

Market Microstructure Model in the Nigerian Capital Market: A Review of Literature

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Abstract

This paper examines market microstructure and high frequency trading (HFT) changes in pricing of assets in the Stock Markets, with particular reference to the Nigerian Stock Market. High frequency trading (HFT) is not just about speed, rather it is a reflection of fundamental changes on how markets operate coupled with the way traders carry out their trading activities. These changes have important implications for microstructure research and actual transaction process of how buyers and sellers find one another and agree on a price, which can affect price formation and trading volumes in a market. This high frequency trading (HFT) has been achieved to a large extent in Nigeria by the introduction of the automated trading system with bids and offers of securities now matched by stockbrokers on the trading floors of the Stock Exchange through a network of computers (under the Central Securities Clearing System). Secondary market transactions are now consummated by stock brokers through the use of computers within the hours of 11.00 a.m. till all bids and offers have been executed (about 1.30p.m. on the average) Thus, by recognizing that legitimate information about companies fundamentals may be unequally distributed between market participants; investors can no longer assume that prices will reflect information immediately even if all participants are rational. Both information risks due to asymmetric information and differences in liquidity and between companies, impact on long term equilibrium prices in the Nigerian Stock Exchange.

Keywords: Market Microstructure, Trading Mechanisms, and Financial Market Regulations

INTRODUCTION

Microstructure theory is a branch of finance that studies the mechanisms of price formation in financial markets. Such understanding is crucial in helping the regulators concerned with the organization of liquidity in electronic markets and the issues raised by high frequency trading. In view of the amount of available data and the development of high frequency trading (HFT), market microstructure is now a mature practical field where precise, quantitative theories can be tested with accuracy. Quantitative research of this kind has always been at the forefront of innovation and development in finance and the mechanisms of price formation is at the very

heart of modern financial economics (Abregel, Bouchand, Fouccalt, Lahalle & Rosenbaum, 2012).

Market microstructure analysis over the years have in multiple ways given direction to market structure development and to a remarkable extent, the various theoretical microstructure models that are centre stage today, and many empirical analysis that are based upon them, share a common structural framework – the asymmetric information paradigm (Domowitz & steil, 1999). Market microstructure focuses on those issues that involve the implementation of investment decisions in the stock marketplace. Implementation entails the placement and handling of orders in a securities market, and their translation into trades and transaction prices. The process links fundamental information concerning equity valuation (which is of primary concern to portfolio managers) to prices and transaction volumes that are realized in the marketplace. The equity of the link depends on the rules, procedures and facilities of a securities market, and on the broader regulatory and competitive environment within which the market operates (Francioni, hazarika, Reck & Schwartz, 2008).

Widespread interest on the part of the securities markets, government and academia is an indication of the importance of market microstructure analysis. It addresses issues that concern investors, broker/dealer intermediaries, market regulators, exchanges and trading venues as well as the broad economy. According to Bernstein (1987), interest in microstructure has increased sharply over the past three and half decades, spurred in particular by three events; the passage by the U.S Securities and Exchange Commission's SEC institutional investor report (1971), the passage by the U.S Congress of the securities Acts Amendments of 1975, and the sharp stock market drop on October 19, 1987. Further, the advent of computer driven trading in recent years has enabled researchers to capture electronically the full record of all trades and quotes, and this has provided empirical researchers with far richer data (referred to as high frequency data) for analyzing trading and price setting (Economides & Schwartz, 1995; Francioni et al, 2008).

Over the years, microstructure analysis has expanded, and exchange structure in several emerging economies of African continent has been strengthened a great deal. In view of the fact that amassing liquidity is a primary function of a marketplace, the market structure features are generally designed with liquidity implications in mind. Portfolio managers also take liquidity into account, along with two other standard variables such as risk and return. Thus, Difficulties in defining, measuring, and modeling liquidity are formidable; however, studies that deals with it directly is still relatively few today (Bernstein, 1987; Bassler, 2006).

To this end, the paper theoretically attempt to review the various issues relating to market micro structure and its practices both in international markets and in the Nigerian Stock market. Some of the areas examined include concept and framework of market microstructure. Market structure and design, price formation, market transparency and four broad applications of microstructure's challenges.

LITERATURE REVIEW

Market Microstructure

Market microstructure is the area of finance that studies the process by which investors' latent demands are ultimately translated into prices and volumes (Madhavan, 2000). Market microstructure according to Nevmyvaka (2005) is a discipline that studies how securities prices are determined under different market mechanisms. From the point of view of economics, price is a point of intersection of supply and demand schedules; in neoclassical finance, price is a gain as in given number an intrinsic value of security on which all market participants agrees and thus can trade an arbitrary number of shares at this one price. Neither concept is faithful to the real world; in financial markets prices are in constant flux, agents have divergent expectations about values, information is never fully accessible, investors act under different constraints, therefore, it is said that financial markets are engaged in a continuous, ongoing process of price discovery through a series of repeating negotiations among themselves, market participants are trying to determine true value of traded securities.

Webfinance (2015) opines that market microstructure is the underlying mechanism of trading in financial markets which is often analyzed in order to understand price discovery, efficiency in trade execution, impact of volume and other factors. However, Wikipedia (2014) sees market microstructure as a branch of finance concerned with the details of how exchange occurs in markets. The major thrust of market research examines the ways in which the working processes of a market affects determinants of transaction costs, prices, quotes, volume, and trading behavior. Recent innovations have allowed an expansion into the study of the impact of microstructure on the incidence of market abuse, such as insider trading market manipulation and broker client conflict.

Randi (2006) argues that market microstructure studies how the actual transaction process, that is to say, how buyers and sellers find one another and agree on a price that can affect price formation and trading volumes in a market. The market serves two functions; one is to provide liquidity for buyers and sellers; the other is to ensure that prices reflect relevant information about fundamental value. He posited further that microstructure models differ from fundamentals may be equally distributed between and differently interpreted by market participants. Hence, no one can assume that prices will reflect information immediately even if all participants are rational. The microstructure theory therefore argues that both information risk due to asymmetric information and differences in liquidity over time and between companies impact on long term equilibrium prices in the market (Randi, 2006).

According to O'Hara (2014), markets are now different in fundamental ways, as high frequency trading (HFT) has clearly made things faster, considering the advent of (HFT) as being only about speed misses the revolution that has happened in markets. From the way trader's trade, to the way markets are structured, to the way liquidity and price discovery arise – all are now different in the high frequency world. What is particularly intriguing is the new role play by microstructure. One might have expected that when things are fast the market structure becomes irrelevant but the opposite is actually the case, as microstructure now matters even at a very fast speed in modern markets today (O'Hara, 2014). But from the point of view of

Madhavan (2000), market microstructure has broader interest, however, with implications for asset pricing, corporate finance and international finance. A central idea in the theory of market microstructure is that asset prices need not equal full information expectations of value because of a variety of frictions. Thus, market microstructure is closely related to the field of investments, which studies the equilibrium values of financial assets. But while many regard market microstructure as a subfield of investments, it is also linked to traditional corporate finance because differences between prices and value of assets clearly affect financing and capital structure decisions. The analysis of interactions with other areas of finance offer a new and exciting dimension to the study of market microstructure, one that is still being written (Madhavan, 2000).

Market Structure and Design: Microstructure deals with issues of market structure and design, price formation and price discovery, transaction and timing cost, information and disclosure, and market maker and investor behavior (Hasbrouck, 2007). Now, market structure and design focuses on the relationship between price determination and trading rules (Hasbrouck, 2007). In some markets, for instance, assets are traded through dealers who keep an inventory (housing). Also, one of the important questions in microstructure research is how market structure affects costs and whether one structure is more efficient than another (Manaster & Mann, 1996). Hence, microstructure and design is a critical factor that affects the investment decision as well as investment exit.

Price formation and discovery: This refers to the extent to which the market provides independent price discovery or uses prices determined in another market as the basis for transactions. In other words, it focuses on the process by which the price for an asset is determined. For example, in some markets prices are formed through an auction process (eBay), in other markets prices are negotiated (new cars) or simply posted (local supermarket) and buyers can choose to buy or not (Manaster & Mann, 1996).

Transaction cost and timing cost: It focuses on transaction cost and timing cost and the impact of transaction cost on investment returns and execution methods. Transaction costs include order processing costs, adverse selection costs, inventory holding costs and monopoly power.

Information and disclosure: It focuses on the market information and transparency and the impact of the information on the behavior of the market participants.

APPLICATIONS OF MICROSTRUCTURES CHALLENGES

Francioni, Hazariaka, Reck and Schwartz (2008) advocated four broad applications for microstructure analysis which underscores that trading frictions are the subject's *raison d'être*. According to them, market participant's orders cannot translated into trades at zero cost (markets are not perfectly liquid), and trades typically are not made at market clearing (equilibrium) prices. Trading decision rules (algorithm) are needed because the costs of implementing portfolio decisions can sharply lower portfolio performance. In fact, much algorithmic trading is designed to control trading costs, rather than to exploit profitable trading opportunities. They are;

First, it gives guidance to market structure development. The link with market structure is straightforward: the critical factor that drives microstructure analysis is friction in the marketplace (the explicit and implicit costs of implementing portfolio decisions), and trading costs depend on the architecture of the marketplace which determines how orders are handled and turned into trades. The flipside of friction is illiquidity. A primary function of a market center is to amass liquidity, and liquidity considerations were continually kept in mind during the development of Deutsche Borse's electronic trading platform (Francioni, Hazariaka, Reck & Schwartz, 2008).

Second, microstructure applications facilitate the development of trading strategies and algorithms for asset managers and broker/dealer intermediates (Francioni, Hazariaka, Reck & Schwartz, 2008). The importance of this application is evident in the current development of computer driven algorithm trading. Algorithms can be fine-tuned to take into account the profitability of a limit order executing, time of day effects such as market openings and closings, the search for liquidity in a fragmented environment and the choice of a trading modality (a continuous limit order book market, a quote driven dealer market, a periodic call auction, a block trading facility, or hybrid combinations of the above) (Francioni, Hazariaka, Reck & Schwartz, 2008).

The third application of microstructure analysis relates to the tests of market efficiency. Fama (1970) EMH was widely accepted as a cornerstone of modern portfolio theory, and it continues to receive broad academic support today. The tenant of the hypothesis was hinged on the fact that informational efficiency is distinct from operational efficiency (transaction costs by superior market design). Accordingly, a market is informationally efficient if no participant is able to achieve excess risk adjusted returns by trading on currently available information (Fama, 1970). Many of the EMH tests have considered one major part of the information set, that is, market information such as recent quotes, trading volumes and transaction prices). If prices properly reflect all known information, then (in a frictionless market at least) they must change randomly over time. However, with the advent of high frequency data, the footprints of complex correlation patterns have been detected. This observation, along with superior knowledge of the impact of trading costs on returns behavior is casting a new light on market efficiency. Whether efficiency is thought of in operational terms, the EMH is not as stellar as it once was (Francioni, Hazariaka, Reck & Schwartz, 2008).

The fourth application of the market microstructure analysis emphasizes on how new information is incorporated into security prices as advocated by the EMH. But in real market situation, information must be received and assessed, traders' orders must be placed and processed, and executions must be delivered and accounts cleared and settled. Both explicit (commissions) and implicit costs (market impact) are incurred during the processes. Some market participants however incur several costs relating asymmetric information environment at the detriment of the uninformed traders. However, considering the size, complexity and imprecision of much publicly available information, both asymmetric information and divergent expectations reflect a rich set of forces that impact the dynamic behavior of security prices.

MARKET MAKERS AND THE ROLE OF INFORMATION IN PRICE FORMATION

In the extant literature on market microstructure, Warasian models that assume perfect competition and free entry remain an alternative to frictionless trading behaviour in the stock exchange. It basically focuses on all aspects of the security trading process, including the role of market institutions. Much of the early literature is concerned with the operations of agents known as market makers, professional traders who stand willing to buy or sell securities on demand. In view of their strategic role as process settlers, market makers are a logical starting point for an exploration of how prices are actually determined inside the “black box” of a security market. Market makers are also of importance because they provide liquidity to the market and permit continuous trading by overcoming the asynchronous timing of investor orders (Madhavan, 2000).

They usually quote two prices: the bid price, at which they will buy securities and the ask price, at which they will sell. The difference between the bid and the ask price is the market maker’s spread (Madhavan, 2000). According to Demsetz (1968), market makers provide a service of predictive immediacy in an organized exchange market, for which the bid-ask spread is the appropriate return under competition. They play a passive role by simply adjusting the bid-ask spread in response to changing conditions. This is a reasonable first approximation because, as noted by Stoll (1985), market makers in the New York Stock Exchange (NYSE) typically face stiff competition from floor traders, competing dealers, limit orders and other exchanges. (Limit orders are orders to buy (sell) that specify a maximum (minimum) price at which the trader is willing to transact. A market order is an order to buy (sell) at prevailing prices. A stop order is an order that becomes a market order if and when the market reaches a price pre-specified by the trader (Madhavan, 2000).

MARKET MECHANISMS

Basically, market mechanisms can be classified into two broad categories: the quote-driven and the order driven. In a quote driven (or dealer) market, dealers post their quotes and all transactions take place at those quotes – investors cannot transact directly with one another, all trade flow goes through market makers (O’Hara & Oldfield, 1986) Bond market and currency market are pure dealer markets, Nasdaq also started as a dealer market. Under this mechanism, the dealer has to buy every time an investor wishes to sell, and has to sell when an investor seeks to make a purchase. The dealer participates in every single transaction and is the designate counterparty for the rest of market participants. Dealer’s buy quote (called bid) is always lower than his sell quote (ask), which creates a so called bid-ask spread enabling the market to sell at higher prices than he buys. The spread reimburses the dealer for providing liquidity to the market (O’Hara & Oldfield, 1986; Nevmyvaka & Sycara, 2005).

It is essential to understand that even though all trades go through the dealer does not set prices in the market: the buyers ultimately transact with sellers, and sellers with buyers. The dealer just interposes himself between the two groups of traders and guarantees that there will always be the “other side” of the trade when the trader of either type arrives to the market place. Quote driven markets can feature multiple dealers in the same securities, competing for the order flow among them public investors will only transact with the dealer who has the highest bid or the

lowest ask in the market. Besides striving to attract the order flow by posting competitive quotes, market makers have to control their inventory. Indeed, if the dealer only receives sell orders (thus accumulating a large positive inventory), he never gets to buy low and sell high in order to profit from the spread. Because of these realities, quote driven markets are best suited for somewhat liquid securities where his presence can add some structure and support to the process of price discovery (Adekunle, Okere, Kokogho, Loretta, & Odio, 2024; O'Hara & Oldfield, 1986; Madhavan & Schmidt, 1993).

In a pure order driven (or auction) market, investors transact directly with one another by submitting limits and market orders; there are no designated market makers. ECNs are a canonical example of such market mechanisms. As described above, limit orders form order books, thereby establishing prices and volumes at which incoming market orders can transact. These books are visible to all market participants. It is said that limit orders provide liquidity to the market (essentially performing the function of the market in the quote driven market), and that market orders demand or take liquidity. This process is also known as a continuous double-auction (Madhavan & Smidt, 1993; Nevmyvaka & Sycara, 2005).

MARKET MICROSTRUCTURE AND INVENTORY MODELS

Demsetz (1968) was the first to point out that there are costs associated with transacting shares. Besides explicit costs (such as stock exchange fees and broker's commissions), there is also an indirect cost associated with getting to trade when you want to. As buyers and sellers do not necessarily need to trade at the same time. Demsetz argues that investors wanting to buy quickly must pay higher price to motivate patient sellers to sell (and vice versa). Another important implication is that the price at which you trade depends on whether or not you wish to buy or sell quickly. i.e. that there are two equilibrium prices rather than one. The first microstructure models assumed optimal dealer behaviour. Garman (1976) looks at how a risk neutral monopolistic dealer will set bid and ask prices in order to maximize expected profit per unit of time. The dealer wants to set prices to avoid bankruptcy, but must also ensure that prices are not set in such a way that his inventory empties. In Garman's model, the dealer sets prices once, after which buyers and sellers arrive in the form of two independent Poisson processes. Garman shows that it is optimal for the dealer to set different bid and ask prices, and that both prices will be functions of the frequency at which buyers and sellers arrive. Thus, his model explains why there is a positive spread in a dealer market. Amihud and Mendelson (1980) expand Garman's model into a multi-period model where the dealer balances his inventory over time by changing his prices in each period. These models shows that optimal bid and ask prices fall monotonically with the size of the dealer's inventory. In other words, the dealer lowers both bid and ask price in response to a growing inventory (and vice versa when his inventory shrinks). This behavior is known as quote shading. Thus Amihud and Mendelson (1980) model also means that the dealer sets a positive spread; what is new in this model is that the optimal pricing strategy also takes into account of the dealer wanting to keep his inventory of shares at a given level. Madhavan and Smidt (1991, 1993) and Hasbrouck and Sofianos (1993) find empirical support for dealers actually having such a desired inventory level, but also for them appearing to be willing to move away from this desired position for long periods. One empirical implication of inventory effects and quote shading is that they lead to a return

towards normal stock returns (mean reversion). The main outcome of these inventory models is that dealers set bid and ask prices in such a way as to cover their order-processing and inventory keeping costs.

MARKET MICROSTRUCTURE AND TRANSPARENCY

Market transparency is defined by O'Hara (1995) as the ability of the market participants to observe information about the trading process. In this regard, information is the knowledge about prices, quotes, or volumes, the sources of order flow, and the identities of market participants. According to Madhavan (2000), he divides market transparency into two forms namely (i) pre trade dimension and (ii) post trade dimension. The pre trade transparency dimension is the wide dissemination of current bid and asks quotations, depths, and possibly also information about limit orders away from the best prices, as well as other pertinent trade related information such as the existence of large order imbalances. On the other hand, the post trade transparency dimension is the public and timely transmission of information on past trades, including execution time, volumes, price and possibly information about buyers and sellers identifications.

Dealer markets typically feature much lower levels of transparency than limit order markets. This goes for how much information is made public, who receives the information, and when the information is published. A number of theoretical studies have shown that an increased transparency results in better liquidity and reduced transactions costs (Admati & Pfleiderer, 1991); Chowdhry & Nanda, 1991; Forster & George, 1992; Bienveniste et al, 1992). However, Madhavan (1995) shows that transparency can also reduce liquidity, because participants not wanting to reveal their interest in buying or selling will withdraw their orders from the market. Empirical and experimental studies have come up with unambiguous results either when it comes to the issue. However, the literature is unanimous that participants trading on the basis of pure liquidity needs – and particularly those who cannot signal this – will prefer high transparency. This means that changes in transparency will benefit some participants at the expense of others.

EMPIRICAL TESTS OF MICROSTRUCTURE MODELS

Copeland and Galai (1983) examine the information effect of the bid-ask spread, by characterizing the cost of supplying quotes as writing a put and call option to an information motivated trader. The empirical test indicates that the bid-ask spread is a positive function of the price level and return variance, a negatively correlated with the degree of competition. Thus, the theory of information effects on the bid-ask spread is consistent with the literature.

Ho and Macris (1984) empirically test a model of dealer pricing using transactions data recorder in an AMEX options specialist's trading book. The data was made up of dealer's inventory positions and transactions were also classified as being purchases or sales, in such a way that econometric estimation is straightforward. They find that the percentage spread is positively related to asset risk and inventory effects are significant. The specialist's quotes are influenced by his inventory position; both the bid and ask prices fall rise) when inventory is positive (negative).

Glosten and Harris (1988) decompose the bid-ask spread into two parts, the informational asymmetries, add the inventory carrying costs, market maker risk aversion, and monopoly rents. The results from the empirical test shows that the adverse selection component of the bid-ask spread is not economically significant for small trades, but increases with trade size.

Hasbrouc (1988) employs a vector autoregressive (reduced form) approach to model NYSE intraday data on volume and quoted prices, and examines both series for Granger-Sims causality. Hasbrouck finds that the intraday transactions volume and quote revision exhibit strong dependencies in both directions, evidence consistent with both the inventory control and asymmetric information models. He then estimates the impact of trade innovations on quote revisions. The trade innovations were found to have a positive impact on quote revisions, suggesting the information effect dominates inventory control effects. Hasbrouck (1991a, 1991b) also empirically employed a similar vector autoregressive approach to examine the information content of stock trades. He finds that there is a significant information effects. This finding was also consistent with that of Litzenberger and Warner (1990).

In another related study, Madhavan and Smidt, (1991) employ actual specialist inventory data to disentangle the two effects and estimate the extent to which asymmetric information is indeed a factor in security pricing. Using past prices as a proxy for mean beliefs, they recover the weight placed by a Bayesian dealer on order flow as a signal of future value by distinguishing it from inventory effects. The results from the empirical test indicate that asymmetric information is an important element of intraday price dynamics. Hasbrouck and Sofianos (1993) employed a different data and methodology; they find weak evidence with respect to intraday inventory effects.

Francioni, Hazarika, Reck and Schwartz (2008) empirically examine equity market microstructure taking stock of what we know in Germany. The results from their analysis indicate that microstructure literature has grown and trading systems around the world in the past three decades, and have been reengineered into modern electronic platforms. The study also showed that, during Xetra's planning period of 1994 to 1997, Xetra's implementation has marked a huge step forward for Germany's equity markets.

MARKET MICROSTRUCTURE DESIGN AND THE NIGERIAN CAPITAL MARKET

The trading system in the Nigeria capital market over decades have been done using the call-over or the manual system of trading with it attendant problem of low trading pattern and the system slow transaction system the completion of transaction was also very slow and the system can only handle few activities. The call-over system was adjudged to be efficient to the extent of it installed capacity but in the instance of internalization growth and high liquid market the call over become weak this necessitate the introduction of the automated trading system (ATS) in 1999, which in effect bring about a microstructure change in the Nigerian stock market (Sunday, Omah & Oladimeji, 2012). Also, the emergence of a large trading facility as a result of the privatisation and the commercialisation of the hitherto government stock made the system feeble and unable to handle large transactions in the market. According to the Nigerian Stock Exchange Fact Book (1999), the consequence of the manual clearing system led to a very low volume of trade over the years resulting in several drawbacks which

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include; delay in issuing share certificates to shareholders, cancellation of share certificates of selling shareholders and issuance of new share certificates for a buying shareholder per transaction, constant signature verification before sales is allowed, dealing members were short-selling, failed transaction, loss of share certificates, and so on. Thus, the purpose of any microstructure change is to enhance growth in the stock market, to improve the trading system or trading mechanisms and to improve on the liquidity of the market with respect to the various dimensions of trading mechanisms such as market type, price discovery, order forms and degree of transparency (Murinde, 2006).

According to Hudak (2005), the Automated Trading System enhances automated decision process, discipline, higher consistency in trade result, and automated monitor of trends. He posited further that the automated trading system may not work perfectly using historical data in view of the fact that historical data produce prices of stock based on past events and trading activity. However, daily price is a function of current market impulse. The buy and sell signals may not be realized due to some other reasons (such as low liquidity, viability). To realize the trade, difference in the ATS signaled price and the available realistic information about the firm must move trade in some direction, either up or down. On his part, Hudak (2005) opines that an inefficient stock market exists where ATS signal price and the realistic information about the firm are not positively correlated. He argued that an efficient Stock market is that market in which every security (Stock) price equals to its investment value

In the last decade, the Nigerian stock market has witnessed monumental changes in economic environment propelled by major technological innovations in telecommunications and information technology resulting in integrated world financial markets with the emergence of globalization or cross-border investments. It should be recalled that in 1988, the Federation of International Stock Exchange (FIBE) of which the Nigeria Stock Exchange is a member, commissioned a group of thirty (G 30) experts to undertake a study of world stock markets. The nine (9) key recommendations of the G-30 have become global stock market yard stick for clearing, settlement, depository, registry and custodian systems till date (Olujide, 2000).

To this end, on July 29, 1992, the Nigerian Stock Exchange established a subsidiary company called Central Securities Clearing System Limited with a mission to speed up the delivery system of the Nigerian Capital Market through the introduction of efficient, effective securities, clearing, settlement and custodian mechanisms with minimum risk. This was however to be achieved by the implementation of the Stock Exchange Management System (SEMS) software application package. The SEMS is a four (4) module package:

- Clearing/Settlement: Depository/registry (CDS) system: Custodian services
- Board and automated trading and market control and surveillance
- Broker management and licensing and stockbrokers banks
- Corporate profile management and statistics including INDEX.

The Central Securities Clearing Systems Limited was commissioned on April 8 1997 and commenced operations on April 14 1997. The CSCS, in addition to clearing and settling trades,

functions as: central depository for share certificates of companies quoted on the Nigerian Stock Exchange, sub-registry for all quoted securities (in conjunction with registrars of quoted companies), issuer of central securities identification numbers to stock holders, and custodian (in conjunction with members) for local and foreign instruments. The system operates a T + 5 settlement cycle for transaction on the exchange, in conformity with the FIBE standard for emerging market to which Nigerian Stock Exchange market belongs. The T + 5 (transaction plus five days) settlement cycle is facilitated by the immobilization of share certificates in a central location which in turn enables transaction to be processed in an electronic book entry form. Thus, physical delivery of share certificates for secondary market transactions to fulfill settlement obligations was replaced by electronic credits and debits to shareholders stock positions (Olujide, 2000).

Therefore, in order to maximize the gain of the Central Securities Clearing Systems, the call-over trading system was in April 1999 replaced with the automated trading system with bids and offers of securities now matched by stockbrokers on the trading floors of the Stock Exchange through a network of computers. Secondary market transactions are now consummated by stock brokers through the use of computers within the hours of 11.00a.m. till all bids and offers have been executed (about 1.30p.m. on the average) (Olujide, 2000).

The whole essence of the foregoing is a simple indication of the several market microstructure changes that have occurred in the Nigerian stock exchange over the last decade. Thus, market microstructure with respect to design or trading mechanisms, either on the floor or by means of electronic systems, market type, price discovery, order forms and degree of transparency, reliance on market makers and the degree of automation, is not just a theoretical design but a practical reality that has long been embraced by the Nigerian Stock Exchange Commission in an attempt to improve, enhance and buy into the global internationalization of stock exchanges in order to make it more attractive to foreign portfolio investors and provide the much needed liquidity to the market.

The several benefits that have accrued to the Nigerian stock market since the introduction of the CSCS were clearly outlined in the study of Olujide (2000) as follow:

1. Reduction in incidence of loss or stolen share certificates
2. Elimination of late delivery of share certificates
3. Reduction in the cost of maintaining register of share holders
4. Increased liquidity of stock
5. Increased transparency of market
6. Increased market turnover
7. Encourages foreign investments
8. Ensures prompt inter-broker money and stock settlements
9. Increased efficiency and profitability of stockbroking firms
10. Reduction of operating costs (Olujide, 2000).

CONCLUSION

Market microstructure model is not only a winning concept but has become very relevant in the contemporary trading of shares/assets in Stock Markets across the globe. Countries have no choice rather than to quickly embrace the model. High frequency trading (HFT) is not just about speed, rather it is a reflection of fundamental changes of how traders and stock markets operate and carry out their daily activities in the stock market. These changes are seen to have important implications for microstructure research, which studies how the actual transaction process (how buyers and sellers) locate one another and agree on a price, which in turn influence price formation and trading volumes in the market. In Nigeria however, the high frequency trading (HFT) has been achieved to a large extent with the introduction of the automated trading system with bids and offers of securities now matched by stockbrokers on the trading floors of the Stock Exchange through a network of computers (under the Central Securities Clearing System). Secondary market transactions are now consummated by stock brokers through the use of computers within the hours of 11.00 a.m. till all bids and offers have been executed (about 1.30p.m. on the average) Thus, by recognizing that legitimate information about companies fundamentals may be unequally distributed between market participants; investors can no longer assume that prices will reflect information immediately even if all participants are rational. Both information risks due to asymmetric information and differences in liquidity and between companies, impact on long term equilibrium prices in the Nigerian Stock Exchange.

REFERENCES

- Abergel, F., Bouchaud, J.P., Foucault, T., Lehalle, C.A., & Rosenbaum, M. (2012). *Market microstructure; confronting many viewpoints*, Aptara Inc. New Delhi, India.
- Adekunle, S. A., Okere, O. O., Kokogho, E., Loretta, E. Z. E., & Odio, P. E. (2024). Board characteristics and corporate performance: evidence from the Nigerian oil and gas companies. *Oradea Journal of Business and Economics*, 9(1), 87-97.
- Bernstein, P. (1987). Liquidity, stock markets and market makers, *Financial Management, Summer*, 54-62.
- Copeland, T.E., & Galai, D. (1983). The information effect of the bid-ask spread. *Journal of Finance*, 38(5), 1457-1470.
- Chowdhry, B., & Nanda, V. (1991). Multimarket trading and market liquidity. *Review of Financial Studies*, 4, 483-511.
- Davis, P., Pagano, M., & Schwartz, R. (2007). Divergent expectation. *Journal of Portfolio Management*, Fall Forth coming, 1-21.
- Domowitz, I., & Steil, B. (1999). Automation, trading costs and structure of the securities trading industry. *Brookings-Wharton Papers on Financial Services*, 33-92.

- UJM Volume 3, Number 1, June 2024*
- Domowitz, I., Glen, J., & Madhavan, A. (1997). Market segmentation and stock prices: evidence from an emerging market. *Journal of Finance*, 52, 1059-1085.
- Economides, N., & Schwartz, R. A. (1995). Electronic call market trading. *Journal of Portfolio Management*, Spring, 10-18.
- Eun, C., & Janakiranmanan, S. (1986). A model of international asset pricing with constraint on the foreign equity ownership. *Journal of Finance*, 41, 897-914.
- Foerster, S.R., & Karolyi, G.A. (1996). The effect of market segmentation and illiquidity on asset prices; evidence from foreign stock listing in the US. *Working Paper, Ohio State University*, 1-45.
- Francioni, R., Hazarika, S., Reck, M., & Schwartz, R. A. (2008). Equity market microstructure: taking stock of what we know, the road from theory to a real market place is indeed bumpy. *Journal of Portfolio Management*, 1-29.
- Garmam, M. (1976). Market microstructure, *Journal of Financial Economics*, 33-53.
- Hasbrouck, J., & Sofianos, G. (1993). The trades of market makers: an empirical analysis of NYSE Specialists. *Journal of Finance*, 48, 1565-1594.
- Hasbrouck, J. (2007). Empirical market microstructure: The institutions, e
- Hudak, O. (2005). *Automated trading system development and emerging capital market*. Department of Corporate finance, Faculty of Finance, Cesta Na Amfiteater University. 21 June, 1-23.
- Karolyi, A. (1996). What happens to stocks that list shares abroad? A survey of the evidence and its managerial implications. *Financial Markets, Institutions and Instruments*, 7, 1-60.
- Madhavan, A., & Smith, S. (1991). A bayesian model of intraday specialist pricing. *Journal of Financial Economics*, 30, 99-134.
- Madhavan, A., & Smith, S. (1993). An analysis of daily changes in specialist inventories and quotations. *Journal of Finance*, 48, 1595-1628.
- Madhavan, A. (2000). *Market microstructure and price formation*, 1-58.
- Murinde, V. (2006). *Capital markets roles and challenges*. Birmingham: university of Birmingham. Retrieved on 06/04/2020 from www.bham.ac.uk/staffitem.asp?
- Nevmyvaka, Y., & Sycara, K. (2005). Market microstructure: time series analysis, in the *proceedings of the fifth international conference on computational intelligence in economics and finance*, 1-14.
- Nevmyvaka, Y (2005). Normative approach to market microstructure analysis, *a thesis submitted* in partial fulfillment of the requirements for the degree of Doctor of

Isibor & Ohwojoro. Market microstructure model in the Nigerian capital market ...

philosophy. School of Computer Science Carnegie mellon university, Pittsburgh, PA 15213, 1-229.

Nigerian Stock exchange (1999). *Fact book*.

Nigerian Stock exchange (1999). *Daily Official List*.

O'Hara, M., & Oldfield, G. (1986). The microeconomics of market making. *Journal of Financial and Quantitative Analysis*, 21, 361-378.

O'Hara, M. (1997). *Market microstructure theory*, Basil Blackwell, Cambridge, MA.

O'Hara, M. (2014). High frequency market microstructure. *Journal of Financial Economics*, 1-44.

Olujide, J.O. (2000). The impact of automation on the Nigerian stock exchange. *Nigerian Journal of Banking and Financial Issues*, 3(1), 91-100.

Randi, N. (2006). Is the market microstructure of stock markets important? *Economic Bulletin* 3/6, (77), 123-132.

Sunday, K. J., Omah, I., & Oladimeji, M. (2012). Microstructure change and the effective trading system: the Nigerian experience. *Global Journal of Management and Business Research*, 12(10),1-5.