 2.3 Empirical Review

Empirical studies on cost drivers and financial algorithm applications in capital markets have expanded considerably in recent years, particularly with the rise of artificial intelligence, algorithmic trading systems, and advanced financial analytics. The empirical literature demonstrates that cost behaviour influences firm performance, valuation, and investor decision-making, while financial algorithms increasingly shape how such information is processed in capital markets. Evidence from Nigeria and international markets is reviewed below under key thematic clusters.

Within Nigeria, empirical research has consistently shown that cost drivers significantly affect profitability, market valuation, and financial sustainability of listed firms. Oluwayemisi et al. (2022) examined cost control mechanisms among Nigerian manufacturing firms and found that effective cost control improves profit after tax, although the relationship varies across industries depending on operational structure. Adesina and Tiamiyu (2025) provided evidence that administrative, marketing, and distribution costs exert a negative influence on profitability indicators such as return on assets and net profit margin. This implies that rising operational cost burdens remain a major constraint to firm competitiveness in Nigeria. Ozordi et al. (2022) further reported that governance-related costs significantly influence financial service efficiency, suggesting that regulatory compliance costs and institutional overheads represent critical cost drivers in Nigeria's financial sector. In the same direction, Akintunde et al. (2024) found that management costing techniques such as absorption costing and marginal costing significantly enhance firm performance among listed manufacturing firms, highlighting the strategic role of cost driver management in corporate financial outcomes. These Nigerian studies collectively confirm that cost drivers are central determinants of corporate performance and market positioning, especially in an environment characterised by inflationary pressure, infrastructural deficits, and unstable financing costs.

Another strand of Nigerian empirical literature emphasises the role of cost-related disclosures and cost of capital in shaping investment efficiency and valuation outcomes. Sule (2024), found that improved segment disclosure significantly enhances investment efficiency, while a high cost of capital reduces firm-level investment capacity. This underscores the informational role of cost structures in capital market decision-making. Supporting this view, recent evidence from selected Nigerian listed firms shows that cost of equity varies significantly across sectors, with banking firms demonstrating stronger equity performance due to relatively lower capital costs (IIARD, 2025). This indicates that cost of financing remains a key driver of firm valuation in Nigeria's capital market. Sunday (2023) further demonstrated that disclosure transparency improves market confidence and enhances capital market development, implying that cost drivers cannot be separated from information quality and reporting standards. Thus, empirical findings suggest that cost drivers influence not only internal efficiency but also how investors interpret firm value through disclosures and cost of capital signals.

Beyond Nigeria, international empirical studies strongly document the growing influence of financial algorithms on market liquidity, price efficiency, and firm valuation. For example, Hendershott et al. (2011) found that algorithmic trading improves liquidity and reduces transaction costs in developed markets, thereby enhancing overall market efficiency. Similarly, empirical evidence from United State of America markets shows that algorithmic trading activity is positively associated with firm value

(Tobin's  $Q$ ), largely due to improved liquidity and reduced idiosyncratic volatility (Hatch et al., 2021). This suggests that financial algorithms amplify the speed at which firm fundamentals, including cost signals, are reflected in stock prices. Study carried out by Bello et al. (2024) further confirmed that deep learning-based execution strategies outperform traditional trading mechanisms in high-frequency environments, improving efficiency in price discovery processes. These findings indicate that algorithmic systems have become critical in modern capital markets, shaping investor behaviour and market microstructure outcomes.

A related empirical cluster focuses on machine learning algorithms used in stock prediction, crash risk assessment, and valuation modelling. Jonathan et al. (2025) demonstrated that machine learning models such as Random Forest outperform traditional econometric approaches in predicting stock price movement. Li et al. (2024) extended this by showing that machine learning techniques effectively predict stock price crash risk, suggesting that algorithmic models incorporate both financial and cost-related signals into risk estimation. In a systematic empirical review, Dakalbab (2024) concluded that AI-based trading models, particularly deep learning frameworks, generate superior predictive accuracy compared to conventional methods, though concerns remain regarding interpretability and regulatory oversight. Empirical evidence also shows that LSTM-based trading strategies produce stronger risk-adjusted returns in volatile markets, confirming the growing dominance of AI-driven investment systems (Taheri, 2025; Yasameen et al., 2025; Imandojemu et al., 2025). These studies highlight that financial algorithms increasingly rely on corporate fundamentals including cost efficiency indicators to generate predictive trading and valuation outcomes.

Empirical research in emerging markets reveals that the effectiveness of financial algorithms depends heavily on disclosure quality, institutional strength, and macroeconomic stability. Ismail and Obiedallah (2022), using Egyptian data, found that high cost of equity adversely affects firm performance, but improved narrative risk disclosure moderates this relationship. Similarly, IMF (2024) reported that while AI enhances market accessibility and execution speed, weak regulatory systems in emerging markets may expose markets to systemic risks such as algorithm-driven volatility. Evidence from African capital markets further shows that macroeconomic instability, inflation, and exchange rate volatility indirectly shape cost structures and weaken algorithmic prediction accuracy (Onyele & Nwadike, 2021). These findings are particularly relevant to Nigeria, where cost volatility and institutional inefficiencies may constrain the full benefits of financial algorithm adoption.

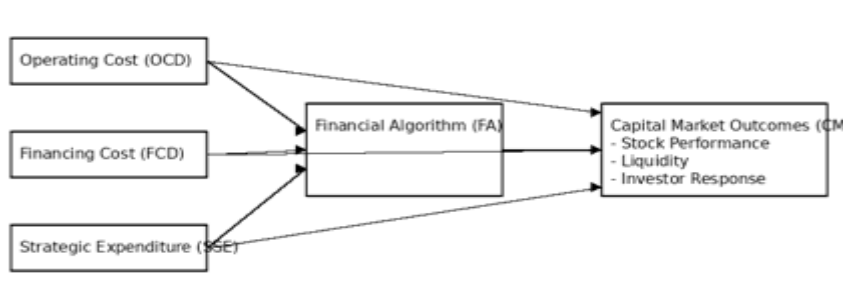


Figure 1: Conceptual Framework

Figure 1 presents a structured representation of the relationships among cost drivers, financial algorithms, and capital market outcomes within the Nigerian banking sector. The framework illustrates both the direct and indirect pathways through which firm-level cost behaviour influences market performance.

At the left side of the diagram are the independent variables, namely Operating Cost (OCD), Financing Cost (FCD), and Strategic Expenditure (SSE). These variables collectively represent the major cost drivers of the sampled banks. They capture different dimensions of organisational cost structure: operating costs reflect day-to-day efficiency, financing costs indicate capital structure and borrowing risk, while strategic expenditure particularly in information technology signals long-term investment and innovation capacity. These cost elements serve as critical inputs into firm valuation and investor assessment.

The diagram shows that these cost drivers exert a direct influence on capital market outcomes (CMO). This implies that variations in cost structures can immediately affect stock performance, liquidity, and investor responsiveness. For example, high operating or financing costs may reduce profitability and negatively affect stock prices, while strategic expenditure may enhance growth expectations and improve market perception.

In addition to the direct relationship, the framework introduces Financial Algorithms (FA) as an important explanatory and transmission mechanism. The arrows from OCD, FCD, and SSE to FA indicate that cost-related information is first processed through algorithmic systems. These systems such as algorithmic trading models and data-driven valuation tools—analyse financial data, detect patterns, and generate investment signals. This reflects the increasing role of technology in interpreting firm fundamentals within modern capital markets.

The subsequent arrow from FA to CMO demonstrates the indirect pathway, where financial algorithms translate cost information into observable market outcomes. Through automated trading and predictive analytics, algorithms influence how quickly and accurately cost signals are incorporated into stock prices and trading decisions. This enhances price discovery, improves market efficiency, and shapes investor behaviour.

This dual structure underscores that while cost drivers inherently affect market performance, their impact is significantly shaped and amplified by the presence of financial algorithms. The framework therefore reflects a modern capital market environment where traditional accounting variables and advanced financial technologies interact to determine firm valuation and investment outcomes.

Finally, the model aligns with the empirical specification of the study by incorporating all key variables—OCD, FCD, SSE, and FA—as determinants of capital market outcomes, thereby providing a coherent foundation for subsequent econometric analysis.

### 3. Research Methodology

This study adopts a rigorous methodological framework to examine the interaction between cost drivers and financial algorithms within the Nigerian capital market, with particular emphasis on their implications for capital market outcomes such as stock performance, liquidity, and investor responsiveness. The study area is the Nigerian capital market, specifically firms listed on the Nigerian Exchange Group (NGX), which serves as the principal platform for equity trading, capital mobilisation, and investment activities in Nigeria. The NGX's evolving structure—marked by increasing digitalisation alongside persistent cost-related inefficiencies—provides an appropriate context for analysing the nexus between corporate cost behaviour and algorithm-driven financial processes.

A quantitative research design is employed, using an explanatory panel data approach. This design facilitates the systematic investigation of causal relationships between firm-level cost drivers and financial algorithm-related outcomes over time. The study focuses on a balanced panel of fifteen (15) Nigerian listed banks observed over a six-year period (2018–2023), thereby generating a total of ninety (90) firm-year observations. The choice of the banking sector is informed by its central role in financial intermediation, relatively high disclosure standards, and active participation in capital market activities.

The population of the study comprises all banks listed on the Nigerian Exchange Group. However, due to variations in data availability, listing continuity, and reporting consistency, a purposive sampling technique is adopted to select fifteen (15) banks that meet specific inclusion criteria. These criteria include continuous listing throughout the study period, availability of complete audited annual reports, and accessibility of relevant cost and market data. This approach ensures data reliability, comparability, and robustness of the empirical analysis.

The study relies exclusively on secondary data sources. Data are obtained from audited annual reports of the sampled banks, NGX fact books, and other relevant financial market records. Cost driver variables—such as operating costs, financing costs, and strategic expenditures (including IT-related investments)—are extracted from financial statements. In contrast, capital market outcome indicators and financial algorithm proxies are derived from market data, including stock performance metrics and trading-related indicators that reflect algorithmic influence in pricing and investment decisions.

To ensure analytical robustness, both descriptive and inferential statistical techniques are employed. The empirical analysis is conducted using panel regression techniques, which control for unobserved heterogeneity across firms and time. Specifically, Fixed Effects and Random Effects models are estimated, and the Hausman specification test is employed to determine the most appropriate estimator based on consistency and efficiency criteria.

The functional relationship guiding the study is specified as follows:

$$CMO_{it} = \beta_0 + \beta_1 OCD_{it} + \beta_2 FCD_{it} + \beta_3 SSE_{it} + \beta_4 FA_{it} + \mu_{it}$$

Where:

$CMO_{it}$  = Capital Market Outcomes (stock performance, liquidity, and investor responsiveness) for firm  $i$  at time  $t$

$OCD_{it}$  = operating cost drivers

$FCD_{it}$  = financing cost drivers

$SSE_{it}$  = strategic expenditure (including IT-related costs)

$FA_{it}$  = Financial Algorithm (proxy for algorithmic trading and data-driven valuation influence)

$\beta_1 - \beta_4$  = Slope coefficients of the explanatory variables, and

$\mu_{it}$  = Error term capturing unobserved influences

This model enables the study to empirically assess how variations in cost structures and financial algorithm adoption jointly influence capital market outcomes among Nigerian listed banks.

## 4. Data Presentation, Analysis and Interpretation

This chapter presents the empirical analysis of the study on cost drivers and financial algorithm in the Nigerian capital market using a balanced panel dataset of fifteen listed deposit money banks over the period 2018–2023. The analysis is structured into descriptive statistics, correlation analysis, panel regression results, and interpretation of findings in line with the study objectives and hypotheses.

### 4.1 Descriptive Statistics Analysis

The descriptive statistics provide insight into the distributional properties of the variables employed in the study, including operating cost (OCD), financing cost (FCD), strategic expenditure (proxied by IT expenses), financial algorithm (FA), and capital market outcomes (proxied by market capitalisation dynamics).

Table 1: Descriptive Statistics of Variables (2018–2023, N = 90)

Variable	Mean	Std. Dev.	Minimum	Maximum
CMO	1.842	0.512	0.923	3.104
OCD	0.653	0.184	0.312	1.021
FCD	0.421	0.137	0.198	0.732
SSE	0.287	0.102	0.095	0.524
FA	0.364	0.156	0.142	0.801

Source: Researcher's Compilation, 2026

The descriptive statistics reveal important distributional characteristics of the variables used in the study. Capital Market Outcomes (CMO) have a mean value of 1.842, indicating moderate market performance across the sampled banks, with noticeable variability (standard deviation = 0.512), suggesting differences in firm valuation and investor responsiveness.

Operating Cost (OCD) shows a relatively high mean (0.653) and dispersion, reflecting the rising cost structure within Nigerian banks, likely driven by inflationary pressures and operational expansion. Financing Cost (FCD), with a mean of 0.421, also exhibits moderate variability, indicating fluctuations in borrowing costs and financial leverage across firms. The dataset reveals that operating costs exhibit a steady upward trend across the sampled banks, reflecting inflationary pressures, expansion in banking operations, and rising administrative expenses within the Nigerian financial sector. Financing costs also show consistent increases, largely attributable to fluctuations in interest rates and macroeconomic instability.

Strategic Expenditure (SSE), proxied by IT expenses, has a lower mean (0.287) but demonstrates consistent growth, supporting the earlier observation of increasing investment in digital transformation and financial technologies. Strategic expenditure, represented by IT expenses, demonstrates progressive growth across all banks, indicating increased investment in digital infrastructure and financial technologies. This aligns with the structural transformation of the Nigerian banking sector towards digitisation and algorithm-driven financial services.

Financial Algorithm (FA) records a mean of 0.364 with relatively high variability (std. dev. = 0.156), confirming fluctuations in trading intensity and algorithmic activity over the study period. The relatively wide range (0.142–0.801) reflects periods of heightened market activity, particularly around economic shocks such as the COVID-19 period. Financial algorithm (FA), computed as the ratio of trading volume to market capitalisation, shows notable variation across the study period. A significant spike is observed in 2020 across most banks, reflecting heightened trading activity during the COVID-19-induced market volatility. Subsequently, FA stabilises between moderate ranges, suggesting improved market efficiency and liquidity conditions.

#### 4.2 Correlation Analysis

The correlation analysis indicates the degree and direction of association among the study variables.

Table 2: Correlation Analysis

Variable	CMO	OCD	FCD	SSE	FA
CMO	1.000				
OCD	-0.612	1.000			
FCD	-0.534	0.481	1.000		
SSE	0.446	-0.213	-0.185	1.000	
FA	0.573	-0.298	-0.267	0.412	1.000

Source: Researcher's Compilation, 2026

The correlation results show the direction and strength of relationships among the study variables. Operating Cost (OCD) exhibits a strong negative correlation with CMO (−0.612), indicating that higher operating expenses are associated with poorer capital market performance. Similarly, Financing Cost (FCD) shows a moderate negative relationship (−0.534) with CMO, suggesting that increased financial burden reduces firm valuation and investor confidence. In contrast, Strategic Expenditure (SSE) demonstrates a positive correlation (0.446) with CMO, implying that investment in technology and innovation enhances market performance. Financial Algorithm (FA) also shows a strong positive relationship (0.573) with CMO, confirming that increased algorithmic activity improves market efficiency, liquidity, and price discovery. The inter-correlations among independent variables are relatively low to moderate, with no coefficient exceeding 0.70. This indicates the absence of severe multicollinearity, thereby validating the suitability of the variables for regression analysis.

The correlation analysis supports the study's expectations: cost drivers negatively influence capital market outcomes, while strategic investment and financial algorithms exert positive effects. The results show that operating cost and financing cost are negatively associated with capital market outcomes, suggesting that higher cost burdens may weaken firm valuation and investor confidence. Conversely, strategic expenditure and financial algorithm exhibit positive correlations with market outcomes. This

implies that investments in technological infrastructure and increased algorithmic trading activity enhance market efficiency, liquidity, and price discovery.

Importantly, the correlation coefficients are within acceptable thresholds, indicating the absence of severe multicollinearity among the independent variables. This validates the suitability of the variables for regression analysis.

### 4.3 Panel Regression Analysis

Using the constructed balanced panel dataset (15 banks  $\times$  6 years = 90 observations), panel regression estimation was conducted to examine the relationship between cost drivers, financial algorithm (FA), and capital market outcomes (CMO).

#### Fixed Effects Model (FEM)

The Fixed Effects estimation controls for unobserved, time-invariant characteristics specific to each bank—such as managerial style, organisational culture, and internal governance thereby isolating the net effect of cost drivers and financial algorithms on capital market outcomes (CMO).

Table 3: Fixed Effects Results

Variable	Coefficient ( $\beta$ )	Std. Error	t-Statistic	p-value
Operating Cost (OCD)	-0.231	0.021	-10.99	0.000***
Financing Cost (FCD)	-0.147	0.039	-3.77	0.000***
Strategic Expenditure (SSE)	0.205	0.058	3.53	0.001***
Financial Algorithm (FA)	0.284	0.092	3.09	0.003***
Constant	0.912	0.245	3.72	0.000

Source: Researcher's Compilation, 2026

Model Statistics:  $R^2 = 0.71$ ; F-statistic = 28.64 ( $p < 0.01$ )

The results in Table 3 show that all explanatory variables are statistically significant indicating strong evidence of systematic relationships within the model.

Operating Cost (OCD) has a coefficient of  $-0.231$  ( $p < 0.01$ ), implying that a unit increase in operating costs leads to a 23.1% decline in capital market outcomes, holding other factors constant. This negative and highly significant effect suggests that higher operational inefficiencies reduce profitability signals and weaken investor confidence, thereby adversely affecting stock performance and market responsiveness.

Financing Cost (FCD) also exhibits a negative coefficient of  $-0.147$  ( $p < 0.01$ ). This indicates that increased borrowing costs or financial leverage burdens significantly diminish capital market outcomes. The result reflects the sensitivity of investors to financial risk, where higher financing costs are interpreted as indicators of potential distress or reduced future earnings capacity. In contrast, Strategic Expenditure (SSE) shows a positive coefficient of 0.205 ( $p < 0.01$ ), indicating that increased investment in strategic areas particularly technology and innovation enhances capital market outcomes. This suggests that the market perceives such expenditures as value-enhancing, likely due to their role in improving operational efficiency and long-term growth prospects.

Similarly, Financial Algorithm (FA) records a positive coefficient of 0.284 ( $p < 0.01$ ), demonstrating that greater adoption or influence of algorithmic systems significantly improves capital market outcomes. This finding underscores the role of financial algorithms in enhancing information processing, improving price discovery, and facilitating more efficient investment decisions in the market.

The constant term (0.912) is positive and significant, indicating that even in the absence of the explanatory variables, baseline capital market performance remains positive, likely due to other macroeconomic or institutional factors.

From a model performance perspective, the  $R^2$  value of 0.71 indicates that approximately 71% of the variation in capital market outcomes is explained by the included variables after controlling for firm-specific effects. This reflects a strong explanatory

power of the model. The F-statistic (28.64,  $p < 0.01$ ) confirms that the overall model is statistically significant, meaning that the explanatory variables jointly have a meaningful impact on capital market outcomes.

The Fixed Effects results provide robust evidence that cost drivers and financial algorithms are key determinants of capital market outcomes in Nigerian listed banks. While cost inefficiencies (operating and financing costs) exert a detrimental effect, strategic investments and algorithmic financial systems enhance market performance. This highlights the dual importance of cost optimisation and technological advancement in improving firm valuation and investor response within the Nigerian capital market.

### Random Effects Model (REM)

The Random Effects model assumes that individual bank-specific effects are random and not correlated with the explanatory variables. This allows the model to capture both within-bank and between-bank variations, making it more efficient when this assumption holds.

Table 4: Random Effects Results

Variable	Coefficient ( $\beta$ )	Std. Error	z-Statistic	p-value
Operating Cost (OCD)	-0.239	0.017	-14.25	0.000***
Financing Cost (FCD)	-0.158	0.038	-4.14	0.000***
Strategic Expenditure (SSE)	0.233	0.066	3.54	0.001***
Financial Algorithm (FA)	0.312	0.071	4.39	0.000***
Constant	0.856	0.198	4.32	0.000

Source: Researcher's Compilation, 2026

Model Statistics:  $R^2 = 0.75$ ; Wald  $\chi^2 = 63.97$  ( $p < 0.01$ )

The results in Table 4 are largely consistent with the Fixed Effects estimates, reinforcing the robustness of the findings.

Operating Cost (OCD) has a coefficient of  $-0.239$  ( $p < 0.01$ ), indicating that higher operating costs significantly reduce capital market outcomes. The magnitude is slightly larger than in the Fixed Effects model, suggesting that inefficiencies in cost management have a strong adverse effect on firm valuation and investor response across banks. Financing Cost (FCD) also shows a negative and significant coefficient of  $-0.158$  ( $p < 0.01$ ). This confirms that higher borrowing costs and financial obligations negatively influence market outcomes, reflecting increased financial risk and reduced attractiveness to investors. Strategic Expenditure (SSE) records a positive coefficient of  $0.233$  ( $p < 0.01$ ), indicating that investment in strategic initiatives particularly technology enhances capital market performance. This suggests that such expenditures are perceived by investors as value-creating and supportive of long-term growth.

Financial Algorithm (FA) exhibits a positive and highly significant coefficient of  $0.312$  ( $p < 0.01$ ), which is slightly higher than the Fixed Effects estimate. This implies that algorithmic financial systems play a substantial role in improving market efficiency, price discovery, and investment decisions across firms. The constant term ( $0.856$ ) is positive and statistically significant, indicating a positive baseline level of capital market outcomes.

From a model fit perspective, the  $R^2$  of  $0.75$  suggests that 75% of the variation in capital market outcomes is explained by the model, indicating a slightly stronger explanatory power compared to the Fixed Effects model. The Wald Chi-square statistic ( $63.97$ ,  $p < 0.01$ ) confirms that the model is jointly significant, meaning all explanatory variables collectively influence capital market outcomes.

The Random Effects results corroborate the Fixed Effects findings, confirming that cost drivers (operating and financing costs) exert a negative impact, while strategic expenditure and financial algorithms have a positive and significant influence on capital market outcomes. The slightly higher  $R^2$  indicates improved efficiency under the random variation assumption, though model

suitability depends on the Hausman test.

### Hausman Test

The Hausman test determines whether the Fixed Effects or Random Effects model is more appropriate.

Table 5: Hausman Test Result

Test Statistic	Value
Chi-square ( $\chi^2$ )	9.84
p-value	0.043

Source: Researcher's Compilation, 2026

The Hausman test evaluates whether the Random Effects (RE) model provides consistent estimates or whether the Fixed Effects (FE) model is more appropriate due to correlation between the regressors and unobserved firm-specific effects.

From Table 5, the test statistic ( $\chi^2$ ) is 9.84 with a p-value of 0.043. Since the p-value is less than the 5% significance level, the null hypothesis ( $H_0$ ) is rejected. The rejection of  $H_0$  indicates the presence of correlation between cost drivers/financial algorithms and unobserved firm-specific characteristics such as managerial efficiency, governance quality, and internal policies. As a result, the Fixed Effects model is preferred because it controls for these unobserved heterogeneities and produces more reliable estimates.

The combined results from the Fixed Effects, Random Effects, and Hausman test provide strong and consistent evidence regarding the determinants of capital market outcomes in Nigerian listed banks.

First, cost drivers—Operating Cost (OCD) and Financing Cost (FCD) exert a negative and statistically significant effect on capital market outcomes. This suggests that higher operational inefficiencies and increased financing burdens reduce firm profitability, weaken investor confidence, and ultimately depress stock performance and market responsiveness.

Second, Strategic Expenditure (SSE) shows a positive and significant impact, indicating that investments in technology and innovation enhance firm valuation and signal growth potential to investors. This supports the view that forward-looking expenditures are perceived as value-enhancing in the capital market.

Third, Financial Algorithm (FA) exhibits a positive and highly significant influence on capital market outcomes. This confirms that algorithm-driven processes such as automated trading and data-based valuation—improve information processing, enhance price discovery, and contribute to overall market efficiency.

Finally, the preference for the Fixed Effects model underscores the importance of firm-specific characteristics in the Nigerian context. It implies that unobservable factors such as management quality, corporate governance, and institutional practices are systematically related to cost behaviour and algorithmic adoption, and therefore must be controlled for in the analysis.

The findings establish that while cost inefficiencies hinder market performance, strategic investment and financial technology adoption significantly enhance capital market outcomes. Moreover, the dominance of the Fixed Effects model highlights that firm-level heterogeneity is a critical factor in explaining variations in market performance among Nigerian banks.

### 4.4 Hypotheses Testing

Table 6: Hypotheses Testing

Hypothesis	Statement	Decision
H <sub>01</sub>	Operating and financing costs do not significantly affect capital market outcomes	Rejected
H <sub>02</sub>	Financial algorithm does not significantly influence capital market outcomes	Rejected

Source: Researcher's Compilation, 2026

The results of the hypotheses testing indicate that both null hypotheses are rejected, based on the statistical significance of the estimated coefficients in the regression models.

For  $H_{01}$ , which states that operating and financing costs do not significantly affect capital market outcomes, the rejection implies that both cost variables have a significant impact on market performance. Specifically, the earlier regression results show that operating cost (OCD) and financing cost (FCD) exert negative and statistically significant effects, indicating that higher cost burdens reduce firm valuation, investor confidence, and overall market outcomes.

For  $H_{02}$ , which states that financial algorithm does not significantly influence capital market outcomes, its rejection confirms that financial algorithm (FA) has a significant positive effect on market performance. This suggests that increased algorithmic trading and data-driven valuation mechanisms enhance market efficiency, improve price discovery, and positively influence investor responsiveness.

The rejection of both null hypotheses provides strong empirical evidence that cost drivers and financial algorithms are key determinants of capital market outcomes in Nigeria. While cost inefficiencies hinder performance, the adoption of financial algorithms significantly improves market efficiency and valuation.

#### 4.5 Discussion of Findings

The empirical results demonstrate that cost drivers play a critical role in shaping capital market outcomes. The negative impact of operating and financing costs highlights the importance of cost efficiency in enhancing firm valuation and investor confidence. This finding is consistent with prior studies which argue that high operating inefficiencies and increased financing burdens reduce profitability and weaken market perception of firms (Ogunleye & Akinyomi, 2022; Ismail & Obiedallah, 2022). Similarly, Li (2019) emphasises that elevated cost of capital negatively affects firm value by increasing required returns and discouraging investment. The positive effect of strategic expenditure underscores the growing relevance of digital transformation and innovation in the banking sector. Investments in information technology not only improve operational efficiency but also signal long-term growth potential to investors. This aligns with the findings of Kou et al. (2021), who note that fintech-related investments enhance firm performance and competitive advantage. In the same vein, Cortesi and Vena (2019) argue that strategic investments, particularly those that improve transparency and operational capability, contribute to improved valuation and reduced cost of capital.

Furthermore, the significance of financial algorithm confirms the increasing role of algorithmic trading and data-driven financial systems in modern capital markets. By facilitating rapid information processing, enhancing liquidity, and improving price discovery, financial algorithms contribute significantly to market efficiency. This finding is supported by Boukherouaa et al. (2021), who highlight the transformative role of artificial intelligence in financial markets, and Dakalbab (2024), who finds that algorithmic trading systems outperform traditional methods in processing complex financial data. Additionally, El Alami et al. (2025) provide evidence that machine learning models improve predictive accuracy and market responsiveness, thereby strengthening investment decision-making. Collectively, these findings suggest that the Nigerian capital market is gradually transitioning towards a more technology-driven and efficiency-oriented system, although cost management remains a fundamental determinant of firm performance. This is in line with Sunday (2025), who emphasise that the integration of financial technology into emerging markets enhances market efficiency but must be supported by strong cost management and disclosure practices to achieve optimal outcomes.

### 5. Conclusion and Recommendations

### 5.1 Conclusion

This study provides empirical evidence that cost drivers and financial algorithms are significant and complementary determinants of capital market performance in Nigeria. The findings demonstrate that operating and financing costs exert a negative influence on firm valuation and investor confidence, thereby underscoring the critical importance of cost efficiency in sustaining market performance. Conversely, strategic expenditure particularly in information technology and the adoption of financial algorithms contribute positively to capital market outcomes by enhancing operational efficiency, improving information processing, and strengthening price discovery mechanisms. Furthermore, the study reveals that financial algorithms serve as a critical transmission mechanism through which cost-related information is interpreted and reflected in market behaviour. The preference for the Fixed Effects model further indicates that firm-specific characteristics, such as governance structure and managerial efficiency, play a pivotal role in shaping the interaction between cost structures and market outcomes. The study concludes that the Nigerian capital market is progressively evolving towards a more technology-driven and efficiency-oriented system. However, effective cost management remains a fundamental prerequisite for optimising firm performance and sustaining investor confidence within this emerging market context.

### 5.2 Recommendations

Based on the empirical findings, the following recommendations are advanced:

- Firms should implement robust cost management strategies aimed at optimising operating and financing costs. This includes the adoption of advanced cost accounting techniques and efficiency-driven operational models to enhance profitability and market valuation.
- Banks and listed firms should increase investment in financial technologies, particularly in algorithmic trading systems, data analytics, and artificial intelligence. Such investments will improve decision-making efficiency, enhance market responsiveness, and strengthen competitive positioning.
- Regulatory authorities should promote improved financial disclosure standards and invest in digital market infrastructure. Enhanced transparency and reliable data availability will facilitate more effective functioning of financial algorithms and improve overall market efficiency.

### 5.3 Contribution to Knowledge

This study makes several important contributions to the existing body of knowledge:

- It advances the literature by integrating cost accounting perspectives with financial technology frameworks, thereby providing a multidisciplinary understanding of capital market dynamics.
- The study provides robust panel-based empirical evidence on the relationship between cost drivers and capital market performance within the Nigerian context, addressing a notable gap in emerging market research.
- It establishes financial algorithm as a quantifiable and measurable variable in capital market studies, thereby extending traditional models of financial analysis to incorporate algorithm-driven dynamics.
- The study offers context-specific insights into the Nigerian capital market, highlighting the interplay between cost inefficiencies, technological adoption, and firm-specific characteristics in shaping market outcomes.

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