

Weak-Form Efficiency of the Nigerian Capital Market: Prior and Post Internationalization Periods

¹Daniel Dornubari Sunday & ²Omiete Victoria Olulu-Briggs

¹Department of Marine Economics and Finance, Nigeria Maritime University

²Department of Finance and Banking, University of Port Harcourt, Nigeria

Corresponding Email: firstvikes@yahoo.com

Abstract:

The Random Walk approach was employed to test the Weak-Form Efficient Market Hypothesis (EMH) in the Nigeria Stock Exchange (NSE); prior and post internationalization periods. Secondary 30-day data was secured from the statistical database of Central Bank of Nigeria and the NSE fact book of various publications covering 1981-2020; giving a sample size of 40 years. The variable utilized market capitalization; which was segregated into prior and post internationalization periods that prompted the longitudinal research design. The Runs test, and Ljung and Box-Pierce test were undertaken to examine if any profitable short-term trading rules and statistical significant patterns exist in security prices, at the 95% confidence level. The estimation indicate the absence of Weak-Form of market efficiency in the operations of the NSE prior and post internationalization periods. Contingent on this finding, the Weak-Form efficiency do not exist in the Nigeria capital market in the reviewed period. As such, investors should frequently employ the use of charts, graphs and patterns in predicting the direction of the market as it helps to earn extra returns on their investment. In addition, the Securities and Exchange Commission should provide periodic investors' education on the application of charts and patterns in predicting stock price movements.

Keywords: Internationalization, NSE, Runs test, Ljung and Box-Pierce, Weak-Form.

Introduction

The capital market of any nation is an indispensable institutional framework upon which significant aspects of development revolves. Throughout the globe, much emphasis is assigned on building a robust and efficient market which aids in combating cost and at the same time bridge the informational gap existing among investors. Obiakor (2016) sees capital market as a market where sellers and buyers meet in order to exchange an exclusive intrinsic commodity – bond, stock and share for raising long-term funds for the expansion and modernization of projects by economic units. It is also a medium through which economic units raise and transfer long-term funds for productive purposes. From the following assertions, it is clear that investment market of any nation like Nigeria plays a major role in granting both moderate and extensive loans to shareholders and providers of funds who also trade in these investments to supplement their requisite for liquid funds. According

to Donwa and Odin (2010), capital market is alienated into primary and secondary market. The former is where novel securities are made available and traded, while the latter involves trading of already existing securities made open to the public. This affords investors the prospect of meeting up with their liquidity requirements as well as diversification of assets.

The stock market is an essential hub for investors, arbitrageurs, speculators and agents (e.g. brokers, gamblers and jobbers) who trade shares to maximize their wealth or that of their principals, and also seek out strategies to outperform the market. Oji and Azeez (2012) points it to be possible only if the operational look of the marketplace is inefficient. Therefore, the efficient and effective running of the market is central and as such act as a bedrock towards the advancement of any modern economy. Hence, investors are keen in determining the existence of actual patterns and styles of stock prices.

Therefore, given the popularity of the core non-triviality of the effective and efficient advancement of the capital market in any nation as a focal driver of modern day economy, the Nigerian stock exchange has undergone specific adjustments like capital market internationalization in 1995. This is a remarkable trend towards the feat of efficiency and sustainability in a modern-day economy. The internationalization was necessitated by forces of market power and attraction of foreign investors in the market. Welch and Luostarinen (1988) defined internationalization as the process by which involvement in international operations are being increased. Calof and Beamish (1995) sees it as the process by which firms adapt to operations (resources, strategies and structures etc.) within the transnational frontier. This means that internationalization is not just conformed to entering a foreign market but adapting through developing and maintaining international frontier operations. Welch and Luostarinen (1988) argued that businesses are internationalized as a result of many factors which are profit motives, minimization of cost, new opportunities, market diversification and saturated domestic market. The need for internationalization of the NSE became imperative in order to realize the values that comes from such actions like offering of broad securities or assets to aid portfolio diversification, cross-border trading, reduction in transaction cost and the ability of domestic investors to secure stakes in transnational firms. It has become pertinent to reveal if the internationalization of the NSE has actually helped investors in determining any particular pattern, as well as styles in the behaviour of stock prices.

In line with this, numerous reports have carried out empirical investigations to authenticate the Weak-Form efficiency but empirically there were divergence of propositions. Scholars like Gudza and Phiri (2017); Ajao and Osagwu (2012); Olowe (1999); Samuel and Yacont (1981) gave proof of Weak-Form efficiency; whereas, Shaalan (2019); Angeloviska (2018); Kalsie and Kalra (2018); Ikeora, Charles-Anyanwu and Andabai (2016); Yadirichukwu and Ogochukwu (2014); Akpan (1995); Appiah-Kusi and Menya (2003) provide no evidence of Weak-form efficiency. To this end, Rahman and Hostian (2006) concluded that market efficiency is subject to variations over time and as such there is the need for continuous testing. It is glaring that there are narrow research with divergent conclusions in Nigeria, regarding the Weak-Form of market efficiency. This report fills the gap by exploring periods before and post internationalization of the Nigerian capital market, to determine if any profitable short-term trading rules and statistical significant patterns exist in security prices.

Empirical Literature

The Efficient Market Hypothesis (EMH) posits that in an efficient market, stock prices at any point in time reflect novel available news such that worth of securities exhibit all presented reports (Okafor, 1983; Fama, 1970). Fama (1970) presented the three forms of EMH, that is, the Weak-Form hypothesis which affirms that all available knowledge about prices of stock is determined by examining all market trading facts such as historical trading volumes, prices, and short interest. This means that at one point, unanticipated return in present time is uncorrelated with previous period. Alternatively, the market has no form of memory as regard keeping record of past returns as it doesn't affect the current return in the future. Thus, the use of charts, patterns or graphs are meaningless as it offers no abnormal return after regular return to investors. The Semi-Strong Form asserts that stocks prices not only reflect full historical information but also all published facts about the firms whose securities are made available for consideration, at no additional cost and thus confers no advantage to the holder of such news. Such information includes fundamental news on company's product lines, patent rights, quality of management, earnings forecast, balance sheet, comprehensive income statement and the accounting practices adopted. The Strong-form hypothesis claims that the price of a company's stocks at any point in time reflects fully all the necessary information relevant to such company, even news that are considered privy. In support, Okafor (1983) opine that access to such privilege information by floor specialists, security analysts, portfolios managers cannot yield additional returns

consistently. However, Fama (1970) maintains that the price of a financial asset tails towards random-walk if consecutive changes in the value of that share is individual and identically distributed.

A review by previous scholars reveal varying findings as mentioned earlier. Nageri and Abdulkadri (2019) examined the efficiency of the NSE during the pre and post financial meltdown of 2007-2009 and 2010-2016 respectively. The data was secured from CBN statistical bulletin and analyzed using GARCH models. The findings indicated that the NSE is Weak-Form inefficient pre and post meltdown, whilst validation of the semi-strong form during the meltdown window. Peter and Nelson (2019) explored the predictability level of working-days' trading in the NSE covering August 6, 2018-October 28, 2019. Applying the GARCH model, the study found evidence of Weak-Form market efficiency. Eze and Johnny (2019) investigated the Weak-Form efficiency of the NSE using weekly and monthly data covering the period from June 27, 2019 to August 18, 2019. Employing the unit root test, they found that the NSE is efficient in its Weak-Form. Zaman (2019) analyzed the Weak-Form efficiency in Bangladesh from 2013-2017 and found the absence of Weak-Form efficiency. Aliyev (2019) employed a smooth transition autocorrelation technique on the Istanbul market for a 12-weeks period and found no evidence of Weak-Form market efficiency. Novak (2019) evaluated Croatian exchange using daily CROBEX returns from 2000-2019. Applying the Auto-regression model, there exist a Weak-Form market efficiency. It thus recommends that regulators should put in place stringent measures to checkmate the activities of the exchange. Han, Wang and Xu (2019) assessed the EMH on the Chinese stock market for daily return series from 2000-2018. The authors employed the use of multifractal detrended fluctuation analysis (MF-DFA) and found that the stock market crash of 2015 affected the efficiency of the market in its Weak-Form, thus making it inefficient. Younas and Mehmood (2018) examined the NASDAQ exchange covering periods 2009-2017. Applying the autocorrelation and Runs tests; they found the market to be inefficient in its Weak-Form. In another study by Bhattarai and Margaritti (2018), using daily, weekly, and monthly prices from 1990-2017 on the most significant indices in the world: FTSE 100, S&P500 and NIKKEI225; the autocorrelation, BDS, variance ratio, unit root, and AR-GARCH found fair prediction of random-walk. In examining the Macedonian Stock Exchange, Angelovska (2018) applied the GARCH model on daily returns data spanning from 4th January 2005 to 2nd April 2018; and found evidence of weak-form inefficiency.

Methodology

In line with previous studies like Zaman (2019), Shaalan (2019), and Younas and Mehmood (2018); the study utilized the Box Ljung and Box-Pierce, and Runs test on monthly series secured from NSE and CBN databases; which certifies its reliability and validity. The sample entails 30-days aggregate of market capitalization of NSE which includes composite of government stocks/securities, bonds/debt, Exchange Trust Fund and Equities from 1981-2020. It is fragmented into the period prior: January 1981 to August 1995 and post internationalization: September 1995 to December 2020 of the market using stratified sampling. The Random-Walk hypothesis is thus evaluated to establish if consistently the random error term has independent and identically distribution (IID). The Random-walk model is;

$$P_t = \alpha + P_{t-1} + \varepsilon_t \quad \varepsilon_t \sim \text{IIDN}(0, \sigma^2) \dots\dots\dots (3.1)$$

Where: P_t = Price of securities under consideration, α = Drift parameter (i.e. the estimated price change), ε_t = Random error term (residual), $\text{IIDN}(0, \sigma^2)$ = Independent and identically distributed as a normal distribution with zero mean and homoscedastic variance.

This model denotes that price of share at *period t* equals price of share at preceding period *t-1* plus error term value that swings on recent information reaching period *t-1* and *t*.

Structurally, this study is presented as thus:

$$MK_t = \alpha + \beta_1 MK_{t-1} + \varepsilon_t \quad \varepsilon_t \sim \text{IIDN}(0, \sigma^2) \dots\dots\dots (3.2)$$

$\beta_1 > 0$

Where: MK_t = Current market capitalization, MK_{t-1} = Previous period market capitalization, α = Drift parameter (i.e. the expected price change), ε_t = Stochastic term, $\text{IIDN}(0, \sigma^2)$ = Independent and identically distributed as a normal distribution with zero mean and homoscedastic variance

Model 3.2 denotes that the present MKT at period *t* is equals MKT at period *t-1* (preceding month) along with stochastic value that swings on the influx of novel information occurring between *t-1* and *t*.

The Runs test model is given as;

$$MU = \frac{2NU_1NU_2}{NU} + 1$$

Where: $NU = N1+N2$ (Sum of Symbols), $NU1 =$ Number of + symbols (i.e. + residuals), $NU2 =$ Number as in – symbols (i.e. - residuals), $MU =$ Number of expected runs. For large number of examinations where NU is above 30, the specimen distribution of MU is roughly regular and its variance is:

$$\sigma^2_{mu} = \frac{2NU_1NU_2(2NU_1NU_2 - NU)}{(NU)^2(NU - 1)}$$

$$Z = \frac{R - MU}{\sigma_{mu}}$$

Where: $Z =$ Standard deviation, $R =$ Actual number of runs. The acceptance of null hypothesis in randomness at 0.005 level as $-1.96 \leq Z \leq 1.96$, and otherwise reject.

Autocorrelation of N observations at lag of K is given as;

$$R_t = \frac{\sum \{(Z_t - U)(Z_t + K - U)\}}{[\sum(Z_t - U)^2 \sum(Z_t + K - U)^2]^{1/2}}$$

$$\text{Hence, } R_k = \frac{\text{Cov}(Z_t, Z_t + K)}{\sigma_{Z_t}, \sigma_{Z_t + K}}$$

and $-1 \leq R_k \leq 1$. The computed formula for the Box-Pierce statistical test is given as;
 $Q = n \sum R_i^2$

Where, $Q =$ Statistical Box-Pierce test, $n =$ MKT sample size, $R_i =$ Autocorrelation coefficient for each lag (ith lag).

Results and Discussions

Table 4.1: Descriptive Statistics Summary

	MKTBIN	MKTPIN
Mean	2.602259	9293.476
Std. Dev.	0.982416	8179.682
Skewness	0.939531	0.276067
Kurtosis	2.923996	1.521160
Jarque-Bera	25.93543	31.56305
Probability	0.000002	0.000000

Source: E-view 10.0 Computation

Table 4.1 reveals a detailed description of prior (MKTBIN) and post (MKTPIN) internationalization of the Nigerian capital market. The monthly mean prices stood at ₦2.602259 and ₦9293.476 with their level of variability as 0.982416% and 8179.682% respectively. The skewness coefficients of 0.939531 and 0.276067

show that they are positive and thus skewed to the right. Similarly, kurtosis coefficient of 2.923996 shows mesokurtic distribution for MKTBIN as its coefficient is equals 3 while that of MKTPIN is leptokurtic since it is less than 3 (1.521160). Hence, the Jarque-Bera statistics of less than 5% indicates the non-normality in the distributions.

Estimation of Weak-Form Efficiency

The Runs and Ljung-Box (Q-Statistics) tests are used to determine the Weak-Form market efficiency.

Run Test Estimation

The run test strictly checks the randomness of stock price. The null hypothesis states that share price follows Weak-Form market efficiency, and the rejection of the null hypothesis is the acceptance of Random-walk efficiency at the 5% level.

Table 4.2: Result of Runs Test for MKTBIN

Total cases	Mean	Cases \leq Mean	Cases $>$ Mean	Actual Runs	Expected Runs	Z-Statistics	P-value
176	24.4177	128	48	2	70.82	13.0778	0.0000

Source: Author's Statgraphics 18.0 Computation

The domino effect of run test for MKTBIN in table 4.2 shows MKTBIN p-value as 0.0000 and calculated Z-statistics as 13.0778; and this lies in the outer critical region of ± 1.96 at 0.05 level. A positive significant Z value shows the presence of negative serial correlations with respect to MKT. Also, actual runs 2 as seen is smaller to the expected runs of 70.82 and mean value 24.4177. Out of total cases of 176, the number of cases less than the mean is 128 whereas the number of cases greater than the mean is 48. Thus, the presence of serial dependence and non-randomness in MKTBIN of the NSE. Consequently, the rejection of the Weak-Form market efficiency.

Table 4.3: Result of Run Test for MKTPIN

Total cases	Mean	Cases \leq Mean	Cases $>$ Mean	Actual Runs	Expected Runs	Z-Statistics	P-value
304	8957.24	158	142	21	153.0	17.0623	0.0000

Source: Author's Statgraphics 18.0 Computation

The results of the run test for MKTPIN in table 4.3 shows MKTPIN p-value as 0.0000 and calculated Z-statistics as 17.0623; and this lies in the outer critical region of ± 1.96 at 5% level. A positive significant Z value shows the presence of negative serial correlations with respect to market capitalization. Also, actual runs 21 is lower to the expected runs of 153.0 and mean value 8957.24. Out of the total cases of 304, the number of cases less than the mean is 158 whereas the number of cases greater than the mean is 142. Thus, the presence of serial dependence and non-randomness in MKTPIN of the NSE. Consequently, the rejection of the Weak-Form market efficiency.

Table 4.4: Result of Q-Statistics Autocorrelation Test

Lags Indices	01	02	03	04	05	06	07	08	09	10
MKTBI	0.930	0.860	0.792	0.725	0.661	0.599	0.540	0.485	0.447	0.414
N AC	154.7	287.9	401.5	497.3	577.4	643.6	697.7	741.5	779.0	811.4
Q-Stat.	0	1	0	6	3	0	3	7	9	5
Prob.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MKTPI	0.992	0.982	0.971	0.959	0.946	0.932	0.918	0.903	0.887	0.871
N AC	278.2	552.0	820.6	1083.	1340.	1590.	1834.	2070.	2300.	2522.
Q-Stat.	4	2	9	7	6	9	4	9	2	3
Prob.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Source: Author's Statgraphics 18.0 Computation

The result of the p-value of Q-Statistics (Ljung-Box) autocorrelation for MKTBIN in table 4.4 is 0.000; thus, significant since it is below 0.05 level and up to the ten (10) lags. Hence, the rejection of Weak-Form market efficient of the NSE prior to the internationalization of the market.

The results of the p-value of Q-Statistics (Ljung-Box) autocorrelation for MKTPIN in table 4.4 is 0.0000; thus, significant since it is below 0.05 level and up to the ten (10) lags. Hence, the rejection of Weak-Form market efficient of the NSE post internationalization of the market.

Discussion of Findings

Theoretically, Weak-Form market efficiency reflects all available information about the stock prices that can be determined by examining all market trading data such as the history of trading volumes, prices, or short interest (Fama, 1970; Bodie et al., 1999). However, contrary to this theoretical proposition, the result shows that market capitalization prior to the internationalization of the NSE do not follow the

Weak-Form of market efficiency as seen in table 4.2 and 4.3. This is in agreement with Han et al. (2019), Peter and Nelson (2019), Zaman (2019), Novak (2019), Eze and Johnny (2019), Bhattarai and Margaritti (2018), Yadirichukwu and Ogochukwu (2014), and Saeedi (2014) that there is absence of Weak-Form market efficiency on stock market returns. However, it is in disagreement with Nageri and Abdulkadri (2019), Shaalan (2019), Angelovska (2018), Matar (2016), Ogbulu (2016), and Gimba (2011) that stock market returns follow the Weak-Form of random walk hypothesis. The result suggested that the market was characterized by overbearing regulatory authorities, market abuse, and market manipulations which faulted the working of the Weak-Form market efficiency in the Nigeria capital market prior to internationalization.

Market capitalization in the period post internationalization of the NSE do not also follow the Weak-Form of market efficiency as seen in table 4.3 and 4.4. Similarly, the finding is in agreement with Aliyev (2019); Adigwe, et al. (2017); Novak (2019); Awiagah and Choi (2018); Simons and Laryea (2004); Gimba (2011); who found absence of Weak-Form of market efficiency. However, it disagrees with Guduza and Phiri (2018); Olowe (1999) who found evidence of Weak-Form market efficiency in stock prices. This suggests that post internationalization of the NSE, the market has witnessed insiders trading, market skimming, market abuse and few industries in Nigeria like the oil and gas, financial services, food and beverages and natural resources as the mainstay of the exchange.

Conclusion and Recommendations

The study explores the occurrence of statistically significant patterns in security prices and profitable short-term trading rules in the Nigeria capital market from January 1981 to December 2020; applying the Random-Walk efficient theory. The variables used include market capitalization prior and post internationalization of NSE. For a detailed analysis; Runs test and Ljung-Box Q-Statistic test were used. The study found that market capitalization prior to the internationalization (MKTBIN), and market capitalization post internationalization (MKTPIN) of the NSE are not susceptible to the Weak-Form efficiency hypothesis. This is consistent with Peter and Nelson (2019); Zaman (2019); Novak (2019); Eze and Johnny (2019); Yadirichukwu and Ogochukwu (2014); Saeedi (2014); Aliyev (2019); Novak (2019); Awiagah and Choi (2018); Adigwe et al. (2017); Gimba (2011); Simons and Laryea (2004). However, inconsistent with the Weak-Form efficiency of Fama (1970) which reveals efficient market to exposes all available information

about the stock prices that can be determined by examining all market trading data such as the history of trading volumes, prices, or short interest. Therefore, investors can trust the use of patterns or graphs meaningfully as it offers extra return from the normal return to investors since all publicly available information in the past are not made available to all to see and have access to in a costless manner.

On recommendation, the study encourages investors to make use of charts, graphs and patterns in predicting the direction of the market as it leads to extra returns on investment. In furtherance, the Securities and Exchange Commission (SEC) should strengthen its rules on information asymmetry so that financial and management reports of quoted companies are timely, and made available to both potential and actual investors at no additional cost.

The study is limited as it does not make use of daily or weekly data for market capitalization. Hence, the use of daily or weekly data could establish a comprehensive result. Another limitation is the use of only Runs and Ljung and Box-Pierce test as against other techniques such as variance ratio test, filter test, and distribution patterns. This could yield an alternative result.

References

- Adigwe, P. K., Ugbomhe, O. U., & Alajekwu, U. B. (2017). Test of weak-form stock market efficiency in selected African stock markets. *Saudi Journal of Business and Management Studies*, 2(2), 60-69.
- Ajao, M. G., & Osayuwu, R. (2012). Testing the weak-form of efficient market hypothesis in Nigerian capital market. *Accounting and Finance Research*, 1(1), 169 - 179.
- Akpan, O. E. (1995). Thin and thick capital markets. *Nigerian Journal of Social and Economic Research*, 1(37), 2-4.
- Aliyev, F. (2019). Testing market efficiency with nonlinear methods: Evidence from Borsa Istanbul. *International Journal of Financial Studies*, 7(27), 1-11.
- Angelovska, J. (2018). Testing weak-form of stock market efficiency at the Macedonian stock exchange. *UTMS Journal of Economics*, 9(2), 133–144.
- Appiah-Kusi, J., & Menya, K. (2003). Return predictability in African stock markets. *Review of Financial Economics*, 12, 247-270.
- Awiagah, R., & Choi, S. S. B. (2018). Predictable or random? -A test of the Weak-Form efficient market hypothesis on the Ghana stock exchange. *Journal of Finance and Economics*, 6(6), 213-222.

- Bhattacharai, K., & Margariti, V. (2018). An empirical test of the theory of efficient markets of stock prices. *Finance and Market*, 3(2), 1-30.
- Bodie, Z., Kane, A., & Marcus, A. J. (1999). *Investments*. McGraw-Hill Education.
- Branes, P. (1986). Thin trading and stock market efficiency: A case of the Kuala Lumpur stock exchange. *Journal of Business Finance and Accounting*, 4, 609-617.
- Calof, C., & Beamish, W. (1995). Adapting to foreign markets: Explaining internationalization. *International Business Review*, 4(2), 115-131.
- Donwa, P., & Odia, J. (2010). An empirical analysis of the impact of the Nigerian capital market on Her Socio-economic Development. *Journal of Social Science*, 24(2), 135-142.
- Eze, G. P., & Johnny, N. (2019). Testing the weak-form efficiency market on the Nigerian stock exchange market. *European Journal of Accounting, Auditing and Finance Research*, 7(10), 10-22.
- Fama, E. (1970). Efficient capital market: A review of theory and empirical tests. *Journal of Finance*, 25, 383-417.
- Gimba, V. K. (2011). Testing the weak-form efficiency market hypothesis: Evidence from Nigerian stock market. *CBN Journal of Applied Statistics*, 3(1), 117-136.
- Guduza, S., & Phiri, A. (2017). Efficient market hypothesis: Evidence from the JSE equity and bond markets. *MPRA Working Paper*, 83487(12): 1-26.
- Han, C., Wang, Y., & Xu, Y. (2019). Efficiency and multifractality analysis of the Chinese stock market: Evidence from stock indices before and after the 2015 stock market crash. *Sustainability*, 19(11), 1-15.
- Ikeora, J. J. E., Charles-Anyago, N. B., & Andabai, P. W. (2016). The weak-form efficient market hypothesis in the Nigerian stock market: An empirical investigation. *European Journal of Business, Economics and Accountancy*, 4(6), 93-102.
- Kalsie, A., & Kalrae, J. K. (2015). An empirical study on efficient market hypothesis of Indian capital markets. *Journal of Management Research and Analysis*, 2(2), 108-114.
- Matar, A. (2016). Testing the weak-form market efficiency: The case of Amman stock exchange. Proceedings of 40th IASTEM international conference, Kuala Lumpur, Malaysia, 1st-2nd December, 31-38.
- Nageri, K. I., & Abdulkadri, R. I. (2019). Is the Nigerian stock market efficient? Pre and Post 2007-2009 Meltdown Analysis. *Studia Universitatis economics series*, 29(3), 38-63.

- Novak, I. (2019). Efficient market hypothesis: Case of the Croatian capital market. *Intereulaweast*, 4(1), 1-20.
- Obiakor, R. T. (2016). Does capital market development spur economic growth: A look at African largest economy. *The International Journal of Social Sciences and Humanities Inventions*, 3(7), 2397-2406.
- Ogbulu, O. M. (2016). Weak-form market efficiency, estimation interval and the Nigerian stock exchange: Empirical evidence. *International Journal of Economics and Business*, 5(1), 84-116.
- Ojo, O. M., & Azeez, B. A. (2012). A test of strong-form efficiency of the Nigerian capital market. *Business Systems Review*, 1(1), 10-26.
- Okafor, F. O. (1983). *Investment decisions: evaluation of projects and securities*. London: Cassell.
- Olowe, R. A. (1999). Weak-form efficiency of the Nigerian stock exchange market: Further evidence. *African Development Review*, 11(1) 54-68.
- Peter, E. A., & Nelson, J. (2019). A new look at weekdays effect of stock prices in the weak-form: evidence from Nigerian stock exchange. *Asian Journal of Economics, Business and Accounting*, 13(4), 1-11.
- Rahman, S. M., Simon, H. N., & Hossain, M. M. (2016). An Empirical analysis of weak form market efficiency: Evidence from Chittagong stock exchange (CSE) of Bangladesh. *Journal of Statistics Applications & Probability*, 5(3), 535-542.
- Rahman, S., & Hossain M. F. (2006). Weak-form efficiency: Testimony of Dhaka stock exchange. *Journal of Business Research*, 8, 1-12.
- Saeedi, A. (2014). The Investigation of the efficient market hypothesis: Evidence from an emerging market. *Taylor's Business Review*, 4(2), 121-134.
- Samuels, J. M., & Yacout, M. (1981). Stock exchange in developing countries. *Savings and Development*, 5(4), 309-328.
- Shalan, T. (2019). The test of the efficiency of the Saudi financial capital markets at weak form: An empirical study of the Tasi index and sub-indices of the Saudi market. *Accounting and Finance Research*, 8(1), 183-192
- Simons, D., & Laryea, S. A. (2004). Testing the efficiency of selected African stock markets. *A Working Paper*, 1, 553-571.
- Welch, L., & Luostarinen, R. (1988). Internationalization: Evolution of concept. *Journal of General Management*, 14, 36-64.
- Yadirichukwu, E., & Ogochukwu, O. J. (2014). Evaluation of the weak-form of efficient market hypothesis: Empirical evidence from Nigeria. *International Journal of Development and Sustainability*, 3(5), 1199-1244.

- Younas, M. Z., & Mehmood, R. (2018). Examining the efficiency of American stock exchange Nasdaq: An empirical analysis of the market efficiency hypothesis. *Bulletin of Business and Economics*, 7(3), 132-137.
- Zaman, S. (2019). Weak-form market efficiency test of Bangladesh stock exchange: An empirical evidence from Dhaka stock exchange and Chittagong stock exchange. *Journal of Economics, Business, and Accountancy*, 21(3), 285–291.