International Journal of Innovative Finance and Economics Research 5(4):87-97, Oct.-Dec., 2017

© SEAHI PUBLICATIONS, 2017 www.seahipaj.org ISSN: 2360-896X

Empirical Test of Market Micro-Structure Model: Evidence from Nigeria

[1]Foluso Olugbenga ARIBABA (Ph.D) & [2]Lateef Olamide AHMODU & [3]Adekunle ARIBATISE

[1]Department of Accounting and Finance, Faculty of Social and Management Sciences, Elizade University, Ilara- Mokin, Ondo State, Nigeria
E-mail: folusoaribaba2003@yahoo.com
GSM: +234-7038102772

[2]Department of Management Sciences, College of Social and Management Sciences
Wesley University Ondo. Nigeria
ahmoduolamidelateef10@gmail.com or lateef.ahmodu@wesleyuni.edu.ng
Phone No. +2348034662789 & +2348135589699

[3]Department of Economics, College of Social and Management Sciences
Wesley University Ondo. Nigeria

ABSTRACT
This study undertakes a test of market micro-structure. The trading of securities in the stock market is usually carried out with appropriate models by investors and traders. Most often, the market is not always efficient due to market frictions like asymmetric information and transaction costs. Price discovery could be herculean to traders if there is no efficient market architecture and particularly, the market transparency component. To investigate how uninformed traders could be freed from price discovery problems, this study employed the Glosten-Milgrom information asymmetry model. The stock prices of twenty five quoted companies for the month of May; specifically 9th and 10th, 2017 were used. The study findings indicate that the model predicted accurately the prices of stock of about four (4) listed companies, thus defiling the random walk movement, while for about twelve companies, the model did revealed how current day's stock price can be a bit high or low of next day's price. Conclusively, this study has significantly contributed to knowledge by revealing how investors/ uninformed ones in the Nigerian Stock Market can be informed and have a foreknowledge of next day's stock price prediction though with slight difference or variation from the prior day's price. It is therefore recommended that future researchers should explore the applicability of other models with a view to contributing to price discovery and in the reduction of asymmetry of information in the trading processes in the security market in Nigeria.
Key words: Market Micro-structure, Asymmetric information, security price and market transparency,

INTRODUCTION

O'Hara (1995) provided a ground breaking research on the study of market microstructure. Since then, varying researches have been done to advance the study of market microstructure. One of the studies is Madhavan (2000). Market microstructure is related to the field of finance, investment, corporate finance and operation research. Each of these fields of study has a model for pricing assets returns. Market microstructure as an aspect in finance has to do with the analysis of all aspects of the security trading process. It is concerned with how new information determines prices of stocks in the stock market. Generally, agents known as market makers, professional traders who stand willing to buy or sell securities on demand play a significant role at determining new prices of securities in the market. Market

microstructure studies also concerns how buyers and sellers find one another and agree on a price thus affecting price formation and trading volume in the security market. In market microstructure, it is assumed that stock markets behaves rationally and have the same information such that share prices will at all times reflect all available information about companies' fundamental value.

Market microstructure encompasses three processes which include the actual transaction process and this involves trading models like inventory model and information model; the effect of market structure and trading rules on the transaction process; and the transaction's process implication for fundamental economic decisions. The transaction model such as the inventory model studies how an intermediary, otherwise refers to as dealers can solve the problem of buyers and sellers not being present in the market simultaneously. The second model known as information model analyze how information which is asymmetrically distributed between participants in the market is reflected in the prices of securities (Madhavan, 2000). A fundamental function of a market is to ensure that buyers and sellers find one another and have the opportunity to trade when they want to. One way of resolving the problem of coordination between buyers and sellers is to involve a dealer who undertakes to sell when somebody wants to buy and to buy when somebody wants to sell. To be able to perform this function, the dealer must ensure that he has an adequate inventory of shares. In return for providing this liquidity for buyers and sellers in the market, the dealer earns the difference between the bid price and ask price, known as bid – ask spread. Traders in the stock market trade with the intention for liquidity purpose and returns. If this must be so, the traders must necessary be made to with little precision determine how next day's stock price could look like in the market.

In Nigeria and other country's stock market, asymmetric information is a major problem that has continued to contribute to financial market frictions. In developing countries, there are little or no tests of empirical model that could assist to obviate the adverse effect of information asymmetry with a view to assisting uninformed investors to trade with gain in the stock market. Apart from the study of Osamwonyi and Aigboduwa (2011), there are very scanty or no empirical tests of market micro structure in Nigeria. Hence, this study seeks to undertake a test of market microstructure in Nigeria using stock market data. The goal is to empirically examine how information asymmetry model could be tested to assist uninformed traders at pricing or having idea about next day's stock price in the stock market.

Operations research and market microstructure theory

Operation research is an interdisciplinary branch of applied mathematics and it uses mathematical modeling such as statistics. The application of operation research models cut across various disciplines like finance upon which market microstructure is an off-shoot. Operation research is related to experimental economics and quantitative behavioural finance. Experimental economics help us to understand why markets and other exchange systems work the way they do. Quantitative behavioural finance uses mathematical method / model in resolving price dynamics in financial markets; and these have been the recently applied in operation research models in market microstructure. These comprise of theoretical models of inventory and asymmetric information and other empirical models.

Market Transparency

This refers to the ability of market participants to observe information about the trading process. Just as the electoral observers in an election keenly observe the free and fairness of an election exercise, so market transparency is observed by the market participants. As a matter of fact, market is usually regarded as transparency when high quantity and quality of information concerning current and past prices, quotes depth volumes and the identities of market participants are rapidly available to the public. Market transparency refers to the disclosure of quotes at which trades can take place and of transaction prices at which trades did place.

Benefits of Market Transparency

- Market transparency speeds up price discovered and enhances market efficiency. With market transparency, all investors see the current quotes and the transaction prices and no investor trades at the wrong price.

- Market transparency helps the customers monitor brokers. The public dissemination of quotes and transaction allows a customer to determine and know that his transaction is in line with others at the same time.
- Market transparency enhances competition in that it allows competing dealers to guarantee the best price anywhere but do it at a lower commission or low or spread.

Costs / Disadvantage of Market Transparency

- It may make traders to be reluctant to place limit orders, particularly if they are large because the display may covey information that will make the price move against the limit order.
- Display of limit order may make it easier for traders to exercise the free trading option and thus reduce the incentive to place limit order. If no one knows whether a limit order exists, it is more difficult to pick it off, but if the limit order is displayed, it can be more readily picked off.

Network Externality Puzzle

Variation in real – world trading systems brings about network externality puzzle. The network externality puzzle refers to the fact that despite strong arguments for consolidation, many markets are fragmented and remain so for long periods of time. Consolidation has to do with buyers and sellers coming into a centralized single market to exchange order at a given bid – ask rat / price. Therefore, network externality puzzle exists because of the failure of diverse (different and many) markets to consolidation in space by sharing information on prices quotes and order flows.

Anonymity and Trader Identity

This is closely related to market transparency. Anonymity and trader identity is concerned with where some traders want to be known and identified in the market. For example, some traders such as the dealers do not like to claim anonymity but want to be identified because they want to build reputations. Other traders such as institutions who are informed always want to be anonymous and not identified because disclosure their identity may cause prices to move against them.

Market Architecture

Market architecture refers to the set of rules governing the trading process, determined by choices regarding market type, price discovery, order forms, protocols and transparency. For market type, we have degree of continuity, reliance on market makers and degree of automation. Price discovery has to do with prices determined in another market as the basis for transactions orders form could be market order, limit order, stop order, upstairs crosses, baskets, e.t.c. protocols have to do with rules regarding program trading, choice of minimum tick, trade – by – trade price continuity requirements, rules to halt trading, circuit breakers and adoption of special rules for opens, re-opens and closes. Transparency is concerned with the quantity and quality of the information provided to market participants during the trading process. Highly transparent markets often provide a great deal of relevant information before and after trade occurs.

Sunshine Trading

Sunshine trading is an aspect in market microstructure that concerns the disclosure of information about pending orders. In sunshine trading, some liquidity traders can preannounce the size of their order while others cannot. Those investors who are able to preannounce their trades enjoy lower trading costs while those who are not able to preannounce their trades suffer from high trading costs.

The Dealer Puzzle

In every market, particularly the continuous market, dealers play a significant role of bringing buyers and sellers together for the purpose of intermediation. Within the class of continuous markets or a limit order market when a trading is accomplished using designated dealers or without intermediaries, the dealer puzzle is said to exist. Similarly, the dealer puzzle is said to exist in an exchange market when there is reliance upon market makers to act as intermediaries. Engagements of market makers as intermediaries rather than the dealers may affect the security in different ways since market makers largely contribute to price formation and discovery.

Rules of Procedures

The interaction of investors, brokers and dealers at an exchange, and the mode of trading are guided by rules and regulations of the exchange market. Markets specify the order in which resting limit orders and dealer quotes executes against incoming market orders. For example, -the rule could specify giving first priority to orders with the best price, and secondary priority to the order posted first at a given price. Most markets adhere to price priority, but many modify secondary priority rules to accommodate large transactions.

When there are many competing markets each with its own rules of procedures, there is usually no requirement that rules of procedure apply across markets. In this case, price priority will tend to rule because market orders will seek out the best price, but time priority at each price need not be satisfied across markets. As Harris (1991) first pointed out, time priority is meaningless if the tick 'size is very small. The tick size is the minimum allowable price variation in a security, usually determined by the exchange on which the security trades and to which the working rules of procedures are therefore closely tied.

Asset Price Formation and Discovery

A characteristic of continuous market is the bid and ask prices at which trades can take place. The bid price is the price a buyer will buy a financial asset while the ask price is the price a seller will sell. It can be viewed as the amount paid to someone else (the dealer) to take on the unwanted position and dispose of it optimally. The bid-ask spread is therefore the difference between the bid and the ask prices of a dealer or market maker. It reflects the difference between what active buyers must pay and what active sellers receive. It indicates the cost of trading and the illiquidity of a market. It also represents an appropriate compensation to the dealer or market maker for the services of providing liquidity, and to cover costs. In this regard, illiquidity could be measured by the time it takes optimally to trade a given quantity of asset. In a market, there may be many prices, depending on direction of trade, the speed at which trade must be accomplished, quantity, and other factors. A central issue in the field of microstructure is what determines the bid-ask spread and its variation across securities. Whereas the spread can be wide in the real estate market, the spread for an actively traded stock is often very small.

Determinants of the Bid-Ask Spread

It is generally assumed that security value comprises private and, common components. Private values are idiosyncratic to the agent and are usually known by the agent when the trading strategy is decided. Common values are the same for everyone in the market and are known or realized only after trade has occurred. The common value component reflects the cash flow from the security, as summarized in the present Value of the flows or the security's resale value. Private value component arise from differences in investment horizon, risk-exposure, endowments, and tax situations, among others.

Determinants of the bid-ask spread include the following five factors: order handling costs, noncompetitive pricing, inventory risk, options, and asymmetric information. These, factors are lots mutually exclusive and all may be present at the same time. As suppliers of liquidity, dealers who maintain continuity of marker incur order handling costs of labour and capital needed to provide quote information, order routing, execution and clearing. Suppliers of immediacy who buy at the bid or sell at the ask price assume inventory risk for which they must be compensated. Placing a bid or an ask grants an option to the rest of the market to trade on the basis of new information before the bid or ask can be changed to reflect the new information, thus necessitating a deviation from the consensus price to reflect the cost of such an option. When there is asymmetric information, some investors arc better informed than others, and the person who places a firm quote for bid or ask loses to investors with superior information, informed investors, will sell at the bid if they have information justifying a lower price, and they will buy at the ask if they have information justifying a higher price. In the Nigerian Stock Exchange, the bid-ask spread is currently pegged at a maximum of 5% (Osamwonyi & Aigboduwa, 2011).

Thus the dealer takes account of information in the order flow when setting his prices. In this way, prices converge towards information-efficient prices. The determination of the bid-ask spread in the Glosten-Milgrom model can be illustrated by assuming that an asset can take on two possible values – a high value, V^H and a low value, V^L – with equal probability. Informed investors who know the correct value

are presented with probability π. Assuming risk neutrality, informed investors value the asset at: $A = (V^H + V^L)/2$. The as price A is then the expected value of the asset conditional on trade at the ask price:

$A = V^H\pi + A(1-\pi)$

The bid is $B_F = V^L\pi + A(1-\pi)$

Since informed investors trade at the ask price or bid price only if they believe the asset value is $V^H(V^L)$, the ask price exceeds the bid price.

The bid-ask spread, is given by:

$A - B = \pi(V^H - V^L)$

Where: V^H = the high value of an asset

V^L = the low value of the same asset

π = probability of informed investors' presence.

This depends on the probability of encountering an informed trader and on the degree of asset value uncertainty. Glisten and Milgrom go on to show that prices evolve through time as a martingale reflecting at each trade the information conveyed by the trade. This model however did not adequately address how quickly prices will converge on informational efficiency.

METHODOLOGY

This study employed the exploratory and ex-post facto research designs. Data about the daily share price of the companies were extracted from the website of cash craft Nigeria Limited for the month of May, 2017 for the purpose of empirical testing. The Glosten-Milgrom information asymmetry model is adapted in this study to critically evaluate price formation and discovery process in the market. This model obviates the stress of the uninformed traders in the price discovery process in the market, contributes to order flow and market transparency. The Glosten-Milgrom information asymmetry model assumes that an asset can take on two possible values, namely, a high value, V^H and a low value, V^L – with equal probability. Informed investors who know the correct value are presented with probability π. Assuming risk neutrality, informed investors value the asset at: $A = (V^H + V^L)/2$.

A = $V^H\pi$ + a (I – π) = ask price

B = $V^L\pi$ + a (I – π) -the bid price.

The Bid price model shows how the informed investors can trade (buy stocks) only if they believe the asset value is $V^H + (V^L)$. This is also similar to the ask price model. The investor can only have a fore knowledge of the next day price in the stock market through the bid – ask-spread price model express as: $A - B = \pi(V^H - V^L)$.

Where V^H = The high value of an asset

V^L = The low value of the same asset

π = probability of informed investors.

With the above model, the investors can be made to have fore knowledge of the price of the financial asset such as stocks in the market and by so doing reduces the severity of occurrence of asymmetry of information between the seller and the buyer. This depends on the probability of encountering an informed trader and on the degree of asset values under uncertainty. This model however did not adequately address how quickly prices will converge on informational efficiency, though it is a slight way of attempting to beat the market. In order to robustly test the model as to how it can reduce information asymmetry, the probability of informed investors presence in the market is denoted at 50%. This then helps us to ascertain the likelihood that an investor will have a foreknowledge of the next day price. To experiment with this, 25 companies were randomly selected using high and low price values of two recent trading day prices which are 9th and 10th May, 2017.

Models commonly used in testing market microstructure

A model is a formalized way of doing things under specific assumptions which must not be violated (Osamwonyi & Aigboduwa, 2011). There are two principal models of market microstructure testing. These are the inventory model and asymmetric information model. In inventory model, the trading process is a matching problem in which the market maker when faced with an unbalance risk, uses the price to balance supply and demand across time with the key factors being the inventory position and the uncertainty surrounding the order flow. Market makers achieve the inventory control by shifting the quotes (bid and ask) to elicit the imbalance of buy and sell orders. Inventory models were first examined theoretically by Garman (1976), Stoll (1978), Amihud and Mendelson (1980) and Ho and Stoll (1981, 1983). Roll (1984), Hasbrouck (1991), Huang and Stoll (1994, 1997), Madhavan, Richurdson and Romans (1997) have equally used the inventory model to modeled time – series behaviour of prices and quotes.

Asymmetric information models

The asymmetric information model is basically related to informed and uninformed traders at pricing securities in the market. The model keep them informed of the prices of securities in the market in a transparent manner as it can. Some prior researchers have tested the information asymmetry model. The model developed by each of them has been named after their works. Examples are Copeland – Galai (1983) model, Glosten-milgrom (1985) model, Eastey-O'Hara (1987) model and O'Hara (2003) model. Each of these models has its own peculiarity in the trading of security prices. For example, Glosten and Milgrom (1985) expanded the Copeland and Galai (1983) model of asymmetric information. According to Glosten and Milgrom (1985) model, dealers and other uninformed investors learn what the correct price is by observing the order flow. Through this model, investors are able to preempt next day price such that the degree of asymmetric information is drastically reduced with a view to creating liquidity and minimizing transaction costs.

DATA PRESENTATION AND ANALYSIS

Under this section, the data generated are analyzed with the Glosten-Milgrom information asymmetry model as described above. This analysis guides investors and simple traders in the market on how they can be abreast of price of securities in the market and reduce the adverse effects of information asymmetry in the transaction process. The companies used and the prices at which the stocks were traded in the Nigerian Stock Market for the period are presented in appendix A (see Appendix A).

The robust analyses from the table above lucidly show that the company's stock price exhibit a random walk movement. For example, for Okomo Oil Nig. Plc, the current day stock price though priced low compared with the next day's price (10^{th} May, 2017), however approximate it. The same occurrences go for Presco Nig. Plc, Guinness Nig. Plc, 7UP Nig. Plc, Dangote Flour Nig. Plc, Dangote Nig. Plc, Flour Nig. Plc, Nestle Nig. Plc, Champion Nig. Plc, Vita foam Nig. Plc, Pz Nig. Plc and Jaiz bank Plc **(see appendix A)**. The implication of these findings are that the Glosten – Milgrom model of information asymmetry could be used to reveal to uninformed investors /traders how companies' stock price could be predicted and so allows them to have a little foreknowledge about next day's prices in the Nigerian stock market without precisions. The model obviously reflects random walk and it does minimize the cost effect of asymmetric information in the stock market. Intriguing enough, the model exactly time next day's stock price of about four companies' in the stock market. The model significantly demonstrate the probability of accurately be informed of next day's stock price compared with the prior day's stock price. In a nutshell, the Glosten – Milgrom model is apt at reducing the adverse effect of information asymmetry against traders / investors in the stock market. The import of the analyses in the above table clearly

S/N	Company	$\pi(v^H - v^L)$	$v^L - \pi(v^H - v^L)$	Predicted price
1	Okomo Oil	0.50(₦50-₦48.02) = ₦0.99K	₦48.02k – ₦0.99k = ₦47.03	₦47,03k
2	A.G Leventis	0.50(0.72 – 0.72) =0.00	0.72	0.72
3	Presco Nig. Plc	0.50(46.90 – 46.900)	46.90-0	46.90
4	Japaul Oil	0.50(0.50 – 0.5) = 0.00	0.50 - - 0.00	0.50
5	Boc gas	0.50(3.52 – 3.52) = 0.00	3.53 – 0.00	3.53
6	UACN	0.50(14.49 – 14.40) = ₦0.045	₦14.40 - ₦0.045 = ₦14.36k	₦14.36k
7	J. Berger	0.50(39.86 – 39.86) = ₦0.00	39.86 – 0.00 = 39.86	₦39.86
8	Transcorp Nig. Plc	0.50(1.05 – 0.98) = 0.035k	0.98 – 0.035l	0.95
9	Guinness Nig. Plc	0.50(6.3 – 6.3) = 0.00k	63.00 – 0.00	63.00k
10	7UP	0.50(102.00 – 102.00) = 0.00	102.00 – 0.00	102.00
11	Dangote flour	0.50(4.20 – 4.18) = 0.01l	4.18k – 0.01k	4.17
12	Dangote sugar	0.50(6.65 – 6.46) = 0.095k	6.46k – 0.095k	₦6.37
13	Flour mill	0.50(17.65 – 17.60) = 0.025k	17.60 – 0.025k	17.58k
14	Honey flour	0.50(1.17 – 1.09) = 0.04k	1.09 – 0.04k	1.05k
15	Nestle	0.50(780 – 780) = 0.00k	780 – 0.00	₦780
16	Champion	0.50(2.04 – 2.04)	2.04 – 0.00	2.04k
17	Vita foam	0.50(2.19 – 2.15k) = 0.02k	2.15k – 0.02k	₦ 2.13k
18	Pz Nig. Plc	0.50(15.70 – 15.50) = 0.10k	15.50 – 0.10k	₦15.40
19	Unilever	0.50(34.00 – 34.00) = 0.00	34.00 – 0.00	₦34.00
20	Access bank	0.50(7.14 – 6.81)	6.81 – 0.17	₦6.64
21	Jaiz bank	0.50(1.005 – 1.00) = ₦0.03	1.00 – 6.03k	₦0.97k
22	Diamond bank	0.50(0.89 – 0.82) = ₦0.04	0.82 – 0.04	₦0.78
23	Skye bank	0.50(0.50 – 0.50) = ₦0.00	₦0.50 – ₦0.00	₦0.50
24	Fidelity bank	0.50(0.91 – 0.87) = ₦0.02k	0.87 – 0.02k	₦0.85k
25	UBA	0.50(6.53 – 6.20) = ₦0.23k	6.20 – 0.23k	₦5.97k

Source: Computed by the researcher, 2017

indicates how uninformed investors / traders could be informed or have a slight idea what next day's price of the companies' stock could be in the stock market. It should be emphasized here that the model is not a bench mark with which investors / professional can beat the market. This is so because the stock market at all times always exhibit a random walk movement. The model is not a source of market prophecy to investors. With the model, the investors are informed that the next day's stock price could be priced high or low but, but cannot be exactly predicted with precision even though it looks like having it so. Additionally, the analyses above point out that it is quite difficult to arbitrarily fix of stock prices in the stock market. It also shows the propensity for insider trading and other trade manipulation to be easily detected in the financial market so as to restore investors' confidence. With the above results, investors can meaningfully predicts what price expectation will look like in the market and thus promote efficiency in the market.

CONCLUSION, RECOMMENDATION AND CONTRIBUTION TO KNOWLEDGE

Literatures have indicated that observing and identifying information asymmetry is prettily a difficult task especially in the financial market. Given that information asymmetry permits one party to have superior information than the other under the usual adverse selection case, this problem can be mitigated. An uninformed investor can probably have a fore knowledge of the price of stocks in the financial market by using prior day price to predetermine future price (tomorrow's price). To demonstrate this, the Glosten and Milgran (1985) model of information asymmetry is employed in this study. As rightly noted by Karlan and Zinman (2008), information asymmetries are important in theory but very difficult to identify and captured quantitatively in practice as far as emerging markets are concerned.

This study has significantly contributed to knowledge by revealing how investors / uninformed one Nigeria stock market can be informed and have a foreknowledge of next day's stock price prediction though with slight difference or variation from the prior day's price.

The study is one of its types that have empirically examined how uninformed investors / traders could be assisted to have a foreknowledge of next day's stock price with a view to timing the market, and profiting thereby from it.

Since this study has contributed largely to the formation and price discovery in the financial market, it is therefore suggested that future researchers should explore the applicability of other models with a view to contributing to price discovery and in the reduction of asymmetry of information in the trading processes in the security market.

REFERENCES

Amihund, Y. & Mendelson, H. (1980). Dealership market: market making with inventory. *Journal of Financial Economics*, 8, 31-53.

Calamia, A. (1999). Market microstructure theory and empirical, laboratory of economics and management. Working paper series, in (http://www.ideas.respec.org/p/ssr/lemwps/1999-19.htm) 22/12/2008.

Calcagno, R. & Lovo, S. (1998). Bid-ask price competition with asymmetric information between market makers. Working paper, CORE, in (http://www.studies2.hec.fr/jahia/wabdav/site/hec/shared/sites/lovo/access_anonyme/research/bid.pfd) 20/12/2008.

Cashcraft (2009). Asset management Limited: price list by sector, in (http://www.cashcraft.com) 23/01/2009.

Coapeland, T. & Galai, D. (1983). Information effects and the bid-ask spread. *Journal of Finance*, 38, 1457 – 1469.

Demsetz, H. (1968). The cost of transacting. *Quarterly Journal of Economics*, No 82, in (http://web.cenet.org.cn/upfile/100078.pdf) 22/12/2008.

Easley, D. & O'Hara, M. (1987). Price trade size, and information in securities markets. *Journal of Financial Economics*, 19, 69 – 90.

Easley, D., Hvitkjaer, S. & O'Hara, M. (2002). Is information risk a determinant of asset returns? *Journal of Finance*, 57, 2182 – 2222.

Froot, K. & Dabora, E. (1999). How are stock prices affected by the location of trade? *Journal of Financial Economics*,53, 189 – 216.

Garman, M. (1976). Market microstructure. *Journal of Financial Economics* , 3, 257 – 275.

Glisten, L. & Milgrom, P. (1985). Bid ask, and transaction prices in a specialist market with heterogeneously informed traders. *Journal of Finance*, 47, 1127 – 1161.

Hasbrouck, J. (2007). Empirical market microstructure. Oxford university press, in (http://pages.stem.nyu.edu/-jhasbrou/EMM%20Book/EMM%20Home.htm 09/01/2009.

Ho, T. & Stoll, H.R. (1981). Optimal dealer pricing under transaction and return uncertainty. *Journal of Financial Economics*, 9, 47 – 73.

Hot, T. & Stoll, H.R. (1983). The dynamics of dealer markets under competition. *Journal of Finance*, 38, 1052 – 1074.

Huang, R.D. & Stoll, H.R. (1994). Market microstructure and stocks return predictions. *Review of Financial Studies*, 7, 179 – 213.

Huang, R.D. & Stoll, H.R. (1996). Dealer versus auction markets: a paired comparison of execution costs on NASDAQ and NYSE. *Journal of Financial Economics*, 41, 313 – 357.

Lyons, R.K. (2001). The microstructure approach to exchange rates. Cambridge, USA MIT press.

Madhavan, A. & Smidt, S. (1993). An analysis of daily changes in specialists' inventories and quotations. *Journal of Finance*, 48, 1595 – 1628.

Madhavan, A. (2000). Market microstructure: a survey. *Journal of Financial Market*, 3, 205 – 258.

Madhavan, A., Richardson, M. & Roomans, M. (1997). Why do security prices change? A transaction – level analysis of NYSE stocks. *Review of Financial Studies*, 10, 1035 – 1064.

Naes, R. & Skjeltorp, J. (2006). Is the market microstructure of stocks important? *Economic Bulletin* 3/06, 7(12) 3–132) in (http://www.norges.bank.no/upload/14403/artikler/microstructure%20stock%20market.pdf) 20.12/2008

NBER working groups descriptions. In(httP://www.nber.org/workinggroups.desc.htm) 20/12/2008.

O'Hara, M. (1995). Microstructure theory: oxford, UK: Blackwell publishers.

Stoll, H.R. (1973). The supply of dealer services in securities market. *Journal of Finance*, 33, 1133 – 1151.

Stoll, H.R. (2003). Market microstructure. Handbook of the economics of finance Elsevier Science BV.

Tabb, L., Lati., R. & Sussman, A. (2009). U.S equity high frequency trading: strategies, sizing and market structure, TABB group research paper.

APPENDIX A

9th May, 2017

S/N	Security company	Price	Price change	Price close	Price open	High	Low	Volume	Traded value
1	Okomo Oil	48.52	10	47.80	49.00	50.00	48.02	782,993	38,537,780
2	A.G Leventis	0.72	0.03	0.72	0.72	0.72	0.72	100	69.00
3	PrescoNig. Plc	46.90	0.5	47.00	46.90	46.90	46.90	228,241	10,702,640
4	Japaul Oil	0.50	0	0.50	0.50	0.50	0.50	19,999	9,999.50
5	Boc gas	3.52	0	3.52	3.52	3.52	3.52	3,500	11,725
6	UACN	14.49	-0.24	14.40	14.42	14.49	14.40	684,221	9,866,970
7	J. Berger	39.86	0	39.86	39.86	39.86	39.86	1000	37,870
8	Transcorp Nig. Plc	1.05	0	0.98	1.00	1.05	0.98	22,750,730	22,809,150
9	Guinness Nig. Plc	63.00	0	63.00	63.00	63.00	63.00	606,792	38,278,300
10	7UP	102.00	-4.73	103.89	102.00	102.00	102.00	14,165	1,435,682
11	Dangote flour	4.20	0.1	4.20	4.20	4.20	4.18	1,641,542	6,892,526
12	Dangote sugar	6.46	0.07	6.70	6.65	6.65	6.46	772,067	5,081,261
13	Flour mill	17.63	1.05	17.50	17.50	17.65	17.60	1318,665	23,242,660
14	Honey flour	1.17	0.06	1.12	1.17	1.17	1.09	1,430,982	1,648,833
15	Nestle	760	0	760	780	780	780	29,567	23,069,490
16	Champion	2.04	0.16	2.04	2.14	2.04	2.04	391,932	799,793.30
17	Vita foam	2.19	0.12	2.10	2.15	2.19	2.15	903,164	1,962,195
18	Pz Nig. Plc	15.70	0	15.00	15.50	15.70	15.50	1023,080	15,869,440

19	Unilever	34.06	0	34.00	34.00	34.0	34.00	431,836	14,687,220
20	Access bank	7.14	0.44	6.81	6.81	7.14	6.81	17,394,200	120,290,300
21	Jaiz bank	1.05	-0.04	1.05	1.00	1.05	1.00	3,476,100	3,510,460
22	Diamond bank	0.84	0.05	0.85	0.85	0.89	0.82	33,942,740	29,017,140
23	Skye bank	0.50	0	0.50	0.50	0.50	0.50	34,213	17,106,050
24	Fidelity bank	0.91	0.05	0.87	0.89	0.91	0.87	17,033,380	15,308,380
25	UBA	6.50	0.37	6.22	6.20	6.53	6.20	42,526,720	274,508,400

Source: Data collected from www.cash craft management Ltd, May, 2017

10th May, 2017

S/N	Security company	Price	Price change	Price close	Price open	High	Low	Volume	Traded value
1	Okomo Oil	50.00	0	48.52	50.94	50.00	50.00	1,148,550	57,386,670.00
2	A.G Leventis	0.69	0.03	0.72	0.69	0.69	0.69	212,000	146,280
3	Presco Nig. Plc	47.00	0.00	46.90	47.00	47.00	47.00	1,063,526	50,020,160
4	Japaul Oil	0.50	0	0.50	0.50	0.50	0.50	207,899	103,949.50
5	Boc gas	43.77	0.00	3.77	3.77	3.77	3.77	10,000	35,900
6	UACN	14.90	-0.01	14.49	14.65	14.90	14.01	9,388,189	135,317,600
7	J. Berger	39.86	0	39.86	39.86	39.86	39.86	5000	189,350
8	Transcorp Nig. Plc	1.15	40.00	1.05	1.10	1.15	1.05	18,685,000	20,824,920
9	Guinness Nig. Plc	65.00	1.00	63.00	5.00	65.00	65.00	1427,293	91,623,660
10	7UP	105.00	-4.98	102.00	105.00	105.00	99.75	81085	8,297,080
11	Dangote flour	4.20	0.95	4.20	4.20	4.20	4.15	8,969,329	37,637,810
12	Dangote sugar	6.78	0.00	6.46	6.65	6.78	6.65	3,099,658	20,914,760
13	Flour mill	18.51	0.24	17.63	18.00	18.51	17.80	46,689,340	842,519,900
14	Honey flour	1.22	0.05	1.17	1.22	1.22	1.22	530,692	647,167.40
15	Nestle	798	5.01	760	798	798	798	502,646	472,921,700
16	Champion	2.02	0.14	2.04	2.04	2.14	1.94	2086,488	4,119,489.00
17	Vita foam	2.29	0	2.19	2.15	2.29	2.15	1499,292	472,921,700
18	Pz Nig. Plc	15.70	0	15.70	15.70	15.70	15.70	307,240	6,017,284
19	Unilever	35.76	1.74	34.06	34.00	35.76	34.00	4456,998	156,099,400
20	Access bank	7.33	0.06	7.14	7.15	7.49	7.10	45,810,210	341,125,200
21	Jaiz bank	1.00	0	1.05	1.00	1.00	1.00	366,794	367,064
22	Diamond bank	0.92	0.04	0.84	0.88	0.92	0.86	53,930,540	48,776,200
23	Skye bank	0.50	0	0.50	0.50	0.50	0.50	32,180,280	16,465,140
24	Fidelity bank	0.99	-0.01	0.91	0.95	0.99	0.95	23,075,7900	22,776,480
25	UBA	6.97	-0.22	6.50	6.64	6.97	6.32	104,124,900	669,850,200

Source: Data collected from www.cash craft management Ltd, May, 2017