

ADAPTIVE MARKET EFFICIENCY: EVIDENCE FROM NIGERIA STOCK MARKET

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Received: 14 March 2020 Revised and Accepted: 8 July 2020

ABSTRACT

Over the years, there has been a great debate on whether stock markets are efficient. The debate has always been on the validity of efficient market hypothesis, not until the recent when Lo, (2004) developed the adaptive market hypothesis stressing that market efficiency evolve over time. This new assertion has been subjected to critical debate. The current study examined the validity of adaptive market hypothesis based on data sourced on the Nigerian Stock Market. Our study revealed that the Nigerian Stock Market is inefficient; and that efficiency in the market evolves overtime. We established a link between the stock market behaviour and systemic changes like global financial crisis among others. Results from the study have some possible policy implications.

Keywords: Stock Market, Adaptive Market Efficiency, Efficient Market Hypothesis, Nigeria

JEL Classification: C12; G12; G14

1.0 INTRODUCTION

In every economy around the world, the stock market performs very essential roles in boosting the growth of the economy, and generally stock markets contribute to economic growth especially the efficient markets and this is because, when the market operates efficiently, confidence will be generated in the minds of the public and investors will be willing to invest their funds in securities with the hope of getting rewards in the future. Stock market efficiency in recent times has been a topic for discussion amongst various researchers and scholars. It shows the level of accuracy of the stock market prices and how it affects investors and the economy of a nation at large. Therefore, an efficient stock market should have impact, not only on the investors but also on the growth of the economy. If a market is efficient it implies that, it is homogeneous, which means that all investors have similar expectations regarding the income and risk associated with each security. An efficient market should be large enough and should have a sufficient number of securities that are being offered to investors, to enable them obtain if they want a perfect and a balanced portfolio. An inefficient market implies that, the prices adjust gradually to relevant information, which could be because of the size of the capital market; also the risk preferences of the investors could vary which is very common in a new capital market. Also a market with a poor communication system and an inadequate regulation will most likely be inefficient.

The definition of business productivity has been based on a vast number of research literature. A popular business quality (EMH) theory argues that, in an open economy, all available knowledge related to their appraisal often entirely represents all values available (Fama 1970).

There have been new assaults from a variety of quarter on the principles of logic and their related effects for business effectiveness (Lo, 2004). The basis for the experiments on bond performance was this theory from Fama.

(Lo, 2004) proposed a new version for testing of efficiency; this new version is called Adaptive Market Hypothesis (AMH). Lo tries to reconcile the Efficient Market Hypothesis with behavioural finance biases.

Lo claims that all of those behaviours cited as contradictory manifestations of economic intuition are, in fact, consistent with a paradigm of people responding using basic heuristics to a shifting world. In fact, overconfidence, oversupply and other behavioural preconceptions are the same. The performance of the industry cannot be measured in a vacuum but is extremely context-based and complex.

The Adaptive Market hypothesis suggests that markets are adaptable and evolve over time, which means that the market can switch from efficient to inefficient over a period of time, and therefore the risk-return relationship, is likely to remain dynamic. Therefore innovation and adaptation is the basis of the AMH which provides a more

superior basis to determine the efficiency of a stock market. As it is seeing, the stock market behaves in a dynamic way rather than a static way.

Many reports have shown that most Stock Markets of emerging countries are inefficient.

This essence of the current study is to examine the efficiency nature of the Nigerian Stock Market within the context of the Adaptive Market Hypothesis (AMH). In other words, the objective of this study is to examine the validity or otherwise of the Efficient market hypothesis and also to examine the validity or otherwise of the Adaptive Market hypothesis using the data from the Nigeria Stock Exchange.

2.0 LITERATURE REVIEW

The present research is driven by two distinct hypotheses. They are the conventional effective consumer theory, which was supported by (Fama, 1970) and by (Lo, 2004). Each theory is discussed briefly in this section. The segment also looked at stock market performance methodological works that demonstrate the latest literature pattern and the reported differences.

EFFICIENT MARKET HYPOTHESIS

Based by an effective theory of market hypothesis (Fama, 1970). According to the paper, "an successful market is characterized as a market where there are large numbers of logical, profit-majorizing 'maximisers' who compete aggressively with each other, each attempting to forecast the future market prices of individual securities. Competition with many smart investors in an competitive market results in a situation where, at every moment, real values of individual shares already represent the impact of knowledge on both now occurring events and future events. In other words , the real price of a security is a fair measure of its intrinquecy in an competitive market at any moment. "(Fama, 1970)

In the Fama, 1970, productive markets were divided into three: solid, semi-strong and powerful in shape. Each group is discussed briefly in this relation.

EMH weakness: The lowest kind of EMH is here; the EMH is limited to only one general information branch, namely the past of the share price itself. That's the truth. In other words, 'new' data should be equivalent to prior information; otherwise it would not be accurate. Therefore, any shares price change cannot be expected in the light of the latest shift or price and the development of the market follows the characteristics of the spontaneous path.

Semi-Strong Form EMH: The semi-strong EMH model notes that all the information currently accessible such as monetary supply statistics, exchange rate, interest rates, stock splits, etc. are expressed in the actual market prices. It notes that the market will rapidly replicate related new information, changing the price to a new level of balance representing the shifts in supply and demand arising from the introduction of those information.

Strong EMH model: Under the strong EMH model, market share rates represent all pertinent details, whether public or private. The EMH notes that a market is effective if all the pertinent knowledge about the valuation of a product is easily and correctly expressed in the price of the stock, whether it is open to current or prospective buyers.

CRITICISMS

Many authors have identified some lapses in the principles that guide the Efficient Market Hypothesis by Fama with evidences to support their claims. Andrew (Urquhart, 2013) identified some anomalies which provide profit making opportunities for investors for a long period of time. The scientifically trendy EMH has been revised to become more practical and realistic as the minimum rationality concept (Tseng, 2006) is applied to the capital market (see also Trimborn, Pareschi & Frank, 2017). (Timekeeper, 2017).

The first established Monday impact is a consistent find in the literature. On Mondays, asset returns appear to be low, first reported by financial professionals and then by university scientists.

Another anomaly identified by (Urquhart, 2013) that was found in the literature is that returns in January appear to have higher returns than other months of the year. This anomaly is known as the January effect and was first documented by Rozeff and Kinney (1976).

A relatively recent but very strong anomaly is the turn-of-the-month effect, where returns are found to be statistically greater on the last day and first three days of the month than any other days of the month.

The calendar anomalies expressed above was also identified by other authors, for instance, (Wachira, 2013); (Isola, Frank and Leke, 2015); (Ayopo, Isola & Somoye, 2016); (Lawal, Nwanji, Asaley, & Ahmed, 2016); (Milosevic-Avdalovic & Milenkovic, 2017) in their works proved the non-existence of the January effect in the Montenegro Stock Market. Testing the Monday Effect also gave a negative result about its existence; they went

further to test The Holiday effect which also proved non-existent. The last test of anomaly which is the Turn of the month effect gave a positive result of its existence in the Market. It was proven that the stock prices are higher at the end of every month of the year compared to the prices for the rest of the month (see also (Pendur, 1980); (Gharaibeh, 2017); (Kampman, 2012).

Seasonal anomalies in advanced emerging markets have been observed (Seif, Abererty, & Shamsuddin 2017) and the performance of advanced economies has been checked by five anomalies in season: one month of the year, the next of January, day of week, holidays. Proof from the test suggests continuity with all of the seasonal trends except the other consequence of January: supporting the statement that advanced emerging markets are less than ideally successful (see also (Sakr, Ragheb, Ragab, & Abdou, 2014); (Zafar, 2017);

Besides the calendar irregularities, the EMH 's key concern is that people do not always perform their behaviorally clear. Any investors tend to deviate from the logic of risk perceptions and decision-making response to challenges. In reality, if risk and uncertainty or incomplete information is added about an alternative or high degree of complexity, people or organizations may comport something different from rationality, it is known as bounded rationality (Baker, 2014).The logically elegant EMH is updated to become more functional and concrete as we extend the principle of minimal rationality (Tseng, 2006) to the stock market (see also (Trimborn, Pareschi & Frank, 2017). (Fromentin, 2017).

These gaps identified in the EMH gives more reasons as to why the AMH has more realistic principles in describing stock market behaviour. As its principles accommodates the evidences found against the EMH.

ADAPTIVE MARKET HYPOTHESIS

A modern variant of the EMH, originating from evolutionary theory, can be used as the adaptive business hypothesis. Prices are as much knowledge as the mixture of environmental factors and the number and type of 'organisms' in the ecosystem or, by means of the related biological word, ecology represents. The theory of competitive markets includes the degree of consumer competition in the sense of environmental variables that define the economic climate of the consumer, such as the number of competitors on the market; the amount of productive opportunities available; this current paradigm is based on several well-known concepts of evolutionary biology (commerce, adaptation, reproduction and natural selection) as proposed by the Adaptive Markets Hypothesis (AMH) (Lo, 2004), and argues that their impact on financial firms and market participants influences market performance, and the increasing and decreasing in capital goods, business. The AMH means the following:

- (1) The share price premium shall not be fixed over time, but differ in accordance with the recent direction of the stock market and investor demographics; (1)
- (2) Asset allotment will add value through the manipulation of demand dynamics and structural behaviour changes;
- (3) All investment goods have higher and lower production cycles;
- (4) Market quality is a trait that does not necessarily differ over time and across the markets and is not all or no circumstance.
- (5) There is no possibility of stabling human and institutional risk expectations over time.

The most important implication of the AMH is that market efficiency can arise time to time due to changing market conditions.

The key point of AMH is the fact that due to evolving business conditions, market performance will occur time by time.

EMPIRICAL FRAMEWORK

Empirical studies from around the world have also found evidences that support the AMH. Some of these studies are briefly discussed in this section.

Supian, Forbes & Hudson (2014) observed that while the former emphasizes on the fittest 's survival, the latter emphasize survival for the wealthiest, thus accommodating a requirement for misalignment of capital as price value un pair. in this context (Soufian, Forbes, & Hudson), Division of Productive Market Hypothesis (EMH) The authors found that the principle of rationality of the investor is less advantageous than discriminating between investment strategies that are impacted by current market conditions.

(Urquhart, A. and McGroarty, 2016) employed a number of econometrics techniques such as bootstrapped versions of the variance ratio test, AR-GAARCH procedures among others to analyse daily stock market indices of the S&P500, FTSE 100, NIKKE1225 and EURO STOXX50 sourced from January 1990 to May 2014. The study aims to find out if the selected bourse follows the EMH or AMH and not that predictability returns on bond markets change over time in line with the AMH and that each market has a different adaptation to specific market situations (see also (Hull & McGroarty, 2014);

The General Hurst Exponent Technologies (Hiremath & Narayan 2014) used both fixed and rolling windows to calibrate the validity of AMH on the basis of information obtained between January 1991 and December 2013 for the Indian stocks market.

The study observed that Indian stock market tends towards AMH, and is essentially influenced by financial crises, international shocks, major domestic policies, foreign institutions investment as well as market microstructure.

In a related development, (Noda, 2016) investigated the validity of the AMH for the Japanese stock markets (TOPIX and TSE2) by employing a time varying model approach to analyse monthly data sourced from October 1961 to December 2015. The study observed that for the two markets, the degree of efficiency changes over time; and that the level of market efficiency of the TSE2 is relatively lower than the degree of market efficiency of the TOPIX for most of the period studied. It further noted that market efficiency has evolved overtime in TOPIX but not in TSE2. The study concluded that evidence supports the validity of the AMH for the two markets studied.

(Manahov & Hudson, 2014) developed a number of artificial stock markets populated with different numbers of traders by employing a special adaptive form of the Strongly Typed Genetic Programming (STGP) based learning algorithm which was later applied to historical data of the FTSE100, S&P500 and Russell 3000 in order to examine the validity of the AMH. The study concluded that AMH holds for the three studied economies (see also (Kristoufek & Vosvrda, 2013); (Auer, 2016); (Lawal, Nwanji, Adama, and Otekunrin, 2017); (Ayopo, Isola, and Somoye, 2016); (Charfeddine & Khediri, 2016); (Lawal, Somoye, Babajide and Nwanji, 2018); (Lawal, Awonusi, and Oloye, 2015).

(Lim & Kim, 2011) examined the predictability of daily and weekly Dow-Jones industrial average indices from 1900 to 2009 and observed that the market tends to move towards adaptive market hypothesis.

(Rodriguez, Aguilar-Cornejo, Femat, & Alvarez-Ramirez, 2014) employed detrended fluctuation analysis to characterized the serial correlations of returns sequences for Dow Jones Index Average (DJIA) based on both interday and intraday returns data sourced between 1929 to March 2014. The study noted that stock markets are mean reverting.

For some selected six Asian capital markets (Todea, Ulici, & Silaghi, 2009) investigated the profitability of the moving average strategy using episodic character of linear and /or nonlinear dependencies based on data sourced from 1997 -2008, the study concluded that efficient market hypothesis holds no evidence exist to support the validity of adaptive market hypothesis.

(Tuyon & Ahmad, 2016) analysed the behaviour of stock market as if relates to efficiency based on data sourced from 1977 to 2014 on the Bursa Malaysia stock market. The study observed that evidence about to support the efficient market framework.

(Zhou & Lee, 2013) employed the automatic variance ratio test and the automatic port manteaux test to analysis the US Real Estate Investment Trust (REIT) based on data sourced from the CRSP/Ziman Real Estate Data series form January 1980 to December 2009. The study conclude that the examined stock market follows of random walk procedure

(Urquhart et al., 2015) examined the moving average rule based on PPST –Block, Lakonishok and LeBaron model that calibrated daily data from 01/01/1987-31/12/2013 for the stock markets of US (DJIA) VK (FT30) and Japan (TOPIX). The study concludes that market efficiency tends towards adaptive.

(Al-Khazali & Mirzaei, 2017) employed stochastic dominance and mean-variance analyses to examine the validity of the Adaptive Market Hypothesis within the concept of calendar anomalies in eight Dow Jones Islamic Indices (DJII) based on data sourced from 1996 to 2015 covering five sub sample sectors. The study observed that varying of calendar anomalies over time support the existence of AMH in the studied Islamic stock indices, stressing that Islamic indices achieved greater efficiency over time reaching its peak during the recent financial crisis (see also (Al-khazali, Soo, & Kim, 2012); (Boamah, Watts, & Loudon, 2017);(Ayopo, Lawal, and Somoye, 2016); (Lawal, Babajide, Nwanji, & Eluyela, 2018); (Lawal, Adedoyin Isola; Somoye , 2018); (Ayopo, Isola, and Somoye, 2015).

3.0 DATA AND METHODOLOGY

The data from the Nigerian Stock Exchange (different issues) was obtained for this study. It includes daily data from 3 January 2006 to 29 December 2018. The period is strategic, as it begins before the world financial crisis in 2007/2008 and comes to an end after the 2016Q3-2017Q2 economic recession recovered in Nigeria.

In order to assess the efficacy nature of the Nigerian stock market, we have used several root testing techniques. We have modeled structural breakdowns to take account of macroeconomic events to explain the scenarios in the market, otherwise to account for shocks.

Following (Lawal et al, 2019a; Lawal, 2019b), we attempts to examine the unit root properties of the data generating set based on two streams: (i) when the time series is stationary (1(0)); and (ii) when the series are non-stationary (1(1)). The first stream is modelled as follows:

$$y_t = \beta_0 + \beta_1 y_{t-1} + \beta_2 y_{t-2}^2 + \beta_3 y_{t-3}^3 + \sum_{j=1}^p \beta_{4,j} \Delta y_{t-j} + \varepsilon_t \tag{1}$$

Where p connotes the number of lags, Δ is the first difference operator. We test the null hypothesis of linearity (H₀, 1(0): β₂ = β₃ = 0) against the alternatives hypothesis of non-linearity (H₁, 1(0): β₂ ≠ 0 and/or β₃ ≠ 0) by employing the Wald statistics defined as w₀ = T(RSS₀^r/RSS₀^u - 1). Where, T is the number of observations, RSS₀^r and RSS₀^u represents the residual sum of square from the unrestricted and restricted forms of equation (1) respectively.

In the second stream characterized by non-stationary (1(1)), the regression equation is as presented:

$$\Delta y_t = \lambda_1 \Delta y_{t-1} + \lambda_2 (\Delta y_{t-1})^2 + \lambda_3 (\Delta y_{t-1})^3 + \sum_{j=1}^p \lambda_{4,j} \Delta y_{t-j} + \varepsilon_t \tag{2}$$

Here, we test the null hypothesis of linearity (H₀, 1(1): λ₂ = λ₃ = 0) against the alternative hypothesis of nonlinearity (H₁, 1(0) : λ₂ ≠ 0 and/or λ₃ ≠ 0) using the Wald statistics defined as W₁ = T(RSS₁^r/RSS₁^u - 1) where RSS₁^r and RSS₁^u are as earlier defined.

The least square t-statistics for y_t under the unit root null has the following asymptotic distribution

$$\frac{\frac{1}{4}W(1)^2 - \frac{3}{2}\int_0^1 W(1)^2 ds}{\sqrt{\int_0^1 W(1)^6 ds}} \tag{3}$$

Here, W(z) is the standard Brownian motion defined on s ∈ [0,1]. When the error terms, (ε_t) are serially correlated, equation (3) can be augmented to calibrate the Zivot and Andrew unit root model. Zivot and Andrews test equation is specified as follows:

$$\Delta y_t = c + \alpha y_{t-1} + \beta t + YDU_t + \sum_{j=1}^k d_j \Delta y_{t-j} + \varepsilon_t \tag{4}$$

RESULTS AND DISCUSSIONS:

UNIT ROOT TESTS WITH STRUCTURAL BREAK

AUGMENTED DICKEY FULLER TEST AT LEVEL

ADF Test statistic; -5.578563

Identified break date: February 2008 (278)

1% Level	-5.347598
5% Level	-4.859812
10% Level	-4.607324

The ADF test conducted at level above provided a result of -5.578563 which can be considered as significant since it is higher than the critical values of 1% (-5.347598), 5% (-4.859812) and 10% (-4.607324). This implies that the null hypothesis that there is a unit root in the variables will be rejected, this means the variables are stationary over the time series, which is in relation to market inefficiency.

The break date of February 2008 was identified as a break point in the variables, which when researched upon was the period before the Nigerian Stock Exchange started suffering a downturn due to the global financial crisis the month of February had an all-share index of 65,652.4 which was the highest of that year, the preceding month which was March showed a negative change of 63016.6, and the all share index continued dropping from that point.

AUGMENTED DICKEY FULLER TEST AT FIRST DIFFERENCE

ADF Test statistic: -12.50923

Identified Break Date: May 2009

1% Level	-5.345798
5% Level	-4.859812
10% Level	-4.607324

The ADF test was conducted at first difference for the purpose of comparing results and it provided a result of -12.50923 which can be considered as significant since it is higher than the critical values of 1% (-5.347598), 5% (-4.859812) and 10% (-4.607324). This also implies that, the null hypothesis; that there is a unit root in the variables will be rejected here too, this means the variables are stationary over the time series, which is in relation to market inefficiency.

The potential break date of May 2009 was identified by the test which when researched upon was a temporal shock in the Nigerian stock exchange to recover as the all share index rose to 29700.2 in May which was higher than that of April 21491.1 but further dropped after that month to 26861.6 in the month of June.

AUGMENTED DICKEY FULLER TEST AT SECOND DIFFERENCE

ADF Test Statistic: -11.22355

Identified break date: May 2009 (279)

1% Level	-5.345798
5% Level	-4.859812
10% Level	-4.607324

The ADF test was conducted at second difference for the purpose of comparing results and it provided a result of -11.22355 which can be considered as significant since it is higher than the critical values of 1% (-5.347598), 5% (-4.859812) and 10% (-4.607324). This also implies that, the null hypothesis; that there is a unit root in the variables will be rejected here too, this means the variables are stationary over the time series, which is in relation to market inefficiency.

The potential break date of May 2009 was identified by the test which when researched upon was a temporal shock in the Nigerian stock exchange to recover as the all share index rose to 29700.2 in May which was higher than that of April 21491.1 but further dropped after that month to 26861.6 in the month of June.

ZIVOT AND ANDREWS UNIT ROOT TEST

Zivot-Andrews test statistic: -7.329013

Identified Break Date: March 2008 (279)

1% Level	-5.34
5% Level	-4.93
10% Level	-4.58

Here another unit root test was used for better analysis by comparing the results which is the Zivot-Andrews unit root tests. The test was conducted and provided a result of -7.329013 which can be considered as significant since it is higher than the critical values of 1% (-5.34), 5% (-4.93) and 10% (-4.58).

The test conducted also identified a break date of March 2008 which when researched upon was the month when the global financial crisis started to have an effect on the Nigerian Stock Exchange as the all share index from the month of February which was 65652.4 dropped to 63016.6 in the month of March and further went lower all through that year.

4.0 RESULTS AND DISCUSSIONS

The empirical finding from this study identified that the global financial crisis had an effect on the Nigerian Stock Exchange as the tests conducted identified key dates in 2008 and 2009 where major changes occurred in the economy that caused the downturn of the Nigerian Stock Exchange. The first break date identified by the ADF at level was February 2008 which after being researched on shows, that month as the month before the Global Financial Crisis had an effect on the Nigerian Stock Exchange as that month had the highest percentage change as well as the last positive change before the All Share Index (ASI) started dropping. Then the ADF tests at first and second difference identified the Month of March 2009 as the structural break which was the only positive change after February 2008 but a change that did not last for long as values continued to drop after that month. The Zivot-Andrews unit root test which was the last test conducted identified March 2008 as the break point, which when analyzed marked the beginning of the drop in the ASI as investors abroad started divesting their funds, which can be traced to various factors, but with the main factor being the global financial crisis.

Aside the break dates identified the unit root tests conducted all gave a result that the variables are stationary which implies market inefficiency. Comparing the results acquired from the test to other works done under the AMH like (Soufian et al., 2014); (Urquhart, A. and McGroarty, 2016); (Hiremath & Narayan, 2016); (Noda, 2016) among others, shows that the NSE is inefficient, because to follow the principle the stock exchange has to experience a moment of efficiency which was never seen in the NSE. Evidences show that the NSE was showing growth potentials and possibly moving towards efficiency before the occurrence of the global financial crisis which pushed it further away from efficiency and has not fully recovered after that.

5.0 CONCLUSION AND RECOMMENDATIONS

This study examines the validity of the Adaptive Market Hypothesis based on daily data sourced 3rd of January, 2006 to 29th of December, 2017 on the Nigeria economy by employing a number of unit root test with structural break dates. The study observed that Nigeria stock market is generally inefficient with degree of efficient varying overtime suggesting that the market follows an adaptive market efficiency framework rather than efficient market hypothesis as claimed by some existing literature. It thus, makes the following recommendations.

Our first recommendation in relation to the findings above is that the AMH should be used by other researchers and other scholars in determining the market efficiency instead of the traditional EMH which has been previously used. This is because of the superiority of the AMH in describing stock market behaviour than the EMH. The next recommendation is related to the findings of the inefficiency which has been traced to a number of problems faced by the Nigerian Stock Exchange which was stated in the literature review. With all the impediments faced by the NSE, the global financial crisis of 2008 exposed the Nigerian Stock Exchange to more problems which caused it to suffer a downturn. Therefore the study's suggestions for these problems are:

1. **DEVELOPMENT OF INFRASTRUCTURE:** The general infrastructure of the Nigerian Stock Exchange is in need of serious development in comparison with other markets in the global front. The technology used

should be updated to global requirement to be able to facilitate transactions quickly and more effective, and in other to gather and transfer useful and new information quickly amongst participants.

2. TRANSACTION PROCESSES SHOULD BE QUICKENED: As identified in my literature review, the transaction processes is slow in the market is slow as the availability of registrars in the Nigerian Stock Exchange is limited to mostly Lagos, which serves as additional costs for the investors
3. AVAILABILITY OF INFORMATION: The key to successful trading in a stock market lies in the information held by the investors. The lack of adequate information about the quoted companies as well as untimely release of results by companies has hindered investor's participation in the market. Therefore the availability of useful information should be facilitated through different means like the internet, newspapers, journals or other forms of outreach to enable the investors make the right decisions and reduce the mistakes in investment decisions.
4. INVESTIBLE ASSETS: After the first quarter of 2008 which is the year of the global financial crisis, the number of investible assets dropped as the all share index dropped as well as the market capitalization. Also the lack of investible funds faced by potential investors needs to be tackled by granting loans and other forms of advances to facilitate investment activities.
5. GOVERNMENT SUPERVISION: The regulatory bodies of financial institutions like the Central Bank of Nigeria as well as the Security Exchange Commission should be more involved by formulating active policies that fosters positive change and ensure transparency in the market to prevent inefficiencies in the market. Also they should strive to reduce the possibilities of share price manipulations. The regulator should work to ensure that the NSE develops depth that is the listing of many companies and provide protection for investors and try to limit the inflow of foreign participation.

REFERENCES

1. Al-khazali, O. M., Soo, C., & Kim, D. (2012). Are exchange rate movements predictable in Asia-Pacific markets? Evidence of random walk and martingale difference processes, *21*, 221–231. <https://doi.org/10.1016/j.iref.2011.07.002>
2. Al-Khazali, O., & Mirzaei, A. (2017). Stock market anomalies, market efficiency and the adaptive market hypothesis: Evidence from Islamic stock indices. *Journal of International Financial Markets, Institutions and Money*, *51*, 190–208. <https://doi.org/10.1016/j.intfin.2017.10.001>
3. Auer, B. R. (2016). On time-varying predictability of emerging stock market returns. *Emerging Markets Review*, *27*, 1–13. <https://doi.org/10.1016/j.ememar.2016.02.005>
4. Ayopo, B. A., Isola, L. A., and Olukayode, S. R. (2015). Monetary policy dynamics and the stock market movements: empirical evidence from Nigeria. *Journal of Applied Economic Sciences*, X(Issue 8(38)), 78–89.
5. Ayopo, B. A., Isola, L. A., and Olukayode, S. R. (2016). Stock Market Response to Economic Growth and Interest Rate Volatility: Evidence from Nigeria. *International Journal of Economics and Financial Issues*, *6*(1), 354–360.
6. Ayopo, B. A., Isola, L. A., and Olukayode, S. R. (2016). Stock Market Volatility: Does our Fundamentals Matter? *Economic Studies Journal*, *18*(3), 33–42.
7. Baker, H. K. (2014). Traditional finance, 1–33.
8. Boamah, N. A., Watts, E. J., & Loudon, G. (2017). Financial crisis, the real sector and global effects on the African stock markets. *Quarterly Review of Economics and Finance*, *65*, 88–96. <https://doi.org/10.1016/j.qref.2016.10.002>
9. Charfeddine, L., & Khediri, K. Ben. (2016). Time varying market efficiency of the GCC stock markets. *Physica A: Statistical Mechanics and Its Applications*, *444*, 487–504. <https://doi.org/10.1016/j.physa.2015.09.063>
10. EL-MAUDE, Jibreel Gambo, et al. "Impact of Capital Gains Tax Awareness on Revenue Generation in North-Eastern Nigeria." *International Journal of Financial Management*, *7* (3), 21–32 (2018).
11. Fama, E. F. (1970). Efficient capital markets: A review of theory and empirical work. *Journal of Finance*, *25*, 383–417.
12. Farias Nazário, R. T., e Silva, J. L., Sobreiro, V. A., & Kimura, H. (2017). A literature review of technical analysis on stock markets. *Quarterly Review of Economics and Finance*, *66*, 115–126. <https://doi.org/10.1016/j.qref.2017.01.014>
13. Fromentin, V. (2017). The long-run and short-run impacts of remittances on financial development in developing countries. *Quarterly Review of Economics and Finance*, *66*, 192–201. <https://doi.org/10.1016/j.qref.2017.02.006>
14. Gharaibeh, O. (2017). The January Effect: Evidence from Four Arabic Market Indices. *International*

- Journal of Academic Research in Accounting Finance and Management Sciences*, 7(1), 144–150.
<https://doi.org/10.6007/IJARAFMS/v7-i1/2590>
15. Hiremath, G. S., & Narayan, S. (2016). Testing the adaptive market hypothesis and its determinants for the Indian stock markets. *Finance Research Letters*, 19, 173–180.
<https://doi.org/10.1016/j.frl.2016.07.009>
 16. Hull, M., & McGroarty, F. (2014). Do emerging markets become more efficient as they develop? Long memory persistence in equity indices. *Emerging Markets Review*, 18, 45–61.
<https://doi.org/10.1016/j.ememar.2013.11.001>
 17. Isik, I., & Topuz, J. C. (2017). Meet the “born efficient” financial institutions: Evidence from the boom years of US REITs. *Quarterly Review of Economics and Finance*, 66, 70–99.
<https://doi.org/10.1016/j.qref.2017.07.017>
 18. Isola, L. A., Frank, A. & Leke, B. K. (2015) [Can Nigeria Achieve Millennium Development Goals?](#) *The Journal of Social Sciences Research* 1 (6), 72-78
 19. Kampman, T. (2012). Behavioral finance : The January effect. *Bachelor Thesis: Finance Tilburg University*.
 20. Kim, J. H., Lim, K.-P., & Shamsuddin, A. (2010). Stock Return Predictability and the Adaptive Markets Hypothesis: Evidence from Century Long U.S. Data. *Ssrn*.
<https://doi.org/10.2139/ssrn.1541639>
 21. Kristoufek, L., & Vosvrda, M. (2013). Measuring capital market efficiency: Global and local correlations structure. *Physica A: Statistical Mechanics and Its Applications*, 392(1), 184–193.
<https://doi.org/10.1016/j.physa.2012.08.003>
 22. Lawal, A. I., Awonusi, F. and Oloye, M. I. (2015). All share price and inflation volatility in Nigeria: An application of the EGARCH model. *Euroeconomica*, 34(1), 75 – 82.
 23. Lawal, A. I., Nwanji T. I, Adama, J. I and Otekunrin, A. O. (2017). Examining the Nigerian stock market efficiency: Empirical evidence from wavelet unit root test approach. *Journal of Applied Economic Sciences*, 12(6), 52, 1680-1689
 24. Lawal, A. I., Somoye, R.O.C., Babajide A. A. and Nwanji, T. I. (2018). The effect of fiscal and monetary policies interaction on stock market performance: Evidence from Nigeria. *Future Business Journal*, 4(1), 16 – 33.
 25. Lawal, A. I., Somoye R. O. C. & Babajide, A. A. (2018). Are African stock markets efficient ? Evidence from wavelet unit root test for random walk. *Economics Bulletin*, 37(4), 2665–2679.
 26. Lawal, A. I., Asaleye, A.J., IseOlorunkanmi, J. & Popoola, O. R. (2018). Economic growth, agricultural output and tourism development in Nigeria: An application of the ARDL bound testing approach. *Journal of Environmental Management and Tourism*, 9(4), 786 - 794
 27. Lawal, A. I., Salisu, A. A., Somoye, O., Babajide, A. A. & Joseph, N. T. (2019). *Re-examining Stock Market Efficiency in Nigeria using Nonlinear Unit Root Tests.*: In *The Impact of Monetary Policy in the 21st Century*, (Eds. R. Das) Emerald Publishing Limited, UK
 28. Lawal, A. I., Omoju, O. E., Babajide, A. A., Asaleye, A. J. (2019). Testing Mean-reversion in agricultural commodity prices: evidence from wavelet analysis. *Journal of International Studies*, 12(4), 100-114 [doi:10.14254/2071-8330.2019/12-4/7](https://doi.org/10.14254/2071-8330.2019/12-4/7)
 29. Lawal, A. I., Babajide, A. A., Nwanji, T. I., & Eluyela, D. (2018). Are Oil Prices Mean Reverting ? Evidence from Unit Root Tests with Sharp and Smooth Breaks, *International Journal of Energy Economics and Policy* 8(6), 292–298.
 30. Lawal, A. I., Nwanji, T. I., Asaleye, A., & Ahmed, V. (2016). Economic growth, financial development and trade openness in Nigeria: An application of the ARDL bound testing approach. *Cogent Economics & Finance*, 4(1), 1–15. <https://doi.org/10.1080/23322039.2016.1258810>
 31. Lim, K. P., & Kim, J. H. (2011). Trade openness and the informational efficiency of emerging stock markets. *Economic Modelling*, 28(5), 2228–2238. <https://doi.org/10.1016/j.econmod.2011.06.004>
 32. Lo, A. W. (2004). The Adaptive Markets Hypothesis. *The Journal of Portfolio Management*, 30(5), 15–29. <https://doi.org/10.3905/jpm.2004.442611>
 33. Manahov, V., & Hudson, R. (2014). A note on the relationship between market efficiency and adaptability - New evidence from artificial stock markets. *Expert Systems with Applications*, 41(16), 7436–7454. <https://doi.org/10.1016/j.eswa.2014.06.004>
 34. Milosevic-Avdalovic, S., & Milenkovic, I. (2017). January effect on stock returns: Evidence from emerging Balkan equity markets. *Industrija*, 45(4), 7–21. <https://doi.org/10.5937/industrija45-13662>
 35. Noda, A. (2016). A test of the adaptive market hypothesis using a time-varying AR model in Japan.

- Finance Research Letters*, 17, 66–71. <https://doi.org/10.1016/j.frl.2016.01.004>
36. Pendu, Y. Le. (1980). Seasonal Movements.
 37. Rodriguez, E., Aguilar-Cornejo, M., Femat, R., & Alvarez-Ramirez, J. (2014). US stock market efficiency over weekly, monthly, quarterly and yearly time scales. *Physica A: Statistical Mechanics and Its Applications*, 413, 554–564. <https://doi.org/10.1016/j.physa.2014.07.036>
 38. Sakr, A. M., Ragheb, M. A., Ragab, A. A., & Abdou, R. K. (2014). Return Anomalies “Disposition Effect and Momentum”: Evidence from the Egyptian Stock Market. *International Journal of Economics and Finance*, 6(2), 181–196. <https://doi.org/10.5539/ijef.v6n2p181>
 39. Seif, M., Docherty, P., & Shamsuddin, A. (2017). Seasonal anomalies in advanced emerging stock markets. *Quarterly Review of Economics and Finance*, 66, 169–181. <https://doi.org/10.1016/j.qref.2017.02.009>
 40. Soufian, M., Forbes, W., & Hudson, R. (2014). Adapting financial rationality: Is a new paradigm emerging? *Critical Perspectives on Accounting*, 25(8), 724–742. <https://doi.org/10.1016/j.cpa.2013.08.009>
 41. Siddiqui, Kalim. "Malaysia's socio-economic transformation in historical perspective." *International Journal of Business and General Management* 1.2 (2012): 21-50.
 42. Todea, A., Ulici, M., & Silaghi, S. (2009). Adaptive markets hypothesis: evidence from asia-pacific financial markets. *The Review of Finance and Banking*, 01(1), 7–14.
 43. Toby, A. "Working capital management policy and corporate profitability of Nigerian quoted companies: A sectoral analysis." *International Journal of Financial Management* 3.1 (2014): 9-20.
 44. Trimborn, T., Pareschi, L., & Frank, M. (2017). Portfolio Optimization and Model Predictive Control: A Kinetic Approach, 1–29. Retrieved from <http://arxiv.org/abs/1711.03291>
 45. Tseng, K. C. (2006). Behavioral Finance, Bounded Rationality, Neuro Finance and Traditional Finance.pdf. *Investment Management and Financial Innovations*, 3(4), 7–18.
 46. Tuyon, J., & Ahmad, Z. (2016). Borsa _ Istanbul Review Behavioural finance perspectives on Malaysian stock market efficiency. *Borsa Istanbul Review*, 16(1), 43–61. <https://doi.org/10.1016/j.bir.2016.01.001>
 47. Umar, MUHAMMAD SANI, and ATANDA TAIWO Mutiu. "A firm-level analysis of corporate governance and bank performance in Nigeria." *International Journal of Business and General Management* 5.3 (2016): 7-20.
 48. Urquhart, A. and McGroarty, F. (2016). Are stock markets really efficient? Evidence of the adaptive market hypothesis. *International Review of Financial Analysis*, 47, 39–49.
 49. Urquhart, A. (2013). An Empirical Analysis of the Adaptive Market Hypothesis and Investor Sentiment in Extreme Circumstances, (June).
 50. Urquhart, A., Gebka, B., & Hudson, R. (2015). How exactly do markets adapt? Evidence from the moving average rule in three developed markets. *Journal of International Financial Markets, Institutions and Money*, 38, 127–147. <https://doi.org/10.1016/j.intfin.2015.05.019>
 51. Wachira, P. N. (2013). the January Effect and Market Returns : Evidence From the Nairobi Securities Exchange a Research Project Submitted in Partial Fulfillment of the Requirements for the Award of the Degree of Master of Science in Finance , School of Business University of Na, (October).
 52. Zafar, N. (2017). Behavioral Biases and Stock Market Reactions: A Study of Pakistani Market. Retrieved from [https://www.cust.edu.pk/downloads/phd_thesis/PhD Thesis Nousheen Zafar PhD Mngt Sc..pdf](https://www.cust.edu.pk/downloads/phd_thesis/PhD%20Thesis%20Nousheen%20Zafar%20PhD%20Mngt%20Sc..pdf)
 53. Zhou, J., & Lee, J. M. (2013). Adaptive market hypothesis: Evidence from the REIT market. *Applied Financial Economics*, 23(21), 1649–1662. <https://doi.org/10.1080/09603107.2013.844326>