MARKET MICROSTRUCTURE AND INFORMATION ASYMMETRY IN THE NIGERIAN CAPITAL MARKET: A DESCRIPTIVE ILLUSTRATION USING THE GLOSTEN-MILGROM (1985) AND KYLE (1985) MODELS

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Abstract
This study provides a descriptive illustration of information asymmetry and market microstructure in the Nigerian capital market using the Glosten–Milgrom (1985) and Kyle (1985) models. Using daily high and low prices of 40 listed equities over two consecutive trading days, the analysis demonstrates how bid–ask spreads, price adjustments, and liquidity conditions are generally observed to suggest varying degrees of informed trading. Stocks with wider spread proxies and lower liquidity generally exhibited larger forecast deviations within the illustrative framework, highlighting the potential relevance of market microstructure concepts to short-term price formation. However, no statistical relationship is estimated, and the findings should be interpreted as descriptive rather than empirical evidence of informed trading. The study emphasizes the importance of transparency, liquidity, and timely information dissemination, which may help reduce information asymmetry and improve market efficiency. The findings are illustrative and intended to demonstrate the conceptual application of these models rather than to formally test predictive performance.

Keywords: Market micro structure; Information Asymmetry; bid-ask spread, price impact, Nigerian capital market
JEL Classifications: G10, D82, G12, G14, G15

1.0 Introduction

The efficiency and proper functioning of financial markets depend critically on how information is produced, disseminated, and incorporated into asset prices. Market microstructure provides an analytical framework for understanding the mechanisms through which trading rules, market design, and information asymmetry may be associated with price formation, trading volume, and liquidity. By examining markets at the transactional level, market microstructure illustrates the

potential roles of different market participants and the processes through which securities are exchanged (O'Hara, 1995).

O'Hara (1995) made a seminal contribution to market microstructure theory, establishing the foundation for subsequent research. Building on this work, scholars such as Madhavan (2000) extended the analysis to include interactions among market participants, the influence of trading mechanisms, and the implications for liquidity provision and price discovery. Market microstructure also intersects with several related fields, including finance, investment analysis, corporate finance, and operations research, all of which provide models for explaining asset pricing behavior (Harris, 1999; Lyons, 2000). Within finance, market microstructure is specifically concerned with the trading process in securities markets and how new information is incorporated into stock prices (Madhavan, 2000).

Market makers play an important role in providing liquidity by being willing to buy and sell securities on demand (O'Hara, 1995; Harris, 1999). In situations where buyers and sellers do not arrive simultaneously, market makers may hold inventories of securities and bear the risk associated with price fluctuations and adverse selection. Their compensation is generally derived from the bid–ask spread, defined as the difference between the price at which a market maker is willing to buy and sell a security (Glosten & Milgrom, 1985). Traders participate in the market either to satisfy liquidity needs or to pursue returns, and their ability to make informed trading decisions may depend on how accurately they can anticipate short-term price movements.

Market microstructure research generally encompasses three broad areas. The first focuses on the transaction process itself, drawing on models such as the inventory model and the information model (O'Hara, 1995; Madhavan, 2000). The inventory model explains how dealers manage their holdings of securities to accommodate trading demands, while the information model examines how asymmetrically distributed information among traders may be reflected in security prices. The second area considers how market structure and trading rules may influence transactions, including order execution protocols, trading mechanisms, and regulatory frameworks, all of which may be associated with liquidity and price formation (Harris, 1999; Kyle & Obizhaeva, 2013). The third area explores the potential implications of trading processes for broader economic decisions, such as investment allocation, risk management, and capital formation.

A major challenge confronting financial markets, particularly in developing economies such as Nigeria, is information asymmetry. Information asymmetry arises when certain market participants possess superior or timelier information than others, which may be associated with market frictions, wider bid–ask spreads, increased transaction costs, and reduced investor confidence (Ehiedu, 2014; Osamwonyi & Aigboduwa, 2009). These challenges are often more pronounced in emerging markets due to limited transparency, weaker regulatory enforcement, and lower analyst coverage. Although several Nigerian studies have examined information asymmetry, market efficiency, and trading behavior, relatively few studies have demonstrated how classical market microstructure frameworks such as Glosten and Milgrom (1985) and Kyle (1985) may be operationalized and interpreted using Nigerian market data.

Despite the growing body of Nigerian studies addressing market efficiency and trading behavior, most existing studies focus on econometric testing of specific market relationships or forecasting exercises. While Ehiedu (2014) and Osamwonyi and Aigboduwa (2009) document the presence of information asymmetry in Nigeria, they do not explicitly illustrate how standard microstructure measures, such as bid ask spreads and price impact, may be interpreted jointly within established theoretical frameworks. Similarly, Ogbeide and Umana (2017) and Osifo and Okuwhere (2018) provide insights into particular aspects of market behavior, but place less emphasis on demonstrating the practical application of classical market microstructure models in the Nigerian context.

Much of the existing Nigerian literature also examines variables such as trading volume, volatility, market capitalization, and stock returns individually, without presenting an integrated illustration of how information asymmetry, liquidity, and price discovery are represented within the Glosten and Milgrom (1985) and Kyle (1985) frameworks. Consequently, there remains scope for studies that demonstrate the mechanics of these models and illustrate how their core concepts may be interpreted using observable Nigerian stock market data.

In light of these gaps, the present study provides a descriptive illustration of market microstructure in the Nigerian capital market using the theoretical frameworks of Glosten and Milgrom (1985) and Kyle (1985). Unlike prior studies that employ econometric techniques to test market microstructure relationships, this study adopts a conceptual and illustrative approach to demonstrate how these classical frameworks may be applied using Nigerian stock market data. Accordingly, the contribution of the study is not to provide new empirical evidence on information asymmetry, but rather to demonstrate the operational mechanics and interpretation of the Glosten–Milgrom and Kyle models within the context of selected Nigerian equities.Consequently, the models are employed as illustrative analytical frameworks rather than as econometric specifications intended for hypothesis testing or statistical inference.Specifically, the study examines how spread proxies and price-impact measures are interpreted within these frameworks.

While previous Nigerian studies have focused primarily on econometric testing, forecasting exercises, and the estimation of market microstructure relationships, the present study differs by emphasizing the conceptual application of classical market microstructure theory. Rather than evaluating predictive accuracy or estimating causal relationships, the study demonstrates how information asymmetry, liquidity, bid–ask spread proxies, and price-impact measures may be interpreted within the Glosten–Milgrom (1985) and Kyle (1985) frameworks using observable Nigerian stock market data. The contribution of the study therefore lies not in providing new empirical evidence on information asymmetry, but in offering an integrated illustration of how these classical market microstructure models may be operationalized and interpreted within the context of the Nigerian capital market.

By illustrating the potential interactions between informed and uninformed traders, the study provides a conceptual demonstration of how market microstructure models may be used to interpret short-term price behavior and information asymmetry. However, the study does not seek to establish empirical relationships or provide statistical evidence of informed trading.

Furthermore, the two-day observation period is not intended to capture the dynamic and persistent nature of information asymmetry in the Nigerian capital market. Rather, it is employed solely to demonstrate the mechanics and application of the selected models using readily available market data. Consequently, the findings should be interpreted as illustrative insights into the operation of the models rather than evidence of long-run market conditions or information asymmetry patterns in Nigeria (Ehiedu & Omojefe, 2016; Eguavoen, 2016).

2.0 Literature Review

Market microstructure demands are ultimately translated into prices and volumes (Madhavan, 2000). According to Nevmyvaka (2005), market microstructure is a discipline that studies how securities prices are determined under different market mechanisms. From an economic perspective, price is the intersection of supply and demand schedules, while in neoclassical finance, price represents an intrinsic value on which all market participants agree. In reality, financial market prices are constantly in flux, agents have divergent expectations, information is never fully accessible, and investors face different constraints. Thus, markets engage in a continuous process of price discovery through repeated interactions among participants. WebFinance (2015) notes that market microstructure examines trading mechanisms to understand price discovery, efficiency in execution, volume effects, and other factors, whereas Wikipedia (2014) defines it as a branch of finance concerned with the detailed workings of exchanges. Overall, research focuses on how market mechanisms affect transaction costs, prices, quotes, volume, and trading behavior.

Information Asymmetry in Financial Markets

Information asymmetry arises when some participants have superior or more timely information, creating market frictions, higher risks for uninformed traders, and wider bid–ask spreads (Glosten & Milgrom, 1985). Kyle (1985) extended this framework by modeling how informed traders strategically trade to maximize profits while minimizing price impact. In markets with low transparency or thin trading, prices adjust gradually, and market depth is limited.

Bid-Ask Spread

The bid-ask spread is the difference between the price at which a security can be sold (bid) and purchased (ask), reflecting transaction costs and compensating market makers for risks (Glosten & Milgrom, 1985; Harris, 1999). Wider spreads indicate higher information asymmetry or lower liquidity, while narrower spreads suggest efficient markets.

Price Impact

Price impact measures how trades, especially large or informed trades, affect market prices. High price impact indicates low liquidity or high information asymmetry, whereas low price impact reflects deeper markets (Kyle, 1985). Price impact is central to market microstructure models linking trading activity, information asymmetry, and market depth to price changes.

Determinants of Bid-Ask Spreads and Price Impact

Bid–ask spreads and price impact are influenced by trading volume, volatility, market capitalization, turnover, and disclosure practices. Higher trading volume reduces spreads by

allowing market makers to better balance informed and uninformed orders, whereas low volume increases spreads (Glosten & Milgrom, 1985; Osamwonyi & Aigboduwa, 2009). Volatility raises the risk for market makers, widening spreads and increasing price sensitivity, consistent with Kyle's model (Kyle, 1985).

Market capitalization and turnover also affect liquidity and trading costs. Larger, high-capitalization firms attract more investors and exhibit narrower spreads, while low-cap or low-turnover stocks face higher spreads (Ehiedu & Omojefe, 2016). Disclosure practices reduce information asymmetry and improve price discovery, as evidenced in Nigerian firms where greater transparency correlates with lower bid–ask spreads (Eguavoen, 2016; Ehiedu, 2014). In sum, both firm-level characteristics and market-level dynamics jointly determine bid–ask spreads and price impact, consistent with theoretical predictions from Glosten–Milgrom (1985) and Kyle (1985).

Empirical Review

Mohammed, Vijayalakshimi, Jahan and Sharma (2021), evaluate the role of market microstructure in maintaining rapid economic performance in India. Specifically the study sought to investigate market microstructure and its effect on the financial market, in terms of trade market and discovery process. The authors employed various econometric techniques, which include disequilibrium and volatility analysis. They found that price volatility, as well as changes in equilibrium price rate occur due to trading problems, market changes and financial market imperfections and manipulations. Base on their finding, they study recommends strong market efficiency enhancing measures to avoid instability, in the financial market.

Kasimu and Osayi (2019) empirically carried out a test of market microstructure in Nigeria by investigating price formation and price discovery processing as it relates to bid – ask – spread of UBA return. The findings shows that general price level in the economy affects order formation, price discovery and to some extent, the speed at which prices impounds or reflect information. Osayi and Agahi (2019); Ehiedu and Olannye, (2014); Ehiedu and Toria (2022) investigated the nexus between financial markets performance and market microstructure in Nigeria using data series from1985 to 2016. The results show that financial market performance positively influences market microstructure.

Osifo and Okuwhere (2018) examined the test of market microstructure in Nigerian capital market. The study extends Copeland and Galai (1983) model and adopts Glosten and Miligrom (1985) model, that determine the bid – ask spread with the assumption that an asset can take a value that is high, VH; and a value that is low, VL with homogeneous probability value. Result indicates that the model was able to predict exactly thirteen securities prices which are 29.5% of the sample of the study. In the same vein, the model was able to predict prices of stocks with minimal differentials, hovering around 1% to 5% which is 14.9% of the sample of the study.

Yacine and Dacheng (2017) examines the possibility of how data sample with high frequency can be treated as being free from noise emanating from market micro structure at a given sampling frequency, with the aim of high frequency volatility implementation. The findings

show an appreciable progress in capital market liquidity over a decade; this has culminated in enhanced frequency of safely utilization of simple, uncorrected volatility estimators.
Ogbeide and Umana (2017) tested the Glosten and Milgrom (1985) model utilizing data from the Nigeria stock market. The result showed that the model forecasted correctly the prices of stock of about four listed firms, hence going against the random walk movement. Igbinovia (2017) empirically tested market microstructure in the Nigerian Capital market, using security returns, with five market microstructure explanatory variables of one lagged security returns, size of firms, measured by market capitalization, trading volume, which measures trading activity, and the inverse of security prices. Employing a multivariate regression estimation technique, the empirical findings show that volume, risk, price and firm size significantly explain most of the variability in security return. The coefficient of volume is found to be negative, apparently showing that dealers can achieve faster turnaround in inventory by lowering their potential liquidation costs and reducing their risk. Nevertheless, there is no evidence of economies of scale in market making.

Matvos, Seru and Silva (2017) examine the effect of market frictions using a developed-augmented approach. They found that at large, diversified publicly traded firms increase their scope during high external capital market micro distortions. Eguavoen (2016) tested the information asymmetry model of Glosten and Milgrom (1985) using data from the Nigeria stock market. The result reveals that the upward and downward movement of price for the following day can be forecasted in the Nigeria stock market. Kyle and Obizhaeva (2013) investigate market microstructure, utilizing q meta-model based on a data set of 400,000 portfolio transition orders. The empirical results show that quantitative predictions of market microstructure invariance (EGARCH) model. The results show that financial market performance positively influences market microstructure. Obizhaeva, (2009) examines portfolio transition and price dynamics using evidence from multiple data sources. His findings corroborate the view that price dynamics and portfolio transition path are correlated.

The reviewed studies provide valuable insights into market microstructure, information asymmetry, liquidity, and price discovery in both developed and emerging markets, including Nigeria. However, most of the Nigerian studies employ econometric techniques, forecasting exercises, or empirical tests to evaluate specific market relationships and model performance. In contrast, the present study does not seek to estimate causal relationships or test predictive accuracy. Rather, it adopts a descriptive and illustrative approach to demonstrate how the Glosten–Milgrom (1985) and Kyle (1985) frameworks may be operationalized and interpreted using Nigerian stock market data. The study therefore differs from earlier Nigerian evidence by focusing on the conceptual application of classical market microstructure models and illustrating their mechanics using observable market prices. Consequently, its contribution lies in providing an integrated demonstration of how information asymmetry, liquidity, bid–ask spreads, and price impact may be interpreted within a unified market microstructure framework rather than in providing new empirical evidence.

3.0 Methodology

This study employs a descriptive approach to explore market microstructure and information asymmetry in the Nigerian capital market using the Glosten-Milgrom (1985) and Kyle (1985) models. The analysis is intended as a conceptual illustration of how these models can highlight short-term price dynamics, rather than a formal empirical test of model performance.

Although the Glosten–Milgrom (1985) and Kyle (1985) models have frequently been employed in empirical market microstructure studies, the objective of the present study differs from that of prior econometric investigations. Rather than estimating causal relationships, testing hypotheses, or evaluating predictive performance, the study employs these models as conceptual frameworks for illustrating how information asymmetry, liquidity, bid–ask spread proxies, and price-impact measures may be interpreted using observable Nigerian stock market data. The emphasis is therefore on demonstrating model mechanics and interpretation rather than on formal statistical estimation or validation.

The probability of informed trading (π) is set at 0.50 throughout the analysis. This value is not intended to represent an empirical estimate of informed trading in the Nigerian capital market. Rather, it is a neutral calibration parameter used to simplify the illustration of the Glosten–Milgrom framework. The choice of $\pi = 0.50$ implies equal likelihood of informed and uninformed trading and is adopted solely for pedagogical clarity. The study does not attempt to estimate π using probability-of-informed-trading (PIN) methodologies or transaction-level data, as such data are not available within the scope of this analysis.

A further methodological consideration concerns the measurement of bid–ask spreads. In the original Glosten-Milgrom (1985) framework, information asymmetry is reflected through actual bid and ask quotations observed in the market. Due to the unavailability of quote-level bid and ask data for the selected equities, this study employs the daily high-low price range as a simplified proxy for spread-related market conditions. While high and low prices are not equivalent to quoted bid–ask spreads, they provide an observable indicator of short-term price dispersion that is used strictly for illustrative purposes.

The dataset consists of daily high and low prices for 40 equities listed on the Nigerian capital market, covering two consecutive trading days: April 20-21, 2025.The 40 equities included in the analysis were selected purposively to provide an illustrative cross-section of the Nigerian capital market. The selection spans major sectors such as banking, consumer goods, industrials, telecommunications, and energy, and includes firms with varying levels of market capitalization and trading activity. The purpose of this selection approach is not to construct a statistically representative sample of the entire market, but to ensure diversity in liquidity conditions and price behavior for illustrative application of the Glosten–Milgrom (1985) and Kyle (1985) models. Accordingly, the sample should be interpreted as a structured illustrative subset rather than a random or exhaustive market sample.

The selected companies span multiple sectors, including banking, consumer goods, energy, and industrials, providing an illustrative cross-section of market activity.It is important to emphasize that the study does not treat the two-day observation window as a basis for temporal inference.

The objective is not to examine how information asymmetry evolves over time, nor to assess persistence, causality, or stability of market microstructure relationships. Instead, the selected period is used as a static snapshot to demonstrate how the Glosten-Milgrom (1985) and Kyle (1985) frameworks operate when applied to observable price data. Accordingly, the study does not make any claims regarding temporal patterns in liquidity, price discovery, or information asymmetry in the Nigerian capital market. Any observed differences across securities are cross-sectional and illustrative only.

The limited timeframe and dataset are explicitly acknowledged as insufficient for statistical inference or broad generalizations. The study does not incorporate transaction-level or order-flow data, which further limits its ability to implement the full econometric structure of the Glosten–Milgrom and Kyle models. As a result, the analysis is confined to conceptual illustration rather than empirical estimation. Accordingly, the study does not make any claims regarding temporal patterns in liquidity, price discovery, or information asymmetry in the Nigerian capital market. Any observed differences across securities are cross-sectional and illustrative only.

Limitations of the Study

This study has several limitations that restrict its findings to a conceptual illustration of market microstructure models.

First, the analysis is based on a very short observation window of only two trading days. This limited timeframe does not allow for the examination of long-run dynamics in information asymmetry, liquidity, or price discovery, which typically require extended time series data.

Second, the study relies on daily high and low prices as proxies for bid–ask spreads due to the absence of quote-level data. These proxies do not capture the full components of bid–ask spreads, including adverse selection, inventory holding costs, and order processing costs as defined in market microstructure theory.

Third, the probability of informed trading ($\pi = 0.50$) is assumed rather than estimated. Since this parameter is not derived from market data, it does not reflect actual trading conditions in the Nigerian capital market. It is used solely as a neutral calibration value for illustrative purposes.

Fourth, the study does not incorporate transaction-level or order-flow data, which limits the ability to implement the Glosten–Milgrom and Kyle models in their full econometric form. As a result, the analysis focuses on conceptual illustration rather than empirical estimation.

Finally, no statistical inference or formal model validation is conducted. The results are therefore not intended to evaluate predictive accuracy or establish causal relationships, but to demonstrate how classical market microstructure models can be operationalized using observable market prices.

In addition, the use of a two-day cross-sectional snapshot precludes any inference about the temporal evolution of market microstructure conditions. The study does not examine whether observed patterns persist, intensify, or reverse over time. As such, any interpretation is confined strictly to the short-run illustrative setting and should not be generalized to broader market behavior.

Future research may address these limitations by using longer time horizons, transaction-level datasets, and established econometric methods such as probability-of-informed-trading (PIN) models and structural market microstructure estimation techniques. In addition, the sample of 40 equities was selected purposively rather than randomly, meaning that the analysis is illustrative and not statistically representative of the entire Nigerian capital market.

Forecast calculations:

i. Glosten-Milgrom forecast: Calculated by adjusting V_L for the assumed probability of informed trading ($\pi = 0.5$):

$$\text{GM Forecast} = V_L + (V_H - V_L)$$

ii. Kyle forecast: Uses the high–low price range as a simplified proxy for order flow, with price impact (λ) and adjusted low prices (Q) calculated as:

$$Q = V_L - \lambda, \text{Kyle Forecast} = Q + \lambda$$

This simplification deviates from the original Kyle framework and is intended solely for conceptual illustration.

Forecast Comparison

In this study, forecast prices generated from both the Glosten-Milgrom (1985) and Kyle (1985) models are compared descriptively with the actual prices, proxied as the midpoint of observed high and low prices on April 21, 2025. The differences between forecasted and actual prices are reported to illustrate how each model responds to variations in bid-ask spreads, price ranges, and assumed order-flow sensitivity.

It is important to note that no formal forecast evaluation metrics, such as mean absolute error (MAE) or root mean squared error (RMSE), are calculated, nor are statistical tests applied. This is because the study is illustrative and descriptive, designed to demonstrate the conceptual application of the models rather than to rigorously evaluate predictive accuracy. The differences observed between forecast and actual prices are therefore indicative patterns rather than formal measures of model performance.

This approach allows the reader to observe how high-low spreads and simplified order-flow proxies may influence forecasted prices, without implying that the models have been statistically validated. Any apparent closeness or divergence between forecast and actual prices should be interpreted as conceptual insights into short-term price behavior, rather than empirical evidence of superior model performance.

Also, it is important to emphasize that differences between forecasted and actual prices are not interpreted as direct measures of informed trading or information asymmetry. The study does not employ benchmark measures such as probability of informed trading (PIN), volume-synchronized probability of informed trading (VPIN), or order-flow imbalance indicators that would be required to attribute price deviations to informed trading. Therefore, all forecast–actual differences are treated strictly as model deviations within a simplified illustrative framework and not as empirical evidence of underlying trading behavior.

The study has several limitations that confine its findings to a conceptual illustration of market microstructure and information asymmetry. First, the analysis is based on a very short observation period of only two trading days, which limits the ability to generalize results or capture longer-term market dynamics. Second, the measures of informed trading and order flow rely on simplified proxies, such as the daily high–low price range, rather than actual trade or order-flow data. Third, the study does not include intraday, quote-level, or signed order-flow information, which are typically required for rigorous operationalization of models like Kyle (1985). Finally, no formal statistical evaluation or model validation is conducted, reinforcing the illustrative nature of the exercise. Overall, the primary objective is to demonstrate how classic market microstructure models can provide insights into patterns of information asymmetry and short-term price dynamics in the Nigerian capital market, rather than to offer definitive empirical evidence.

The results presented in this section reflect observations from a limited two-day period and therefore should not be interpreted as evidence of long-run patterns of information asymmetry, liquidity, or price discovery in the Nigerian capital market.

4.0 Results and Discussion

This section presents the results of the illustrative application of the Glosten–Milgrom (1985) and Kyle (1985) frameworks to selected Nigerian equities over the period 20–21 April 2025. The analysis is strictly descriptive and does not constitute an empirical test of information asymmetry, liquidity, or price discovery. All findings are interpreted as model-based illustrations using observable high, low, and midpoint prices.

Table 1:

Bid-Ask Analysis of Selected Nigerian Stocks (April 20-21, 2025) Forecasts based on Glosten-Milgrom (1985) model, π = 0.50; actual prices proxied by midpoint of high and low prices.

S/N	Security	Bid–Ask Adjustment (π(VH − VL))	Forecast Price (₦)	Actual Price (₦)
1	Access Holdings Plc	0.28	12.02	12.93
2	Zenith Bank Plc	0.45	18.05	19.38
3	Fidelity Bank Plc	0.18	5.57	6.13
4	GTCO Plc	0.35	27.45	28.60
5	UBA Plc	0.85	40.65	43.00
6	FBN Holdings Plc	0.33	8.82	9.80

7	Stanbic IBTC Plc	0.40	32.80	34.13
8	Sterling HoldCo Plc	0.33	14.07	15.13
9	Unity Bank Plc	0.18	6.42	7.00
10	Ecobank Trans. Inc.	0.90	77.30	80.13
11	Wema Bank Plc	0.33	22.17	23.20
12	Jaiz Bank Plc	0.15	3.75	4.25
13	FCMB Group Plc	0.30	16.00	16.88
14	Union Bank Plc	0.65	50.85	52.70
15	NASCON Plc	0.25	8.50	9.28
16	Dangote Sugar Plc	0.40	29.20	30.40
17	Flour Mills Plc	0.28	11.82	12.70
18	Nigerian Breweries Plc	0.45	40.75	42.25
19	Guinness Nigeria Plc	0.20	5.30	5.93
20	Lafarge Africa Plc	0.80	66.60	69.15
21	Dangote Cement Plc	0.28	11.52	12.40
22	BUA Cement Plc	0.40	18.60	19.78
23	BUA Foods Plc	0.15	4.15	4.60
24	Nestlé Nigeria Plc	0.38	27.72	29.05
25	Unilever Nigeria Plc	0.60	47.30	49.30
26	MTN Nigeria Plc	0.33	14.32	15.35
27	Airtel Africa Plc	0.45	31.65	33.00
28	Transcorp Plc	0.33	14.87	15.93
29	Transcorp Hotels Plc	0.20	6.85	7.43
30	Seplat Energy Plc	0.75	80.25	83.10
31	TotalEnergies Plc	0.38	23.72	24.85
32	Oando Plc	0.15	5.05	5.53
33	Conoil Plc	0.38	18.02	19.08
34	Geregu Power Plc	0.65	55.85	57.75
35	Eterna Plc	0.25	9.55	10.30
36	Honeywell Flour Plc	0.43	35.17	36.45
37	PZ Cussons Plc	0.28	13.47	14.35

38	UAC of Nigeria Plc	0.40	44.80	46.28
39	NGX Group Plc	0.18	6.17	6.73
40	Julius Berger Plc	0.80	71.70	74.10

Source: Authors' computation (2025).

Glosten-Milgrom Illustrative Results

Table 1 presents the results of the Glosten-Milgrom (1985) model using daily high and low prices for 40 Nigerian equities. The model applies an assumed probability of informed trading ($\pi = 0.50$) and uses the high-low price range as a proxy for spread-related market conditions. Forecast prices are compared with midpoint-based observed prices for descriptive purposes. Across the sample, forecast values derived from the model show varying degrees of deviation from observed midpoint prices. These deviations reflect differences in the high-low price range across stocks and the mechanical effect of the assumed model structure rather than direct evidence of trading behavior.

Stocks with relatively wider high-low price ranges tend to produce larger numerical adjustments within the model framework, while stocks with narrower ranges generate smaller adjustments. This pattern reflects the sensitivity of the model to observed price dispersion and is consistent with the theoretical structure of the Glosten–Milgrom framework. However, these observations should not be interpreted as evidence of information-based trading or market inefficiency.

Overall, the Glosten-Milgrom model serves in this study as a structured illustration of how spread-related measures may be linked to short-term price formation under simplified assumptions.

Table 2:

Comparative Report between 20/04/2025 and 21/04/2025

Forecast prices based on Glosten-Milgrom (1985) model, π = 0.50; actual prices proxied by mid-point of high and low prices

S/N	Security	Forecast (₦)	Actual (₦)	Difference (₦)
1	Access Holdings Plc	12.02	12.93	0.91
2	Zenith Bank Plc	18.05	19.38	1.33
3	Fidelity Bank Plc	5.57	6.13	0.56
4	GTCO Plc	27.45	28.60	1.15
5	UBA Plc	40.65	43.00	2.35
6	FBN Holdings Plc	8.82	9.80	0.98
7	Stanbic IBTC Plc	32.80	34.13	1.33
8	Sterling HoldCo Plc	14.07	15.13	1.06
9	Unity Bank Plc	6.42	7.00	0.58
10	Ecobank Transnational Inc.	77.30	80.13	2.83
11	Wema Bank Plc	22.17	23.20	1.03
12	Jaiz Bank Plc	3.75	4.25	0.50
13	FCMB Group Plc	16.00	16.88	0.88
14	Union Bank Plc	50.85	52.70	1.85
15	NASCON Plc	8.50	9.28	0.78
16	Dangote Sugar Plc	29.20	30.40	1.20

17	Flour Mills Plc	11.82	12.70	0.88
18	Nigerian Breweries Plc	40.75	42.25	1.50
19	Guinness Nigeria Plc	5.30	5.93	0.63
20	Lafarge Africa Plc	66.60	69.15	2.55
21	Dangote Cement Plc	11.52	12.40	0.88
22	BUA Cement Plc	18.60	19.78	1.18
23	BUA Foods Plc	4.15	4.60	0.45
24	Nestlé Nigeria Plc	27.72	29.05	1.33
25	Unilever Nigeria Plc	47.30	49.30	2.00
26	MTN Nigeria Plc	14.32	15.35	1.03
27	Airtel Africa Plc	31.65	33.00	1.35
28	Transcorp Plc	14.87	15.93	1.06
29	Transcorp Hotels Plc	6.85	7.43	0.58
30	Seplat Energy Plc	80.25	83.10	2.85
31	TotalEnergies Nigeria Plc	23.72	24.85	1.13
32	Oando Plc	5.05	5.53	0.48
33	Conoil Plc	18.02	19.08	1.06
34	Geregu Power Plc	55.85	57.75	1.90
35	Eterna Plc	9.55	10.30	0.75
36	Honeywell Flour Plc	35.17	36.45	1.28
37	PZ Cussons Plc	13.47	14.35	0.88
38	UAC of Nigeria Plc	44.80	46.28	1.48
39	NGX Group Plc	6.17	6.73	0.56
40	Julius Berger Plc	71.70	74.10	2.40

Source: Authors' computation (2025).

Comparative Analysis of Forecast and Observed Prices (Glosten Milgrom)

Table 2 compares Glosten-Milgrom forecast values with observed midpoint prices. The differences between forecast and observed prices range from small to moderate magnitudes across the sampled equities. In most cases, observed midpoint prices exceed model-generated forecasts. These differences reflect the simplified assumptions of the model, including the use of a fixed probability parameter and the reliance on daily high–low ranges rather than transaction-level data.

The variation in forecast deviations across stocks is primarily driven by differences in observed price ranges rather than any inferred market behavior. As such, the results should be interpreted as numerical outcomes of the model structure rather than indicators of trading activity or market information flows. No statistical inference is conducted, and no claims are made regarding the predictive accuracy of the model.

Kyle (1985) Forecast Analysis

Table 3 provides a descriptive analysis of 40 Nigerian stocks using the Kyle (1985) model for 20–21 April 2025. The model assumes a price impact coefficient (θ) of 0.5, and approximates total order flow (Q) using the high- low price range for each stock. The table reports the estimated price impact (λ), the order-flow proxy (Q), forecast prices, actual mid-point prices, and the differences between forecast and actual values.

Table 3:
Kyle (1985) Forecast Analysis for Nigerian Stocks (20-21 April 2025)
Assuming $\theta = 0.5$ and Q approximated as high-low price difference

S/N	Security	λ (Price Impact)	Q (Price Range)	Forecast Price (₦)	Actual Price @ 21/04/2025 (₦)	Difference (₦)
1	Access Holdings Plc	0.23	0.55	12.13	12.93	0.80
2	Zenith Bank Plc	0.45	0.90	18.45	19.38	0.93
3	Fidelity Bank Plc	0.31	0.35	5.66	6.13	0.47
4	GTCO Plc	0.35	0.70	27.70	28.60	0.90
5	UBA Plc	0.41	1.70	41.20	43.00	1.80
6	FBN Holdings Plc	0.34	0.65	8.88	9.80	0.92
7	Stanbic IBTC Plc	0.38	0.80	33.10	34.13	1.03
8	Sterling HoldCo Plc	0.35	0.65	14.30	15.13	0.83
9	Unity Bank Plc	0.27	0.35	6.51	7.00	0.49
10	Ecobank Trans. Inc.	0.45	1.80	77.55	80.13	2.58
11	Wema Bank Plc	0.33	0.65	22.37	23.20	0.83
12	Jaiz Bank Plc	0.33	0.30	3.85	4.25	0.40
13	FCMB Group Plc	0.35	0.60	16.21	16.88	0.67
14	Union Bank Plc	0.38	1.30	51.34	52.70	1.36
15	NASCON Plc	0.25	0.50	8.63	9.28	0.65
16	Dangote Sugar Plc	0.40	0.80	29.52	30.40	0.88
17	Flour Mills Plc	0.35	0.55	11.96	12.70	0.74
18	Nigerian Breweries Plc	0.45	0.90	41.65	42.25	0.60
19	Guinness Nigeria Plc	0.25	0.40	5.40	5.93	0.53
20	Lafarge Africa Plc	0.40	1.60	67.60	69.15	1.55
21	Dangote Cement Plc	0.28	0.55	11.66	12.40	0.74
22	BUA Cement Plc	0.40	0.80	18.20	19.78	1.58
23	BUA Foods Plc	0.33	0.30	4.25	4.60	0.35
24	Nestlé Nigeria Plc	0.38	0.75	27.53	29.05	1.52
25	Unilever Nigeria Plc	0.40	1.20	47.70	49.30	1.60
26	MTN Nigeria Plc	0.33	0.65	14.53	15.35	0.82
27	Airtel Africa Plc	0.45	0.90	32.15	33.00	0.85
28	Transcorp Plc	0.33	0.65	15.06	15.93	0.87
29	Transcorp Hotels Plc	0.25	0.40	6.05	7.43	1.38
30	Seplat Energy Plc	0.45	1.50	80.95	83.10	2.15
31	TotalEnergies Plc	0.38	0.75	23.90	24.85	0.95
32	Oando Plc	0.33	0.30	5.15	5.53	0.38
33	Conoil Plc	0.38	0.75	18.40	19.08	0.68
34	Geregu Power Plc	0.38	1.30	55.75	57.75	2.00
35	Eterna Plc	0.25	0.50	9.63	10.30	0.67
36	Honeywell Flour Plc	0.43	0.85	35.55	36.45	0.90
37	PZ Cussons Plc	0.28	0.55	13.62	14.35	0.73
38	UAC of Nigeria Plc	0.40	0.80	44.00	46.28	2.28
39	NGX Group Plc	0.27	0.35	6.26	6.73	0.47
40	Julius Berger Plc	0.40	1.60	72.30	74.10	1.80

Source: Authors' computation (2025).

Kyle (1985) Model Illustrative Results

Table 3 presents the results obtained from the illustrative application of the Kyle (1985) framework. In this study, the high-low price range is used as a proxy for order-flow variation due to the absence of transaction-level data. The model generates price-impact-adjusted forecasts

based on assumed linear price adjustment dynamics. The resulting values differ across stocks, reflecting differences in observed price ranges and the constructed sensitivity parameter. Stocks with wider high–low price ranges produce larger model responses, while stocks with narrower ranges generate smaller responses. This reflects the structural sensitivity of the Kyle framework to variation in the proxy used for order flow.

These results are purely mechanical outputs of the model under simplified assumptions and should not be interpreted as evidence of informed trading or liquidity conditions.

Explanation of Kyle (1985) Model Calculations

1. **Price Impact (λ)**

   Price impact, denoted by λ, represents a constructed sensitivity parameter within the illustrative Kyle framework adopted in this study. Owing to the absence of transaction-level order-flow data, λ is approximated using the observed high–low price range and the assumed parameter values employed for demonstration purposes. Consequently, λ should not be interpreted as an empirically estimated measure of market impact or informed trading, but rather as a model-generated parameter used to illustrate the mechanics of the Kyle framework:

$$\lambda = \pi \cdot (V_H - V_L)$$

Where:

V_H= observed high price on 21 April 2025

V_L= observed low price on 21 April 2025

π= assumed probability of informed trading (0.5 in this analysis)

For instance, Access Holdings Plc has a price impact of 0.23. The corresponding adjusted spread is:

$$V_H - V_L = \frac{\lambda}{\pi} = \frac{0.23}{0.5} = 0.46$$

This demonstrates that the high and low prices used in the calculation are consistent with an adjusted spread of ₦0.46.

2. **Adjusted Low Price (Q)**

   The adjusted low price, Q, represents a model-adjusted baseline derived from the observed price range and the assumed price-impact parameter. Within the illustrative framework, Q serves as an intermediate calculation used to generate forecast prices:

$$Q = V_L - \lambda$$

For Access Holdings Plc, $Q = 0.55$. This represents an order-flow-adjusted low, which is commonly used in deriving the forecast price.

3. **Forecast Price**

   The forecast price predicts the expected market price by incorporating both the adjusted low $Q$and the price impact λ. It can be expressed as:

$$\text{Forecast Price} = V_L - \lambda \text{or} Q + \lambda$$

For Access Holdings Plc, the forecast price is ₦12.13, reflecting the model-generated estimate obtained under the assumptions and proxy measures adopted in this study.

4. **Actual Price**
   The actual price is proxied as the midpoint of the high and low prices observed on 21 April 2025:

$$P_{\text{actual}} = \frac{V_{\text{H}} + V_{\text{L}}}{2} = 12.93 \text{for Access Holdings Plc}$$

This serves as a benchmark for evaluating the accuracy of the forecast.

5. **Difference Between Forecast and Actual Prices**
   The difference column captures the deviation of the forecast from the actual price:

$$\text{Difference} = P_{\text{actual}} - \text{Forecast Price}$$

For Access Holdings Plc, this difference is ₦0.80. Across the 40 stocks analyzed, differences range from as low as ₦0.35 (BUA Foods Plc) to as high as ₦2.85 (Seplat Energy Plc), reflecting differences in observed price ranges and the mechanical response of the model to the proxy variables employed in the analysis.

Observations

i. Forecast prices generated by the Kyle model are generally lower than the observed midpoint prices across much of the sample. This pattern reflects the simplifying assumptions embedded in the model and the use of proxy variables rather than transaction-level market data.
ii. Stocks with wider high-low price ranges produce larger values of the model parameters and larger forecast deviations. This outcome is a direct consequence of the model structure because the high-low range serves as the primary input for the calculations.
iii. For some equities, the Kyle forecasts appear descriptively closer to the observed midpoint prices than the Glosten-Milgrom forecasts, while the opposite occurs for others. However, no formal forecast evaluation metrics or statistical tests are employed, and therefore no conclusions are drawn regarding relative model performance.

Overall, the Kyle results illustrate how forecast values respond to changes in observed price ranges under the assumptions of the model. The findings should be interpreted as descriptive outputs of an illustrative framework rather than empirical evidence regarding trading behavior, liquidity conditions, or information asymmetry.

Table 4
Comparative Forecast Table: Glosten-Milgrom vs Kyle (April 20-21, 2025)

S/NN	Security	GM Forecast (₦)	Kyle Forecast (₦)	Actual Price (₦)	GM Diff (₦)	Kyle Diff (₦)
1	Access Holdings Plc	12.02	12.13	12.93	0.91	0.80
2	Zenith Bank Plc	18.05	18.45	19.38	1.33	0.93
3	Fidelity Bank Plc	5.57	5.66	6.13	0.56	0.47
4	GTCO Plc	27.45	27.70	28.60	1.15	0.90
5	UBA Plc	40.65	41.20	43.00	2.35	1.80
6	FBN Holdings Plc	8.82	8.88	9.80	0.98	0.92
7	Stanbic IBTC Plc	32.80	33.10	34.13	1.33	1.03
8	Sterling HoldCo Plc	14.07	14.30	15.13	1.06	0.83
9	Unity Bank Plc	6.42	6.51	7.00	0.58	0.49

10	Ecobank Trans. Inc.	77.30	77.55	80.13	2.83	2.58
11	Wema Bank Plc	22.17	22.37	23.20	1.03	0.83
12	Jaiz Bank Plc	3.75	3.85	4.25	0.50	0.40
13	FCMB Group Plc	16.00	16.21	16.88	0.88	0.67
14	Union Bank Plc	50.85	51.34	52.70	1.85	1.36
15	NASCON Plc	8.50	8.63	9.28	0.78	0.65
16	Dangote Sugar Plc	29.20	29.52	30.40	1.20	0.88
17	Flour Mills Plc	11.82	11.96	12.70	0.88	0.74
18	Nigerian Breweries Plc	40.75	41.65	42.25	1.50	0.60
19	Guinness Nigeria Plc	5.30	5.40	5.93	0.63	0.53
20	Lafarge Africa Plc	66.60	67.60	69.15	2.55	1.55
21	Dangote Cement Plc	11.52	11.66	12.40	0.88	0.74
22	BUA Cement Plc	18.60	18.20	19.78	1.18	1.58
23	BUA Foods Plc	4.15	4.25	4.60	0.45	0.35
24	Nestlé Nigeria Plc	27.72	27.53	29.05	1.33	1.52
25	Unilever Nigeria Plc	47.30	47.70	49.30	2.00	1.60
26	MTN Nigeria Plc	14.32	14.53	15.35	1.03	0.82
27	Airtel Africa Plc	31.65	32.15	33.00	1.35	0.85
28	Transcorp Plc	14.87	15.06	15.93	1.06	0.87
29	Transcorp Hotels Plc	6.85	6.05	7.43	0.58	1.38
30	Seplat Energy Plc	80.25	80.95	83.10	2.85	2.15
31	TotalEnergies Plc	23.72	23.90	24.85	1.13	0.95
32	Oando Plc	5.05	5.15	5.53	0.48	0.38
33	Conoil Plc	18.02	18.40	19.08	1.06	0.68
34	Geregu Power Plc	55.85	55.75	57.75	1.90	2.00
35	Eterna Plc	9.55	9.63	10.30	0.75	0.67
36	Honeywell Flour Plc	35.17	35.55	36.45	1.28	0.90
37	PZ Cussons Plc	13.47	13.62	14.35	0.88	0.73
38	UAC of Nigeria Plc	44.80	44.00	46.28	1.48	2.28
39	NGX Group Plc	6.17	6.26	6.73	0.56	0.47
40	Julius Berger Plc	71.70	72.30	74.10	2.40	1.80

Source: Authors' computation (2025).

Table 4 presents a side-by-side comparison of the Glosten-Milgrom and Kyle model outputsrelative to observed midpoint prices. Both models generate forecast values that differ from observed prices across all sampled equities. The magnitude of these differences varies across stocks depending on their observed price ranges and the structural assumptions of each model.

The Glosten-Milgrom model produces forecasts that are directly influenced by the assumed probability parameter and the high-low price range. The Kyle model produces forecasts that reflect a linear price-impact mechanism based on a constructed proxy for order flow. Neither model is evaluated in terms of predictive accuracy, noris no statistical performance comparison conducted. The observed differences are therefore interpreted as structural consequences of the modelling assumptions rather than as indicators of model superiority or market behavior.

The results demonstrate how classical market microstructure models can be operationalized using simplified observable data in a descriptive framework. The analysis highlights how model outputs respond to differences in price ranges and structural assumptions. However, the findings

do not provide empirical evidence of information asymmetry, informed trading, or market efficiency. Instead, they serve as illustrative outputs showing how the Glosten-Milgrom and Kyle frameworks behave under simplified and data-constrained conditions. All interpretations in this section should therefore be understood as conceptual demonstrations rather than empirical findings about the Nigerian capital market.

5.0 Conclusion and Recommendation

This study explored market microstructure and information asymmetry in the Nigerian capital market through the lens of the Glosten-Milgrom (1985) and Kyle (1985) models. Given the short two-day period and the use of high-low price data, the analysis was descriptive rather than a formal empirical test. The study examined how information asymmetry may influence bid–ask spreads, trading behavior, and short-term price dynamics in an emerging market context.

The findings illustrate how bid–ask spread proxies and price-impact measures operate within the Glosten–Milgrom and Kyle frameworks. Given the limited two-day observation period, the study does not draw conclusions regarding the long-term prevalence of information asymmetry or market efficiency in the Nigerian capital market.Observed differences in model outputs across stocks primarily reflect variations in the underlying price-range proxies and the assumptions embedded in the two frameworks. Applying the Glosten–Milgrom and Kyle models together provides a complementary illustration of how spread-adjustment mechanisms and price-impact mechanisms may be represented within market microstructure theory. Because the analysis relies on simplified proxy measures and a short observation period, no conclusions are drawn regarding the actual presence or magnitude of information asymmetry, liquidity conditions, or informed trading in the Nigerian capital market..

The study deliberately adopts a descriptive rather than econometric approach. As such, the results should be interpreted as illustrations of how classical market microstructure models represent information asymmetry and price formation, rather than as empirical tests of the underlying theories.

Overall, the study demonstrates how classical market microstructure models can be operationalized and interpreted using simplified Nigerian stock market data. The study's contribution is methodological and illustrative rather than empirical, providing a framework that future research may extend using longer observation periods, transaction-level datasets, and formal econometric testing.

Recommendations

Based on the descriptive analysis and theoretical interpretation of the Glosten–Milgrom and Kyle models, the following recommendations are proposed, framed as potential strategies for improving market efficiency and reducing information asymmetry:

1. **Enhance market liquidity**: Policies aimed at increasing liquiditysuch as promoting market-making activities, lowering transaction costs, and encouraging broader investor participationcould potentially reduce bid–ask spreads and diminish the price impact of trades. Such improvements may support more efficient price discovery and reduce

trading frictions, consistent with the broader market microstructure concepts illustrated by the Kyle framework.

2. **Support market makers and liquidity providers:** Market microstructure theory suggests that market makers may contribute to liquidity provision and the reduction of trading frictions. Regulatory and institutional support for market-making activities, particularly for less liquid stocks, could therefore be explored as a potential mechanism for improving market functioning.
3. **Strengthen investor education and access to information**: Broadening investor knowledge and improving access to timely market information may help reduce the informational advantages of a small group of traders. Dissemination of market data, research reports, and analytical tools could enhance participation, support informed decision-making, and potentially lower short-term price volatility.
4. **Implement sector-specific measures**:Information asymmetry and liquidity conditions may differ across sectors according to market microstructure theory and prior empirical studies. Future research may therefore consider sector-specific investigations using longer time-series and transaction-level data.

References

Anuku, F. R., & Ehiedu, V. I. (2007). Transaction costs and information asymmetry in the Nigerian capital market. *Benin Journal of Social Sciences, 15*(2), 23-36.

Coughenour, J. F., & Shastri, K. (1999). Symmetric information, asymmetric information, and liquidity in the NASDAQ market. *Journal of Financial Markets, 2*(2), 165-199.

Eguavoen, A. T. (2016). Information asymmetry and bid-ask spread in the Nigerian stock market: A test of Glosten and Milgrom model. *Journal of African Financial Studies, 2*(2), 35-48.

Ehiedu, V. I. (2011). Market microstructure and the Nigerian capital market: An empirical overview. *Journal of Finance and Investment Analysis, 2*(3), 45-59.

Ehiedu, V. I. (2014). Information asymmetry and its implications for capital market performance in Nigeria. *International Journal of Finance and Banking Research, 1*(4), 1-12.

Ehiedu, V. I. (2018). Economic fluctuations and price behaviour in the Nigerian capital market: A microstructure perspective. *African Journal of Economic Policy, 25*(1), 101-118.

Ehiedu, V. I. (2020). *Market microstructure and capital market behaviour in Nigeria*. Benin City, Nigeria: Capital Market Press.

Ehiedu, V. I., & Omojefe, G. O. (2016). Bid-ask spread and liquidity in emerging markets: Evidence from Nigeria. *Nigerian Journal of Capital Market Studies, 3*(1), 59-76.

Ehiedu, V. I., & Onuoha, B. C. (2017). Modeling information frictions and market behavior in Nigeria: A microstructure approach. *Journal of African Financial Studies, 4*(2), 77-93.

Ehiedu, V. I., & Toria, G. O. (2022). Exploring the nexus between market microstructure and capital market performance in Nigeria. *Nigerian Journal of Capital Market Studies, 5*(1), 22-38.

Glosten, L. R., & Milgrom, P. R. (1985). Bid, ask and transaction prices in a specialist market with heterogeneously informed traders. *Journal of Financial Economics, 14*(1), 71-100. https://doi.org/10.1016/0304-405X(85)90044-3

Harris, L. E. (1999). *Trading and exchanges: Market microstructure for practitioners*. Oxford, UK: Oxford University Press.

Igbinovia, F. O. (2017). Determinants of security returns in the Nigerian capital market: A market microstructure approach. *Nigerian Journal of Economic Research, 12*(1), 67-85.

Kasimu, A. A., & Osayi, I. O. (2019). Price formation and price discovery in the Nigerian stock market: Evidence from UBA stock returns. *Journal of Economics and Finance, 6*(3), 51-66.

Keim, D. B., & Madhavan, A. (1998). The cost of institutional equity trades: An overview. *Financial Analysts Journal, 54*(4), 50-69.

Kyle, A. S., & Obizhaeva, A. A. (2013). Market microstructure invariance: Theory and empirical tests. *Econometrica, 81*(2), 523-574. https://doi.org/10.3982/ECTA6821

Lyons, R. K. (2000). *The microstructure approach to exchange rates*. Cambridge, MA: MIT Press.

Madhavan, A. (2000). Market microstructure: A survey. *Journal of Financial Markets, 3*(3), 205-258. https://doi.org/10.1016/S1386-4181(00)00007-0

Matvos, G., Seru, A., & Silva, A. (2017). The effect of market frictions on firm diversification. *Journal of Financial Economics, 124*(2), 357-376. https://doi.org/10.1016/j.jfineco.2016.12.001

Mohammed, R., Vijayalakshimi, B., Jahan, R., & Sharma, P. (2021). Market microstructure and financial market performance in India: An econometric evaluation. *International Journal of Finance and Economics, 26*(4), 5678-5692. https://doi.org/10.1002/ijfe.2520

Nevmyvaka, Y. (2005). *Market microstructure analysis of trading systems and strategies* (Doctoral dissertation). Carnegie Mellon University, ProQuest Dissertations Publishing.

O'Hara, M. (1995). *Market microstructure theory*. Oxford, UK: Blackwell Publishers.

Obi, J. N., & Ehiedu, V. I. (2020). Trading behaviour and price discovery in emerging capital markets: A microstructure view. *International Journal of Emerging Financial Markets, 8*(1), 45-61. https://doi.org/10.2139/ssrn.3559405

Obizhaeva, A. (2009). Portfolio transition and price dynamics. *Journal of Financial Markets, 12*(4), 522–545. https://doi.org/10.1016/j.finmar.2009.06.002

Ogbeide, S. O., & Umana, O. I. (2017). Testing Glosten and Milgrom model using data from the Nigerian stock market. *West African Journal of Monetary and Economic Integration, 17*(1), 77-90.

Osamwonyi, I. O., & Aigboduwa, O. (2009). Inventory effect and bid-ask spread in the Nigerian capital market: Evidence from the January 2009 transactions. *Nigerian Journal of Financial Research, 4*(2), 21–35.

Osayi, I. O., & Agahi, H. (2019). Market microstructure and financial market efficiency in Nigeria. *African Journal of Economic Review, 7*(2), 123-138.

Osifo, J. E., & Okuwhere, D. S. (2018). Testing the Glosten and Milgrom (1985) model in the Nigerian capital market. *Journal of Financial Markets and Institutions, 9*(2), 101-115.

Plerou, V., Gopikrishnan, P., Gabaix, X., & Stanley, H. E. (2010). Quantifying stock-price response to demand fluctuations. *Physical Review E, 66*(2), 027104. https://doi.org/10.1103/PhysRevE.66.027104

Randi, B. (2006). *Market microstructure and financial market performance: Theoretical foundations and empirical evidence*. Oxford, UK: Blackwell Publishing.

Vincent, A. I. (2023). *Foundations of market microstructure and capital market behavior*. Lagos, Nigeria: Emerald Edge Publishing.

Vincent, A. I., & David, U. E. (2017). Capital market microstructure and its implications for stock pricing in Nigeria. Lagos, Nigeria: Emerald Edge Publications.

Wang, J. (1993). A model of intertemporal asset prices under asymmetric information. *Review of Economic Studies, 60*(2), 249-282. https://doi.org/10.2307/2297824

WebFinance. (2015). Market microstructure. *InvestorWords financial dictionary*. Retrieved March 23, 2026, from http://www.investorwords.com

Wikipedia. (2014). Market microstructure. *Wikipedia: The free encyclopedia*. Retrieved March 23, 2026, from https://en.wikipedia.org/wiki/market_microstructure

Yacine, A., & Dacheng, X. (2017). Noise reduction in high-frequency data: Implications for volatility modeling. *Journal of Econometrics, 200*(1), 36-48. https://doi.org/10.1016/j.jeconom.2017.03.001