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ABSTRACT

Ikechukwu Kelikume[a*], Evans Olaniyi[b] and Faith Iyoha[c]
[a]Department of Accounting, Finance and Economics, Lagos Business School Nigeria

[b]Department of Economics, Pan-Atlantic University Ibeju Lekki, Lagos Nigeria

[c]Department of Economics, Pan-Atlantic University Ibeju Lekki, Lagos Nigeria
*Ikechukwu Kelikume: ikelikume@lbs.edu.ng

ABSTRACT
This paper investigates the weak-form efficient market hypothesis of top twenty eight stock markets in Africa. The paper deviates from the conventional linear approach of testing efficient market hypothesis and the method of using the runs test for serial dependency to test the weak-form efficient market hypothesis. The paper adopts the wavelet unit root analysis-tool which decomposes the stochastic processes into its wavelet components, with specific frequency band. There are currently over 29 stock exchanges in Sub-Saharan Africa with a wide degree of disparities ranging from market size, trading volume, number of listed companies, access to funds, access to information to market standardization. These institutional constraints have implications for the efficient market hypothesis and investment in the African stock market. The main objectives of this study is to examine the weak axiom of the efficient market hypothesis as it applies to twenty eight of the leading stock markets in Africa and to use a new technique-the wavelet unit root test approach to investigate the efficient market hypothesis in African. Conclusion drawn from the study will test the relevance of using past historical stock prices to predict the current earnings in stock prices in Africa.

Keyword: Efficient Market, Information Asymmetry, Stocks Prices

Introduction
The African continent has evolved from a description of been "The Hopeless Continent" in the periods between 2000 and 2002 (see Brook, 2000; Williams, 2004) to an optimistic description of the African continent as "Aspiring Africa" in 2013 (see Andersen and Jensen, 2014) where investors all over the world are projecting the African continent as the next frontier of economic growth.
A major area where substantial growth is predicted to take place is the stock market in

Africa-a sector that behavioral economists and financial analysts have long argued that arbitragers and wealth holders with significant market information and insight into previous changes in the price level can predict future prices and current profit takings in the market (see Adam, Marcet & Beutel, 2017; Butt, ur Rehman, Khan & Safwan, 2010; Dimpfl & Jank, 2016; Kafayat, 2014; Mallick, 2015; Yang, Jhang, & Chang 2016; Zindel, Zindel & Quirino, 2014).

The reality however, is that in a competitive markets setting, current prices are known to adjust rapidly in real time eliminating the ability of investors and arbitragers to use previous past information available to them to predict current and future price outcome (Bhargava, 2014; Degutis & Novickytė, 2014; Tiwari & Kyophilavong, 2014).

This line of thought is known as the Efficient Market Hypothesis (EMH) made popular by Eugene Fama in his 1960 dissertation where he asserted that at any given time, stock prices are a reflection of all available information in the capital market and are traded at their fair value at all times making it impossible for market participants to consistently choose stocks that will beat the returns of the overall market.

The efficient market hypothesis (EMH), although well received by financial and behavioral economist in the 1970's through to the 1990's. The theory came under attack in the late 1990's up until late 2000 following the series of events that happened globally that undermined the assumptions on which the EMH rested upon. The first of these events was the dot-com bubble and the technology bubble that occurred from 1995 to 2000 –a period of excessive speculation, rapid share price growth and high stock price valuation that allowed investors to make abnormal returns.

The second is the United States subprime mortgage crisis and stock market crash of 2007-2010 which triggered the 2007-2008 global economic crises. Economic analysts questioned the relevance of the EMH on the premise that the dot-com bubble and the sub-prime mortgage crisis would not have occurred if the efficient market assumptions were fundamentally correct (Constâncio, 2014; Gilson & Kraakman, 2014; Ouarda, El Bouri & Bernard, 2013).

Despite the attacks on the assumptions of the EMH, African stock market is on the increase, expanding rapidly and attracting private investment and integration into the global financial market. There are currently over twenty nine (29) stock exchanges in Sub-Saharan Africa with a wide degree of disparities in terms of market size, trading volume, number of listed companies, access to funds, access to information and market standardization. These institutional constraints alongside the existence of information asymmetry, principal agency problems, regulatory constraints and the presence of weak financial institution has implications for the relevance of EMH   and investment in the African stock market.

The broad objective of this study is to examine the relevant of efficient market hypothesis in Africa in the presence of information asymmetry and market imperfections. The focus of the study will be to test the weak axiom of the efficient market hypothesis as it applies to selected stock markets in Africa.

Following the introductory section, the rest of the paper reviews the body of empirical literature on EMH and the performance of the stock market in Africa (Section 2). The methodology and theoretical framework is presented in section 3 while section 4 deals specifically with the analysis of the result. Section 5 presents the conclusion, findings and recommendations.

2.0 LITERATURE REVIEW

1.1 Conceptual Literature

The underpin of the Efficient Market Hypothesis (EMH hereafter) remains very sound and relevant to finance even until today however empirical evidence remains inconclusive and vague. The EMH gained credence in the mid-1960s from the work of Eugene Fama. Fama (1970) argued that in an active market (with many well-informed and intelligent investors), appropriately priced securities reflect all available information that is it a market in which securities price reflect all possible information quickly and accurately so that it is impossible for market participants to earn abnormal profits.

Also, the degree of market efficiency depends on existing information conditions in the market environment; therefore, Fama (1970) categorised the information set into three forms (levels) namely the weak, semi-strong, and strong-form. The strong-form efficient market must have: many knowledgeable investors actively analysing and trading stocks; information is widely available to all investors; events, such as labour strikes or accidents, tend to happen randomly; fast and accurate reaction of investors to new information. When any of these conditions are absent in the market, we may have weak-form or semi-strong form. The weak-form EMH defines a market as being efficient if current prices fully reflect all information contained in previous stock prices. This form implies that historical prices cannot suffice as a forecast tool for stock price. Thus, it is impossible to make abnormal returns by using only the past historical prices. While the semi-strong form of the EMH states that current market prices reflect all publicly available information.

The strong-form EMH implies that private information (inside information) for making abnormal returns is hard to obtain as a result of the stiff competition amongst participant. However, in reality, some investors or market participant can make abnormal returns;

thus the strong-form EMH is not very likely to hold. Furthermore, three models for testing the stock market: the Expected Return or Fair Game model, the Sub-martingale model, and the Random Walk model was suggested by Fama (1970).

2.2 Empirical Literature

A large number of publications have examined the existence of the EMH theory in various developed and undeveloped markets with varying results (Ananzeh, 2014). Evidence from literature confirms the presence of the weak-form EMH in developed market Cootner (1962), Fama and Blume (1966), Williamson (1972), Nicolaas (1997), and Sungs and Johnson (2006) while empirical evidence from studies conducted studies emerging economies has yielded mixed results, between accepting or rejects the null hypothesis of weak form EMH.

For instance, Dahel and Laabas (1999) reported that the Kuwait stock market displays the weak-form EMH, and reject the weak-form EMH for Bahrain, Kuwait, Saudi Arabia and Oman. Wheeler, Bill, Tadeusz, and Steve (2002) did not support the weak form of EMH for the stock market of Warsaw (Poland). Also, Abeysekera (2001) and Abraham and Alsakran (2002) in their empirical finding rejected the hypothesis of weak form efficiency for stock markets in Sri Lanka, Bahrain Kuwait, and Saudi Arabia. On the other hand, Karemera, Ojah and Cole (1999) strongly support the weak form of EMH for the stock market in Turkey. Iqbal and Mallikarjunappa (2008, 2010, and 2011) studied on Indian Stock Market and found that Indian Stock Market is not efficient in weak and semi-strong form.

Hou and Sun (2014) tested the weak-form market efficiency for Canada and China and found a mixed result that differs from the sample period to sample period for both markets. Although, almost all testing techniques generated unfavourable results against the weak-form EMH for both countries, however, result from more recent data sample suggests that both markets are efficient. Furthermore, Awan and Subayyal (2016) studied six stock exchanges in the Gulf region (Oman, UAE, Kuwait, Saudi Arabia, Bahrain and Qatar) for the period 2011 to 2015. The results provide evidence that the stock prices at the Gulf markets do not follow the random walk model.

In 2017, Hawaldar Rohit and Pinto Tested for the weak-form efficient market hypothesis in Bahrain Bourse using the Kolmogorov-Smirnov (K-S) goodness of fit test, run test and autocorrelation test. Whereas the K-S test result concludes that the general stock price movement does not follow the random walk, results of the runs test

reveal that share prices of seven companies do not follow random walk while the autocorrelation tests reveal that share prices exhibit low to moderate correlation varying from negative to positive values. With the show of mixed result from the different test, it was difficult for Hawaldar Rohit and Pinto (2017) to ascertain the weak form of the efficiency of Bahrain Bourse.

Similarly, in Africa, empirical evidence conducted has remain inconclusive yielding weak-form efficient (Bundoo, 2000; Simons and Laryea, 2005; Van, Rodrigues, Hockly, Lambert, Tjaart and Phiri, 2013; Bulla, 2015; Adigwe, Ugbomhe, and Alajekwu, 2017), inefficient (Smith, 2008; Ayentimi, Mensah, and Naa-Idar, 2013; Chikoko and Muparuri, 2013; Nwidobie, 2014; Lawal, Somoye and Babajide, 2017; Katabi and Raphael, 2018; Awiagah and Choi, 2018; Zaman, 2019), mixed results (Vitali and Mollah; 2015; Phiri, 2015; Abakah, Alagidede, Mensah, and Ohene-Asare, 2018) and strong-form efficient (Kelikume, 2016).

Studies on EMH in Africa

Author & Year	Methodology Applied	Data / Country Examined	Key Findings
Bundoo, 2000	Serial correlation test	Mauritius, 1992-1998	weak-form efficient
Appiah-Kusi & Menyah, 2003	EGARCH-M	Botswana, Egypt, Ghana, Ivory Coast, Kenya, Mauritius, Morocco, Nigeria, South Africa, Swaziland and Zimbabwe	Egypt, Kenya, Mauritius, Morocco and Zimbabwe are weak-form efficient
Simons & Laryea, 2005	K-S goodness of fit test, runs test, autocorrelation test, multiple VAR test, auto-regression test	Egypt, Ghana, Mauritius, South Africa, 1990-2003	weak-form efficient
Smith, 2008	Wright's joint VAR tests, Kim's wild bootstrap approach on Chow-Denning multiple VAR test	Botswana, Egypt, Ghana, Ivory Coast, Kenya, Mauritius, Morocco, Nigeria, South Africa, Tunisia and Zimbabwe, 2000-2006	not weak-form efficient
Ayentimi, Mensah,	Kolmogorov-	Monthly for Ghana covering	not weak-form

& Naa-Idar, 2013	Smirnov and runs test	Jan. 2007 - Jun. 2012	efficient
Chikoko & Muparuri, 2013	Runs test and Autocorrelation test	Daily and weekly data for Zimbabwe covering Feb. 19, 2009 to Dec.31, 2012	not weak-form efficient
Van, Rodrigues, Hockly, Lambert, Tjaart & Phiri, 2013	Threshold Autoregressive (TAR) model	Weekly data for South Africa over 2000 and 2013	weak-form efficient
Nwidobie, 2014	Augmented Dickey-Fuller	Monthly for Nigeria covering Jan. 2000 - Dec. 2012	not weak-form efficient
Obayagbona & Igbinosa, 2014	Auto-correlation test, Ljung- Box Q test, LM serial correlation, unit roots test and Runs test	Monthly for Nigeria covering Jan. 2006 - Dec. 2011	not weak-form efficient
Vitali & Mollah, 2015	Unit root, auto-correlation, runs and variance ratio	Daily data for Egypt, Kenya, Mauritius, Morocco, Nigeria, South Africa and Tunisia over the period 1999-2009	South Africa may be regarded as a weak-form efficient while other markets are inefficient
Bulla, 2015	Serial correlation, and Runs test	Weekly data for Nairobi over 2000 and 2009	weak-form efficient
Phiri, 2015	Classical augmented Dickey-Fuller tests, Two-regime threshold Autoregressive unit root tests and Three-regime unit root tests	Weekly data for South Africa over Jan. 31, 2000 to Dec. 16, 2014	Linear framework indicated weak-form efficient for South Africa while nonlinearity accounted for weak-form inefficient
Kelikume, 2016	wavelet-based unit root tests	Monthly data for Nigeria Stock Market over the sample period 1985 to 2015	Strong-form efficient
Adigwe, Ugbomhe, & Alajekwu, 2017	Jarque-Bera statistics test and Augmented Dicker Fuller test	Monthly data for 13 African Stock Exchange covering Jan.2013 to Dec. 2015	African stock markets are weak-form efficient
Lawal, Somoye &	wavelet-based unit	Monthly data on seven Africa	African stock

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Babajide, 2017	root tests	stock markets,	markets are inefficient
Katabi & Raphael, 2018	Serial correlation test-The Ljung-Box test, Unit root tests, non-parametric runs test and the variance ratio test	Daily closing stock prices of the market index (All share Index-DSEI) for Dar es Salaam covering Jan. 2009 – Mar. 2015.	weak form inefficient
Awiagah & Choi, 2018	Ljung-Box autocorrelation test, unit root tests, the runs test, and variance ratio tests (such as Wright's rank and sign and Lo-Mac Kinlay)	Daily, weekly, monthly, and quarterly returns Ghana covering 1990 - 2017	Inefficient at weak-form
Abakah, Alagidede, Mensah, & Ohene-Asare, 2018	Non-Linear Fourier unit root test	Weekly returns of S&P/IFC return indices for five African countries over the period 2000-2013	South Africa, Nigeria and Egypt are weak-form efficient whilst Ghana and Mauritius are weak-form inefficient.
Zaman, 2019	Descriptive statistics, Autocorrelation test, Run test	Daily data for two Bangladesh stock market covering Jan. 2013 – Aug. 2017	Weak form inefficient

2.3 Contribution to the body of Knowledge

A plethora of studies on Africa but has been carried out in a disaggregated manner. To this end, we undertake the present research and contribute to the existing literature on the form of market efficiency prevailing in twenty eight currently most active capital markets in Africa. Unlike other studies, the study employed a wavelet unit root test with different lags and other traditional random walk testing procedure. Furthermore, the study accounts for the dynamics in the market environment and corrects the heterogeneity in data

Reference

Abakah, E. J. A., Alagidede, P., Mensah, L., & Ohene-Asare, K. (2018). Non-linear approach to Random Walk Test in selected African countries. *International Journal of Managerial Finance*, *14*(3), 362-376.

Abeysekera, S. P. (2001). Efficient Markets Hypothesis and the Emerging Capital Market in Sri Lanka: Evidence from the Colombo Stock Exchange: A Note. Journal of Business Finance and Accounting, 28(12), 249-261.

Abraham, S., and Alsakran, S. A. (2002). Testing the random behavior and efficiency of the Gulf stock markets. The Financial Review, 37(3), 469-480.

Adam, K., Marcet, A., and Beutel, J. "Stock price booms and expected capital gains." *American Economic Review* 107(8), 2017, 2352-2408.

Ananzeh, I. E. (2014). Testing the Weak Form of Efficient Market Hypothesis: Empirical Evidence from Jordan. International Business and Management, 9(2), 119-123.

Andersen, T. B., and Jensen, P. S. Is Africa's recent growth sustainable?. *International Economic Journal*, 28(2), 2014, 207-223.

Appiah-Kusi, J., and Menyah, K. (2003). Return predictability in African stock markets. Review of Financial Economics, 12(3), 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.

Ayentimi, D. T., Mensah, E. A. and Naa-Idar, F. (2013). Stock market efficiency of Ghana stock exchange: An objective analysis. International Journal of Management, Economics and Social Sciences, 2(2), 54 –75.

Bhargava, A. Firms' fundamentals, macroeconomic variables and quarterly stock prices in the US. *Journal of Econometrics*, 183(2), 2014, 241-250.

Brooks, D. Hope for the 'hopeless continent': mercenaries. Traders: *Journal for the Southern African Region*, 3, 2000, 1-9.

Bulla, D. (2015). Random walk hypothesis in emerging stock markets: Evidence from the Nairobi securities exchange. International Journal of Economics, Finance and Management, 4(2), 99-104

Bundoo, S. K. (2000). The Mauritius stock exchange: an assessment. Social Sciences & Humanities and Law & Management Research Journal, 3, 67-80.

Butt, B. Z., ur Rehman, K., Khan, M. A., and Safwan, N. Do economic factors influence stock returns? A firm and industry level analysis. *African Journal of Business Management*, 4(5), 2010, 583-593.

Chikoko, L. and Muparuri, W. (2013). Zimbabwe stock exchange and efficiency in the multiple currency exchange rate regime. Journal of Business and Economic Management 1(3), 41-47.

Constâncio, V. The European crisis and the role of the financial system. *Journal of Macroeconomics*, 39, 2014, 250-259.

Cootner, P. (1962). Stock prices: Random vs. systematic changes. Industrial Management Review, 3, 24-45.

Dahel, R., and Labaas, B. (1999). The behavior of stock prices in the GCC markets. Working paper No. 9917, Economic Research Forum

Degutis, A., and Novickytė, L. The efficient market hypothesis: a critical review of literature and methodology. *Ekonomika*, 93(2), 2014, 7-23.

Dewan, S. G. and Chen, L. D., Mobile Payment Adoption in the USA: A Cross-industry, Cross platform Solution, *Journal of Information Privacy & Security*, 1(2), 2005, 4-28.

Dimpfl, T., and Jank, S. Can internet search queries help to predict stock market volatility?. *European Financial Management*, 22(2), 2016, 171-192.

Fama, E. Efficient capital market: A review of theory and empirical work. *Journal of Finance*, 25(2), 1970, 382-417.

Fama, E. F., and Blume, M. E. (1966). Filter rules and stock-market trading. The Journal of Business, 39(1), 226-241.

Gilson, R. J., and Kraakman, R. Market efficiency after the financial crisis: It's still a matter of information costs. *Va. L. Rev.*, 100, 2014, 313.

Hawaldar, I. T., Rohit, B. and Pinto, P. (2017). Testing of weak form of efficient market hypothesis: Evidence from the Bahrain Bourse. Investment Management and Financial Innovations, Volume 14, Issue 2, 2017

Hou and Sun (2014). Testing the Weak-Form Market Efficiency Hypothesis for Canadian and Chinese Stock Markets. M.Sc project, Simon Fraser University.

Kelikume, I., Olaniyi, E., & Iyohab, F. A. (2020). Efficient market hypothesis in the presence of market imperfections: Evidence from selected stock markets in Africa. International Journal of Management, Economics and Social Sciences (IJMESS), 9(1), 37-57.

Iqbal, H. I. and Mallikarjunappa, T. (2008). The Behavior of Indian Stock Prices and Returns: Is the Stock Market Efficient? Scour, 2(2), 39-46.

Iqbal, H. I. and Mallikarjunappa, T. (2010). A Study of Efficiency of the Indian Stock Market. Indian Journal of Finance, 4(5), 32-38.

Iqbal, H. I. and Mallikarjunappa, T. (2011). Efficiency of Stock Market: A Study of Stock Price Responses to Earnings Announcements. LAP Lambert Academic Publishing Company, Germany.

Kafayat, A. "Interrelationship of biases: effect investment decisions ultimately." Theoretical & Applied Economics 21, no. 6 (2014).

Kafayat, A. Interrelationship of biases: effect investment decisions ultimately. *Theoretical and Applied Economics*, 21(6). 2014.

Karemera, D., Ojah K., and Cole J. A., (1999). Random Walks and Market Efficiency Tests: Evidence from Emerging Equity Markets. Review of Quantitative Finance and Accounting 13:171-188.

Katabi, M. M., & Raphael, G. (2018). An emprical analysis of weak-form efficiency of Dar es Salaam Stock Exchange. African Journal of Economic Review, 6(2), 115-134.

Kelikume, I. (2016). New evidence from the efficient market hypothesis for the Nigerian stock index using the wavelet unit root test approach. Journal of Developing Areas

Lawal, A. I., Somoye, R. O., & Babajide, A. A. (2017). Are African stock markets efficient? Evidence from wavelet unit root test for random walk. Economics Bulletin, 37(4), 2665-2679.

Mallick, L. R. Biases in behavioural finance: a review of literature. *Management*, 1(3), 2015, 100-104.

Nicolaas, G. (1997). Share market efficiency: Tests using daily data for Australia and New Zealand. Applied Financial Economics, 7, 645-657.

Nwidobie, B. M. (2014). The random walk theory: An empirical test in the Nigerian capital market. Asian Economic and Financial Review, 4(12), 1840-1848.

Obayagbona, J. and Igbinosa, S. O. (2014). Test of random walk hypothesis in the Nigerian stock market, Current Research Journal of Social Sciences 7(2), 27-36.

Ouarda, M., El Bouri, A., and Bernard, O. Herding behavior under markets condition: Empirical evidence on the European financial markets. International *Journal of Economics and Financial Issues*, 3(1), 2013, 214-228.

Phiri, A. (2015). Efficient Market Hypothesis in South Africa. Managing Global Transitions, 13(4), 369–387.

Simons, D. N., & Laryea, S. (2005). Testing the efficiency of African markets. Available at SSRN 874808.

Smith, G. (2008). Liquidity and the Informational Efficiency of African Stock Markets. South African Journal of Economics, 76(2), 161-175.

Sung, M. C., and Johnson, J. (2006). A new perspective on weak form efficiency: Empirical evidence from the UK bookmaker based betting market. In The 13th International Conference on Gambling & Risk Taking, Nevada, USA, 22-26.

Tiwari, A. K., and Kyophilavong, P. New evidence from the random walk hypothesis for BRICS stock indices: a wavelet unit root test approach. *Economic Modelling*, 43, 2014, 38-41.

Van, D.H., Rodrigues, J., Hockly, D., Lambert, B., Tjaart, T. and Phiri, A. (2013). Efficient Market Hypothesis in South Africa: Evidence from a threshold autoregressive (TAR) model. MPRA Paper No. 50544.

Vitali, F., and Mollah, S. (2010). Stock market efficiency in Africa: Evidence from random walk hypothesis. South Western Finance.

Wheeler, F. P., Bill N., Tadeusz K., and Steve R. L., (2002). The Efficiency of the Warsaw Stock Exchange: the First few Years 1991-1996. The Poznan University of Economics Review 2 (2):37-56.

Williams, P. Britain and Africa after the cold war: beyond damage limitation?. In Africa in International Politics (pp. 53-72). 2004. Routledge.

Williamson, J. (1972). Measuring mutual fund performance. Financial Analysts Journal, (November/December).

Yang, C. Y., Jhang, L. J., and Chang, C. C. Do investor sentiment, weather and catastrophe effects improve hedging performance? Evidence from the Taiwan options market. *Pacific-Basin Finance Journal*, 37, 2016, 35-51.

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 & Accountancy Ventura (JEBAV), *21*(3), 285-291.

Zindel, M. L., Zindel, T., and Quirino, M. G. Cognitive bias and their implications on the financial market. *International Journal of Engineering and Technology*, 14(3),   2014, 11-18.

Kelikume, I., Olaniyi, E., & Iyohab, F. A. (2020). Efficient market hypothesis in the presence of market imperfections: Evidence from selected stock markets in Africa. International Journal of Management, Economics and Social Sciences (IJMESS), 9(1), 37-57.