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SOLIDITY AND IMMUTABILITY OF BEHAVIOURAL FINANCE THEORY IN CAPITAL MARKET INVESTMENT: A GLOBAL PERSPECTIVE

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ABSTRACT

This study evaluated the argument that the capital market is efficient such that all information from both the past, present, and unpublished have already been reflected in the market price of security as a guide for investors in the market and that the behavior of the same investors could affect the performance of the market. To address the above concern, the researcher employed various suitable final metric tools such as the Normality/Random Walk test, Variance ratio test, EGARCH models, etc., to analyze the daily historical data from prominent capital markets, each from all the continents around the world. From the results of these tools employed, none of the markets under study follow the random walk theory within the scope of the study. The results of EGARCH and volatility clustering tests also revealed that all the countries under study exhibited the property of stock returns distribution called volatility clustering or volatility pooling, a kind of heteroscedasticity, suggesting the nonconformity of the random walk theory. The failure of the various results to corroborate the random walk theory shows that investors are rational and unpredictable. These results have rightly positioned the behavioral finance theory as a veritable tool that can guide economic agents on capital market investment decisions. That means the behavior of investors makes share prices deviate from the economic fundamentals or assumptions. Considering the above findings, the researcher boldly advocates for a paradigm shift to behavioral finance theory, where emotions and psychology or mindsets of investors influence the investment decision-making process and financial markets, hence a veritable guide for decisions on stock market investments. Therefore, the researcher suggested that emotional and psychological checks be carried out on all stock market investors, mainly when an innovation or new policy is promulgated.

INTRODUCTION

Most scholarly papers on the performance and behaviour of capital market returns around the world are inundated and anchored on the efficient market hypothesis and have resulted in endless controversy on whether the market is efficient in any of its forms. A good number of scholars have the belief that the market should always follow a random walk theory, where no investor usurps the information available to make abnormal profit since all information both from previous and current as well as information available and knowable in the future have already reflected in the market price of the security. However, some scholars are of the opinion that the behaviour of investors could affect the performance of the market, hence the behavioural finance theory, that sees investors as both rational and exhibit behavioural biasness while evaluating and pricing securities and that financial markets are informationally inefficient (Kumar, 2017). The random walk hypothesis was first formalized by a French mathematician Bachelier (1900) who presented convincing evidence that commodity speculation in France was a "fair game" meaning that neither buyers nor sellers could expect to make profit. The induction for random walk hypothesis is a variation on the economists' classical efficiency argument which holds that $100 bill will never be found lying on the sidewalk because someone else would have packed it up first. This intuition incited study on the issue and for the past century it has been exhaustively debated upon. Pearson (1905) become perplexed by the problem of the random walk and after making some analytical observations appealed to the readers of nature for a solution as the problem was of considerable interest to him. The random walk, also known as the drunkard's walk, is central to probability

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theory and still occupies the quantitative mind today. Rayleigh (1905) responded to the appeal of Pearson and his contributions led Pearson to conclude that "the most probable place to find a drunkard who is capable of keeping on his feet is somewhere near his starting point. The random walk theory in the field of finance and precisely stock market, it is contended that stock prices take a random and unpredictable path. The chance of a stock future price going up is the same as its going down implying that stock prices change randomly, thus making it impossible to predict. Malkiel (1973) a Princeton university Professor of Economics through his book, "A random walk down wall street" popularized the random walk hypothesis using a hypothetical stock whose closing price was determined by a conflict. Thus, the random walk theory is based on the occurrence of an unpredictable event determined by a series of random events.

Furthermore, the concept of efficient stock markets stemmed into a chance discovery. In 1958 Maurice Kendall, a British statistician, presented a controversial paper to the Royal Statistical Society on the behavior of stock and commodity prices. Kendall had expected to find regular price cycles, but to his surprise they did not seem to exist. Each series appeared to be a wandering one, almost as if once a week the Demon of Chance drew a random number… and added it to be current price to determine the next week's price. In other words, the price and commodities seemed to follow a random walk of stocks (Brealey & Myers, 2003). This means that market efficiency is consistent with a market in which there are no transactions costs in trading securities; all available information is costless to all market participants, and all participants in the market are rational in decision, suggesting that all agree on the implications of current information for the current price and distributions of future prices of each security (Fama, 1970). Rossi and Gunardi (2018) contend that the stock market is an important principle used to measure efficiency as the correlation between prices and all the information present in a market. Reily (1989) sees an efficient market as one in which security prices adjust rapidly to the infusion of new information and current stock prices fully reflect all available information, including the risks involved. Thus, the stock market is said to be efficient if information is widely and cheaply available to investors such that share prices are fair. A fair share price is one which reflects all available, relevant, and ascertainable information in the market. The efficient market hypothesis may be expressed in several alternative ways, and differences between these alternative representations can easily become rather esoteric, technical, and subtle (Cuthbertson & Nitzsche, 2001). The implication is that security prices adjust instantly and without bias to any new information released to the market and that expected return is compatible with the risk involved (Afego, 2012). An Efficient Stock market results from the presence of numerous, rational profit maximizing investors, who are actively competing with one another, and these resulted in three variants of efficient market hypothesis (weak, semi-strong and strong forms (Wong & Kwong, 1984; Dimson & Mussavian, 1998; Sharpe et al., 1999).

The efficient market hypothesis (EMH), alternatively known as the efficient market theory, is a hypothesis that states that share prices reflect all information and consistent alpha generation is impossible. According to the EMH, stocks always trade at their fair value on exchanges, making it impossible for investors to purchase undervalued stocks or sell stocks for inflated prices. Therefore, it should be impossible to outperform the overall market through expert stock selection or market timing that is a type of investment or trading strategy. It is the act of moving in and out of a financial market or switching between asset classes based on predictive methods and the only way an investor can obtain higher returns is by purchasing riskier investments. The appraised values of security are based on the assessment made by independent investors. While the assessment made by independent investors dependent on the background and information available to him (Afego, 2012). Financial information is the building blocks from which the analysts construct research analysis that form the basis for their investment recommendations. In such a market, the current price of security obviously "fully reflects" all available information. But the speed and way the market adjusts to the relevant information on dividend and bonus issues declaration has been punctuated by untimely release of information and poor behavior of the authorities. The excruciating influence of timidity could emanate from insecurity of investors due to the intending insider trading and fall in investors' confidence, deter trading activities and the performance of the market. In an efficient information market, prices of shares adjust quickly to new information and enable more informed and efficient investment choices. In such markets, investors do not care about various trading strategies by fundamentalists, technicalist or chartists to beat the market with the bid of earning abnormal returns. But in the Nigeria capital market, the case is the reverse. In most cases, investors pay extra money to acquire additional information and sometimes go as far as sourcing for insider information on the values of companies listed with the exchange. So far, before certain information is announced, some investors have already traded on the information, causing disparities in available information among market participants (Cuthbertson & Nitzsche, 2001).

Fama (1965) opined that successive price changes in individual securities are independent depicting that the history of the series cannot be used to predict the future in any meaningful way. Fama (1970) categorized three types of efficient markets as weak-form, semi-strong and strong form efficiency. The least form covers all past information concerning prices and returns; the semi-strong form covers all publicly available information while the strong form covers all information be it private and public. The strong form of the efficient market hypothesis states that current market prices instantaneously and fully reflect all pertinent information including everything that is known whether it is public or private so that no group of investors has monopolistic access to any information that could be usurped to beat the market. The various forms of the efficient market have been tested in several empirical studies by finance and economics scholars and have resulted to unending controversy globally and Nigeria in particular on whether capital market return is efficient or inefficient in any of the efficient market hypothesis forms, Some empirical literature reviewed reveal that actually that past share prices cannot be used as a predicting factor to ascertain future share prices movement in stock market, indicating that successive price changes in the market follow a random walk (Olowe, 1999; Ajao & Osayuwu, 2012; Gay, 2016), whereas greater number of the studies found that the capital market returns are inefficient in any of the forms (Cooray & Wickremasinghe, 2007; Chien-Chang et al., 2010; Afego, 2012; Gambia, 2102; Gourdari, 2013; Ogbulu, 2016; Adebanjo et al., 2018). The plethora

of studies that aligned to the random walk inefficiency seem to have demystified the highly revered efficiency market hypothesis, hence emphasis is suggested for paradigm shift to behavioural finance theory.

The rest of this paper is organized as follows: Section 2 reviews some theoretical and empirical literature. Section 3 provides data and methods of analysis. Section 4 analyses and discusses the findings of the study. Section 5 concludes and recommends.

LITERATURE REVIEW

There exist several studies on whether capital market returns follow any of the forms of the efficient market hypothesis and have resulted to unending controversies on the efficiency of the market, hence many researchers have advocated for a paradigm shift to behavioural theory as basis of capital market investment. The study employed daily historical data from prominent capital markets each from all the continents of the world: Nigeria, South Africa, USA, Germany, United Arab Emirate and China. Results of the analysis revealed that none of the markets follows the random walk theory, hence investors cannot use the past data about the markets to predict their outcome. Since all the markets under study do not follow random walk, demystifying the efficient market hypothesis, meaning that the behaviours of investors, heavily influenced by share prices deviated from the economic fundamentals or assumptions. This means that the psychology of investors influence investment decision-making process and financial markets. Therefore, the researcher advises among others to place more emphasis on the theory of behavioural finance as a guide for decision concerning stock market investments.

Applying correlation analysis and monthly stock returns data over the period January 1981 and December 1992, Olowe (1999), studied weak form efficiency of the Nigerian stock market to examine if share prices on the Nigerian stock market adjust to historical price information. The study research revealed that the Nigerian market is efficient in weak form.

With Cointegration and Granger causality tests Augmented Dickey Fuller (ADF-1979, 1981), Phillips-Perron (PP-1988), Dicky-Fuller Generalized Least Square (DF-GLS-1996) and Elliot-Rothenberg-Stock (ERS – 1996) tests. Cooray and Wickramasighe (2007) investigated weak and semi strong form of the efficiency in four South Asian stock markets such as India, Sri Lanka, Pakistan, and Bangladesh. After the analysis, Semi-strong form efficiency was not supported as their tests indicate a high degree of interdependence among the South Asian stock markets.

Chien-Chong, Jung-De, and Chi-Chuan (2010) employed a state-of-the-art panel data stationarity test which incorporates multiple structural breaks to whether the efficient market hypothesis holds in stock markets under different economic development levels using January 1999 to May 2007. After the empirical analysis, it was observed that using general forms of cross-sectional dependence as well as controlling for finite-sample bias, the real stock price series appear to be stationary in 32 developed and 26 developing countries. Again, real stock price indices are stationary processes that are inconsistent with the efficient market hypothesis.

Employing seven (7) parametric tools; Autocorrelation test, the ADF and P-P unit root tests, Variance Ratio test, the Normality/Random test, the Granger Causality test ARCH-GARCH test and Regression test, Ogbulu (2016) investigated the efficiency level of Nigerian Stock Exchange (NSE) across different data estimation intervals (daily, weekly, monthly and quarterly aggregate stock price data using the NSE all share index series from 1999 to 2013) with reference to the weak form variant of EMH. The result found that on balance the NSE is weak form inefficient when daily, weekly, monthly, and quarterly prices are examined irrespective of the estimation interval and the parametric test employed in the tests.

Adebanjo, Awonusi, and Eseyin (2018) looked at the weak- form efficiency of the Nigerian stock market. Employing Partial autocorrelation (PACF) test to test for independence of stock prices, the runs test, and the distribution patterns to test for randomness of stock prices and the one-sample Kolmogorov Smirnov test to examine the observable trend in the pattern of stock price movements. After the analysis, the movements of stock prices in the stock market were observed to be independent. The movements of stock prices in the stock market were not random. Also was an observable trend in the pattern of stock prices movement in the stock market. The result of the partial auto correlation test showed that the movements of the stock prices are independent. Again, the result of the runs test and the distribution patterns also show that the movements of stock prices were not completely random.

Applying serial correlation technique and runs test, Ajao and Osayuwu (2012) investigated the efficacy of the weak form of efficient market hypothesis in the Nigerian capital market. The study covered all securities traded on the floor of the Nigerian Stock Exchange and the month end value of the All-Share Index from 2001-2010. The serial correlation technique was used to test for independence of successive price movement and the distributive pattern whereas runs test was applied to test for randomness of share price movement and found that the correlation coefficients did not violate the two-standard error test. Again, the Box-Ljung statistic revealed that none of the serial correlation coefficients was significant, and the Box pierce Q-statistics indicated that the overall significance of the serial correlation test was poor while the result of the distribution pattern shows that stock price movements are approximately normal. On that premise, it was concluded that successive price changes of stocks traded on the floor of the Nigerian Capital Market are independent and random. Therefore, the Nigerian Capital Market is efficient in the weak form.

Afego (2012) employed non-parametric runs test to examine the weak-form efficient market hypothesis for the Nigerian stock market with emphasis on random walks in the monthly index returns over the period 1984-2009. The results observed that index returns on the Nigerian Stock Exchange (NSE) exhibited a predictable component, indicating that traders can earn superior returns by employing trading rules. The statistically significant deviations from randomness also suggest sub-optimal allocation of investment capital within the economy. The results generally contradict the weak form of the efficient market hypothesis.

Gimba (2012) used autocorrelation test to investigate the weak form EMH of the NSE using daily and weekly NSE All Share Index (ASI) and five most traded banks stock of NSE from January 2007 to December 2009 for the daily and from June 2005 to 2009 for the weekly data. The results found that Nigerian Capital market is weak form is inefficient.

Applying Box-Jenkins ARIMA models, Gay (2016) investigated the relationship between stock market prices and macroeconomic variables (exchange rate and oil price) and found no relationship between present and past stock returns, affirming that BRIC markets exhibited weak form efficiency within the scope of the study.

Goudarzi (2013) employed ADF test and GARCH model to investigate market efficiency in India Stock Market through modeling one asset return series. The results found that underlying series is stationary, mean reverting, suggesting that the Indian stock market is weak form inefficient.

Efficient Market Hypothesis Controversy and Emergence of Behavioural Finance

Before the emergence of modern portfolio selection, Bernoulli and Cramer in the 18th century reached the conclusion that decisions under condition of uncertainty could not be made solely based on expected (mean) return. Subsequently, various economists have tried to evaluate investments with the aid of two (or more) indicators based on the distribution of returns. Generally, one index reflects the profitability of the investment while the other is based on the dispersion of the distribution of returns and reflects the investment's risk. The most common profitability distribution of returns; the risk index is usually based on the variance of the distribution, its range, and so on. As result of the Bernoulli and Cramer observation and various economists' attempts to bridge the gap, rules of thumb and intuitive judgment were also employed by portfolio managers, until Dr Harry M. Markowitz infused a high degree of sophistication into portfolio construction by developing Mean-Variance Models for the selection of portfolio. Dr Harry M. Markowitz is credited with developing the first modern portfolio analysis model since the basic elements of modern portfolio theory emanate from a series of propositions concerning rational investor behaviour set by Markowitz (Brealey & Myers, 2003; Ross et al., 2009; Bhalla, 2011).

However, the prepositions of Markowitz's model were attacked because the discussion was centered on pricing portfolio in the market which stated that the expected return of a portfolio is a linear function of the standard deviation. Hence, for the purpose of pricing or determining the prices of individual securities in the capital market, the Security Market Line **(**SML) was introduced. This model, which is also known as Capital Asset Pricing Model (CAPM) was developed by William F Sharpe and John Linter in 1963 and 1964 as a testable model for determining the value of individual securities or portfolio. This model is a significant departure from the efficient market model, which as discussed earlier focused attention on the risk-return features of the portfolio. The CAPM contends that the expected return on any asset is a linear function of its systematic risk (Brealey & Myers, 2003; Ross et al., 2009).

Again, the CAPM was flawed due to the sighted limitations, thus the theory of Arbitrage Pricing by Stephen Ross in 1976. Stephen Ross clearly argued that in a situation where different portfolios with multiple factors (betas) exist, CAPM with one-factor model (one beta) may not be able to produce the desired results (actual returns) for efficient portfolio. He further emphasized that APT is a multifactor model (multiple betas model) that accommodates all types of security investments. Meanwhile, in APT, there may be one or more macroeconomic factors that may measure the systematic (non-diversifiable) risk of an asset. The fundamental logic of APT is that investors always indulge in 'arbitrage' whenever the find differences in the returns of assets with similar risk features. Broadly speaking, the APT allows the actual return to be influenced by a numbers of market wide variables or factors such as interest rates, the exchange rate, change in inflation, change in output etc. The sensitivity of the return on asset to each of these factors is known as the 'factor beta' (Brealey & Myers, 2003; Ross et al., 2009).

Despite the efforts made by Dr Markowitz, William Sharpe, John Linter, Stephen Ross, and others, yet the argument based on capital market investment and share pricing remains unending controversy. Therefore, Behavioural finance which applies scientific research on cognitive and emotional biases is considered as alternative to understand financial decisions. Cognitive refers to how people think. Thus, behavioural finance emerges from a large psychology literature documenting that people make systematic errors in the way that they think: they are overconfident; they put too much weight on recent experience, etc. In addition, behavioural finance considers limits to arbitrage. Even though misevaluations of financial assets are common, not all of them can be arbitraged away. In the absence of such limits a rational investor would arbitrage away price inefficiencies, leaving prices in a non-equilibrium state for protracted periods of time. Behavioural finance might help us to understand some of the apparent anomalies. However, critics say it is too easy to use psychological explanations whenever there is something we do not understand. Moreover, critics contend that behavioural finance is more a collection of anomalies than a true branch of finance and that these anomalies will eventually be priced out of the market or explained by appealing to market microstructure arguments (Copur, 2015; Kumar, 2017; Ogbulu, 2019). The theory is therefore an innovation in the field of finance, a departure from the efficient market hypothesis.

Behavioral finance sees the different factors of an investor's behavior like judgment, emotional, social, intellectual factors, and restricted cognitive capabilities which are important drivers of the stock market. That investors are not always rational; emotions, heuristic and behavioral biases are significantly inherent with investment decisions (Barberis &Thaler, 2003; Bakar & Yi, 2016; Baker et al., 2019; Bhatia et al., 2020; Trifan, 2020). This is irrational behavior which happens due to misrepresenting in perception and false judgment of investors that he or she is a perfect rational investor of the stock market (Babajide & Adetiloye, 2012). The repeated pattern of irrational behavior in the decision-making process includes inconsistency, inability, or incompetency in the way of investment choices under uncertain conditions (Bernstein, 1996; Jain et al., 2015). The irrational behavior makes them biased that deviates the market from its actual position. These investors are behaviorally biased for investment patterns which in return create over reaction and under reaction in the market (Zahera & Bansal, 2018). Every single investor prefers to invest in more profitable and highly liquidated stocks. They always act wisely in choosing the stocks and being an investor, it must be clear where investors should invest. But they are psychologically biased in their personal decisions and do not make fair judgments that would ultimately cause changes in investment decisions. Consequently, the disposition effect has been incurred in the market (Frydman et al., 2014). Behavioral biases (herd bias, anchoring, mental accounting, and overconfidence bias) have a strong relationship with the

decision building process of investors (Kartašova, 2013; Parveen et al., 2020). Overconfidence investors and managers notably drive the firm value upward with lack of precise directions (Shah et al., 2018)

Theoretical Framework

This study is anchored on the Efficient Market Hypothesis (EMH), theory of Behavioural Finance, prospect theory and Risk aversion theory.

The Efficient Market Hypothesis (EMH)

This is also known as the Random Walk theory (Kendall, 1953), and is of the view that equity value of a listed firm reflects all data or information regarding the business value, indicating that market responds to all the available or possible-to-know information. Efficient market as presented by Eugene Fama in 1965, suggested that stocks always trade at fair value, implying that prices adjust rapidly and, on average, without bias to new information (Fama, 1976). Numerous scholarly papers have been anchored on this theory since the presentation, to justify the assumptions inherent in the model. This has increasingly attracted reasonable attacks on the assumed deficiencies in the theory mostly as regards return predictability (Rossi, 2016). In practice, certain information may affect stock prices more quickly than other information, leading to discrepancies in the response rates and researchers have made frantic efforts to separate these responses rates or information into different types, information about past prices, publicly available information, and all information. There are the Weak Form (if it fully incorporates the information in the past stock prices); the Semi-Strong Form (if prices reflect (incorporate) all publicly available information, including information such as published accounting statement for firm as well as historical price information); and the strong Form (reflect all information relevant to the firm, including information available only to company insiders) (Fama, 1976; Brealey & Myers, 2003; Ross et al., 2009; Bhalla, 2011; Rossi & Guardi, 2018).

Behavioural Finance Theory

This is an innovation in the field of finance, a departure from the efficient market hypothesis. This theory believes that the pattern of behaviour, whether overconfidence, overreactions, over representation, perceptions of investors are the same, hence such attitude do heavily influence share price from reflecting the economic fundamentals or beliefs or assumptions. It borders on how psychology influences investment decision-making process and financial markets, hence deviation of investors from traditional economic assumptions (Sewell, 2007; Kumar, 2017). Contrary to the EMH that sees investors as trying to outsmart each other in the market to make abnormal profit thereby making prices of securities return to equilibrium market value, also does not see all investors to be rational, rather assume that markets make unbiased forecast for future (Copur, 2015; Kumar, 2017), the behavioural finance theory adjudges investors as both rational and exhibit behavioural biasness while evaluating and pricing securities. The theory assumes that financial markets are informationally inefficient (Muradoglu & Harvey, 2012; Kumar, 2017). It seeks to explain certain psychological influences and biases that alter the logical reasoning of the people or investors. The biases of behavioural finance are that: it makes investors to totally adhere to the information that suites their beliefs (confirmation bias): investors experiences from previous or past trading influence them to take a position, even when such decision is not rational (experience bias): it makes investors to avoid taking risks completely even when it promises high returns (aversion bias); it makes investors to overestimate their capacity or marketing prowess, hence make decisions ignoring factual evidence (overconfidence); it gives investors the propensity to keep securities even when the prices are dwindling, hoping that the prices will definitely appreciate in future (disposition bias); it makes investors to always patronize or invest in familiar firms, firms they can attest to, rather than going into unfamiliar market (familiarity bias); investors making budget or spending could be at variance depending on the circumstances confronting them, thus not in permanent disposition (mental accounting) (Saba & Syed, 2014; Copur, 2015; Trifan, 2020).

Prospect Theory

This is an aspect of behavioural finance developed by Amos Tversky and Daniel Kahneman in 1992 that emphasizes more psychological accuracy on how decisions are taken vis a vis the expected utility theory (Tversky & Kahneman, 1992). The theory is of the opinion that losses and gains are evaluated separately, that individual investors take decisions relying on perceived gains rather than perceived losses. This theory modifies the analytical description of rational risk averse investors found in standard financial theory, hence known as *loss aversion* theory. This implies that if difference choices present themselves to an investor with equal magnitude; one based on potential benefits or gains, the other on possible losses, the former option will be preferred. Here, choices are independent and singular, the chances of gain or loss is assumed to be equal rather than probability being presented (Tversky & Kahneman, 1992; Bodie et al., 2013; Pahlevi & Oktaviani, 2018). Prospect theory explains the risk avoidance tendency of investors relating to hold loser stock and sell winning one. It is expressed by Shefrin and Statman (1985) that price of stocks is a reason of disposition to avoid risk. The disposition effect is greatly dealt with prospect theory, regret aversion, self-control, and mental accounting bias. Investors make decisions to reduce losses and gain more to encourage them to hold losers' stocks too long and sell the winning ones too early. On the other hand, herding behavior is another phenomenon in which an investor ignores his or her own market information and follows the market participants. They observe the others' information and discourage their own information (Bikhchandani et al., 1992). In financial markets, investors herd the other's actions or stock market movement and completely ignore their private information. It is the human behavior that mimics the actions of major investors rather than private information (Lee et al., 2011). This behavior is due to investors' sentiments that are connected with behavioral finance (López-Cabarcos et al., 2020). These sentiments are highly sensitive on account of upgrade and downgrade announcements, implying the analyst to yield the worthwhile trading indications to uninformed traders in the market (Kim et al., 2019). These sentiments are

pessimistic due to the release of bad news, significantly affecting the stock returns' response to downgrade announcements. Thus, investor's sentiment is one possible cause of stock market reactions to change the analyst recommendations.

Risk aversion theory is based on the phenomenon of risk avoidance by the investor (Bailey & Ball, 2006). Financial decisions related to investment in stocks have a great concern with a high level of risk of losses (Aydin et al., 2005). These financial decisions are correlated with the risk factor, especially in the purchase or sale of investment (Noussair et al., 2014). It contributes to the perceived risk of an investment. Perceived risk is referred to as the uncertainty and consequences related to a particular investment (Schiffman et al., 2011). Awais et al. (2016) defined that perception of risk and investments are negatively related to each other.

MATERIALS AND METHODS

This study employed various econometric tools such as Descriptive statistics, Unit root tests (Augmented Dickey Fuller (ADF) and Philip-Perron (P-P)), Autocorrelation test, Pairwise Granger Causality test, Normality/Random Walk test, and Variance ratio test (VRT) and EGARCH models. It employed daily historical data from May 18, 2015 to June 6th, 2022, from prominent capital markets each from all the continents around the world; Africa: Nigeria All Share Index (ASI-NG) and South Africa Johannesburg All Share (JSE-SA); America: USA Dow Jones Industrial Average (DJI-USA); Europe: Germany DAX (DAX-GER); Middle East: United Arab Emirate UAE) DFM General (DFM-UAE); Asia/Pacific: China CSI 1000 (CSI-CH).

The price data were converted into compound returns by taking logarithms:

$$R_t = \ln (p_t / p_{t-1})$$

Where R_t, is the current market returns, p_t is the current market index price, p_{t-1} is the previous market index price.

According to Brooks (2008), for EGARCH, model, the conditional covariance is given by:

$$\ln (\sigma_t^2) = \omega + \beta \ln (\sigma_{t-1}^2) + \gamma \frac{\mu_{t-1}}{\sqrt{\sigma_{t-1}^2}} + \alpha \left(\frac{|\mu_{t-1}|}{\sqrt{\sigma_{t-1}^2}} - \sqrt{\frac{2}{\pi}} \right)$$

Where, ω, β, α, γ are constant parameters, Log (σ_t^2) = the one period ahead volatility forecast,

ω = the mean level, β = persistence parameter, α = volatility clustering coefficient, Log (σ_{t-1}^2) = the past variance, γ = the leverage effect.

The above model ensures that even when the parameters are negative, σ_t^2 will be positive and the asymmetry or the leverage effect measure, γ, will be negative even when the relationship between volatility and log returns is negative. The EGARCH is symmetric when = 0, when $\gamma < 0$ then positive shocks (good news) generate less volatility than bad news (negative shocks); in other way round, bad news or negative shocks magnify more volatility than good news or positive shock of the same magnitude. When $\gamma > 0$, it implies that positive innovations or shocks are more destabilizing than negative innovations or shocks (Black, 1976; Christie, 1982). In other words, negative value of γ is called the 'sign effect'. The choice of EGARCH framework is to accommodate examination of conditional variance (volatility), asymmetric effect and volatility persistence. The $\propto$ parameter represents the symmetric effect of the model, if $\propto$ is positive, then the conditional volatility tends to rise (fall) when the absolute value of the standardized residuals is larger (smaller), hence magnitude effect'. The GARCH effect β measures the persistence in conditional volatility. When β is relatively large, then volatility takes a long time to fizzle out or decay or die out following mayhem in the market or economy in general. Succinctly, the EGARCH model has a good number of advantages over the normal GARCH specification. First, since the log (σ_t^2) is modeled, then even the parameters σ_t^2 will be positive. There is thus no need to artificially impose non-negativity constraints on the model parameters. Second, asymmetries are allowed under the EGARCH formulation, since if the relationship between volatility and returns is negative, γ, will be negative (Brooks, 2008).

RESULTS AND DISCUSSIONS

Table 1. Descriptive Statistics for stock of selected countries under study.

	ASI_NG	JSE_SA	DJI_USA	DAX_GER	DFM_UAE	CSI_CH
Mean	0.000285	0.000118	0.000348	0.000165	-5.44E-05	-0.000123
Median	-0.000100	0.000000	0.000700	0.000600	0.000200	0.000900
Maximum	0.062300	0.071900	0.113700	0.109800	0.073200	0.066200
Minimum	-0.049100	-0.090400	-0.129300	-0.122400	-0.082900	-0.087900
Std. Dev.	0.009662	0.012676	0.011929	0.012986	0.011510	0.018312
Skewness	0.373743	-0.515504	-0.633512	-0.401560	-0.513715	-0.882702
Kurtosis	7.491546	9.277415	24.47933	13.27723	11.70983	6.611110
Jarque-Bera	1515.216	3107.676	34433.15	7956.694	5672.606	1161.268
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Observations	1754	1843	1785	1797	1770	1725

Table 1 above shows the descriptive statistics explaining the distributional features of stock returns for the selected countries in this study. The results for respective countries suggest a low average daily stock returns series. The standard deviations recorded are 0.9%, 1.2%, 1.1%, 1.2%, 1.1% and 1.8% for Nigeria, South Africa, USA, Germany, UAE, and China respectively, which are closely related suggesting relatively high volatility in each country. The difference between the values of the minimum and maximum are also relatively high in various countries, suggesting high volatility in price changes in each country. The values of the skewness and kurtosis are greater than normal (for null hypothesis, Skewness = 0 and Kurtosis = 3) for respective countries. For Kurtosis which is greater than 3 showing leptokurtic distribution (the tendency of financial asset returns to have distribution that exhibit fat tails and excess peakedness at the mean) which is because of volatility clustering in the return series for the select countries in this study. Positive skewness recorded in all the countries indicates that all their returns distribution is skewed to the right of their mean with long right tail, suggesting there are tendencies that large positive returns occur more than large negative returns in the various markets. This shows that large movements in stock returns do not follow with the same magnitude of negative movement. In sum, skewness greater than zero and kurtosis greater than 3 are sufficient evidence supporting presence of asymmetry and volatility clustering in the stock return series of respective countries, also the deviation from normality support weak form inefficiency. Jarque-Bera values are expected to be zero under null hypothesis, but the results here revealed that the values for all the countries in this study are greater than zero, also the associated probability values are highly significant at 1%; sufficient evidence of abnormal distribution, supporting deviation from random walk, hence weak form inefficient for the respective countries.

Next is the unit root test, a popular macroeconomic technique used for the test of stationarity of time series data due to the dependent nature of most economic variables. This study used ADF, and P-P unit root tests as shown below.

Table 2. Unit Root test

Unit Root Stat& Prob.	ASI_NG	JSE_SA	DJI_USA	DAX_GER	DFM_UAE	CSI_CH
ADF Test	-31.90581 (0.0000)	-42.30078 (0.0000)	-18.3469 (0.0000)	-42.85463 (0.0000)	-21.60995 (0.0000)	-37.85180 (0.0000)
P-P Test	-32.73587 (0.0000)	-42.36418 (0.0000)	-364.9594 (0.0001)	-42.86291 (0.0000)	-38.19370 (0.0000)	-37.94114 (0.0000)

Results of ADF and P-P unit root tests on table 2 revealed rejection of null hypothesis at 1 % significant level, supporting deviation from random walk which is consistent with most financial time series data. The results affirm the weak form inefficiency in the stock return series of all the countries.

The researcher then proceeded to Autocorrelation (AC) and Partial Autocorrelation (PAC) tests; a special correlation test that examines the relationship between successive values of the same variable and not necessarily between two or more variables. The test is shown in table 3 below.

Table 3. Autocorrelation Test

AC & PAC Test (1-36)	ASI_NG	JSE_SA	DJI_USA	DAX_GER	DFM_UAE	CSI_CH
Q-Statistics range	123.17 to 195.23	432.32 to 519.09	50.313 to 426.57	50.313 to 426.57	498.26 to 662.44	14.714 to 107.13
Probability	0.000	0.000	0.000	0.000	0.000	0.000
AC &PAC Coefficient. Range	-0.002 to 0.265	-0.012 to 0.078	-0.001 to 0.080	-0.001 to 0.206	-0.002 to 0.080	-0.008 to 0.092

Table 3 above revealed that the individual AC and PAC coefficients at different lags from 1-36 are significantly different from zero for all price series in the selected countries, also the associated probability values suggest that successive autocorrelation of the prices are incredibly significant from 1-36, showing rejection of serial correlation for series in the select countries. This suggests that there is an existence of volatility clustering in the price series, also that the price series in all the markets do not follow random walk.

Table 4. Variance Ratio Test (VRT)

VRT Prob		ASI_NG	JSE_SA	DJI_USA	DAX_GER	DFM_UAE	CSI_CH
Joint Tests		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Individual Test	**2**	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	4	0.0000	0.0000	0.0002	0.0000	0.0000	0.0000
	8	0.0000	0.0000	0.0037	0.0000	0.0000	0.0000
	16	0.0000	0.0000	0.0201	0.0000	0.0000	0.0000

Table 4 above shows the test of random walk using the Variance Ratio test (VRT) done under the null hypothesis of stock returns (Martingale process) for all the six countries under study. The results revealed that both joint and individual (lags 2-16) variance tests were rejected at 1% significant level, suggesting that price series do not follow a martingale process, hence do not follow random walk, or is not weak form efficient.

Table 5. Causality Test

Select Countries	Null Hypothesis	Prob
NIGERIA ASI	ASI_NG does not Granger Cause ASI_NIG_1	0.0000
SOUTH AFRICA JSE	FTSE_SA does not Granger Cause JSE_SA_1	0.0000
USA DJI	DJI_USA does not Granger Cause DJI_USA_1	0.0000
GERMANY DAX	DAX_GER does not Granger CauseDAR_GER_1	0.0000
UAE DFMG	DFM_UAE does not Granger Cause DFM_UAE_1	0.0000
CHINA CSI 1000	CSI_CH does not Granger Cause CSI_CH_1	0.0000

Granger Causality tests for all the select countries in table 5 above reject the null hypotheses of no causal direction found between successive variables (prices regressed on their lagged value), suggesting deviation from random walk assumption for the return series; meaning that the various markets are not efficient in the weak form.

Then the researcher moved to check the relationship between the successive variables using Ordinary Least Square (OLS) Model as shown below.

Table 6. ARCH Effect Test

ARCH Test	ASI_NG	JSE_SA	DJI_USA	DAX_GER	DFM_UAE	CSI_CH
F-statistic	0.0000	0.0000	0.0000	0.0096	0.0000	0.0000
Obs*R-squared	0.0000	0.0000	0.0000	0.0096	0.0000	0.0000

Table 6 above shows that the F-version and the LM-statistics are incredibly significant, indicating the presence of ARCH effects in the returns of all capital markets of the countries under study.

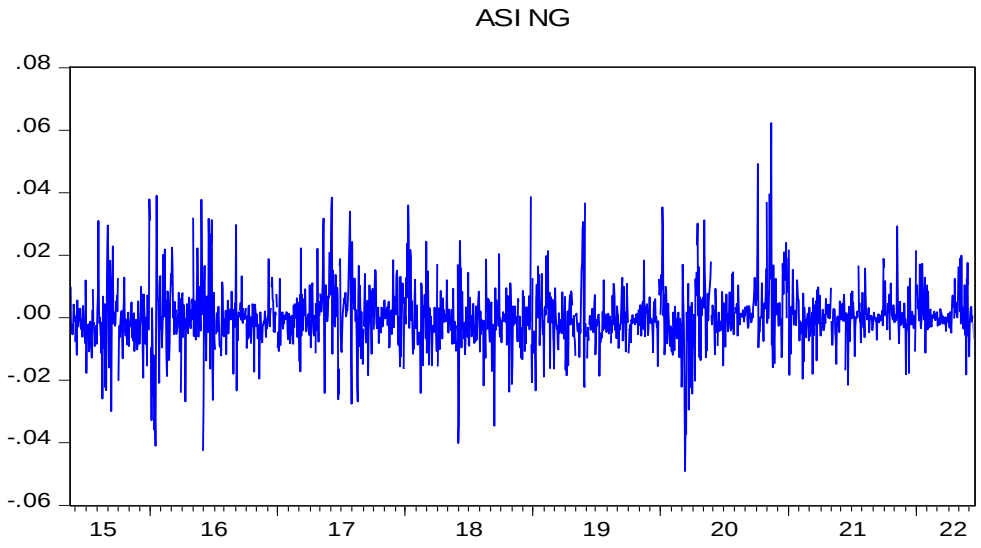

Figure 1. Volatility Clustering Test for Nigeria Capital Market returns

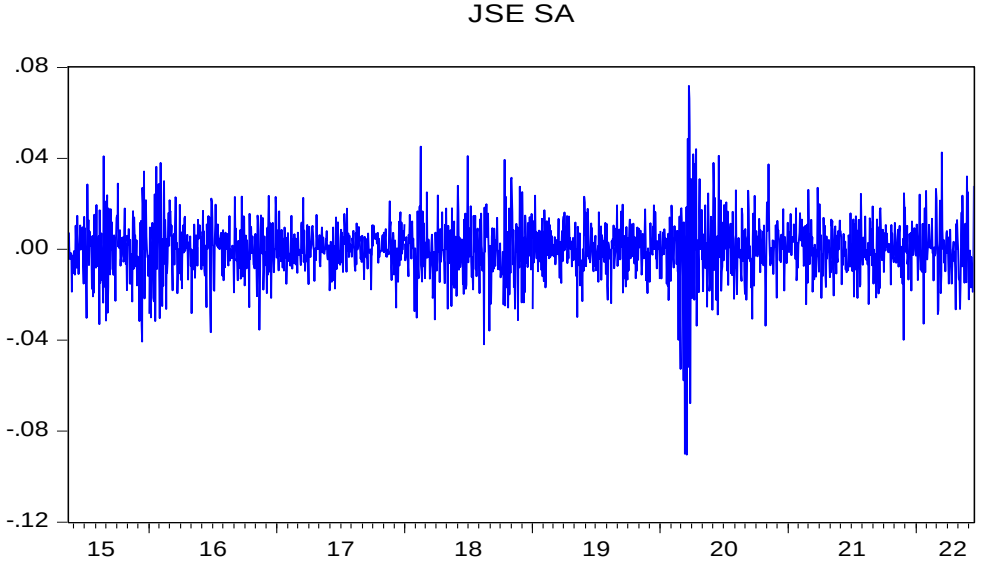

Figure 2. Volatility Clustering Test for South Africa Capital Market returns

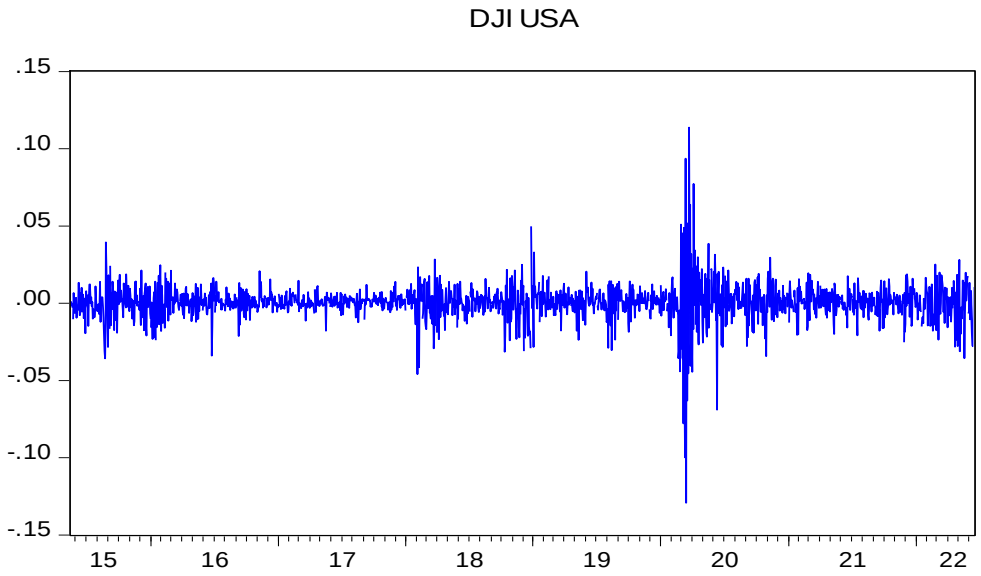

Figure 3. Volatility Clustering Test for USA Capital Market returns

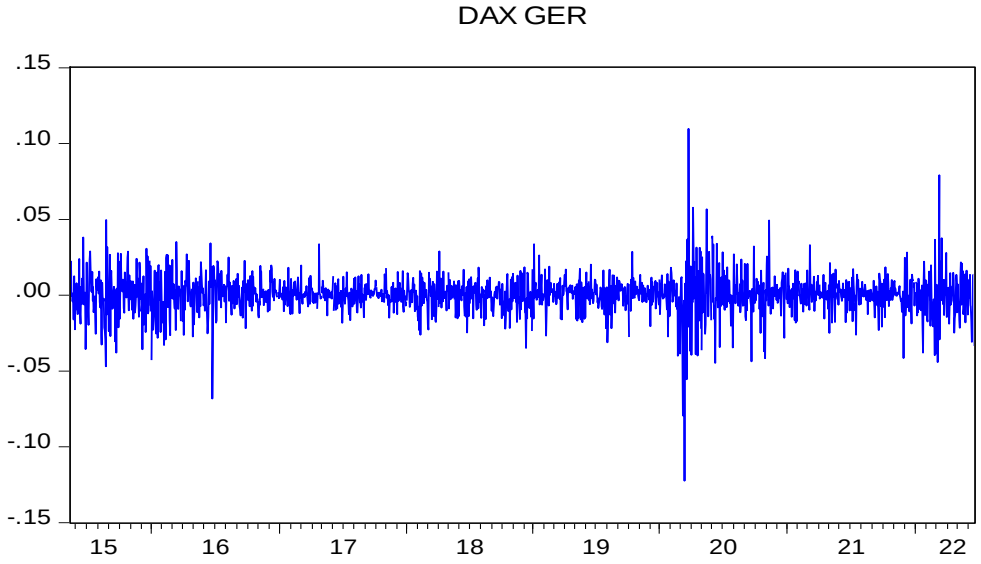

Figure 4. Volatility Clustering Test for Germany Capital Market returns

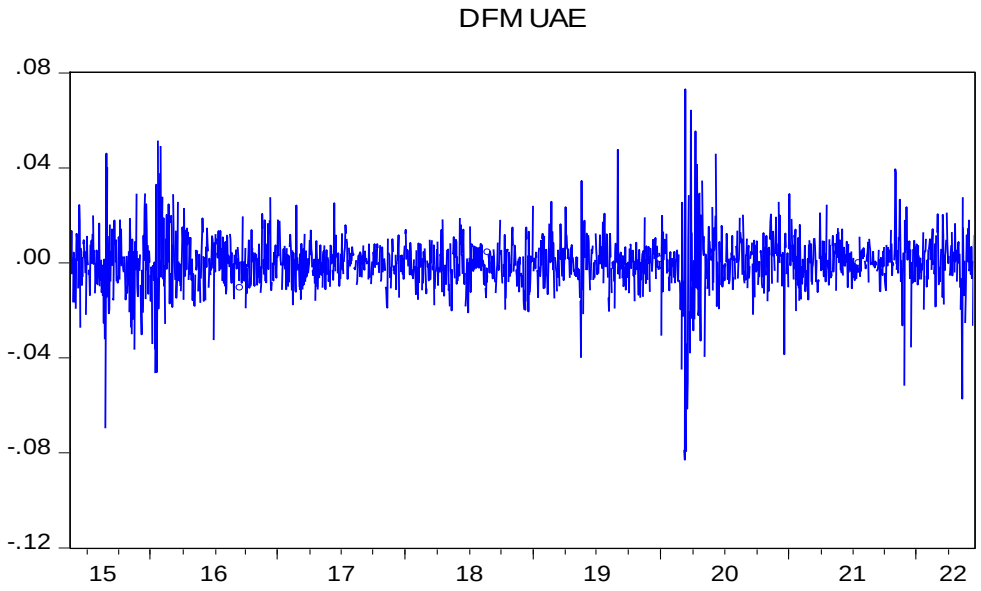

Figure 5. Volatility Clustering Test for UAE Capital Market returns

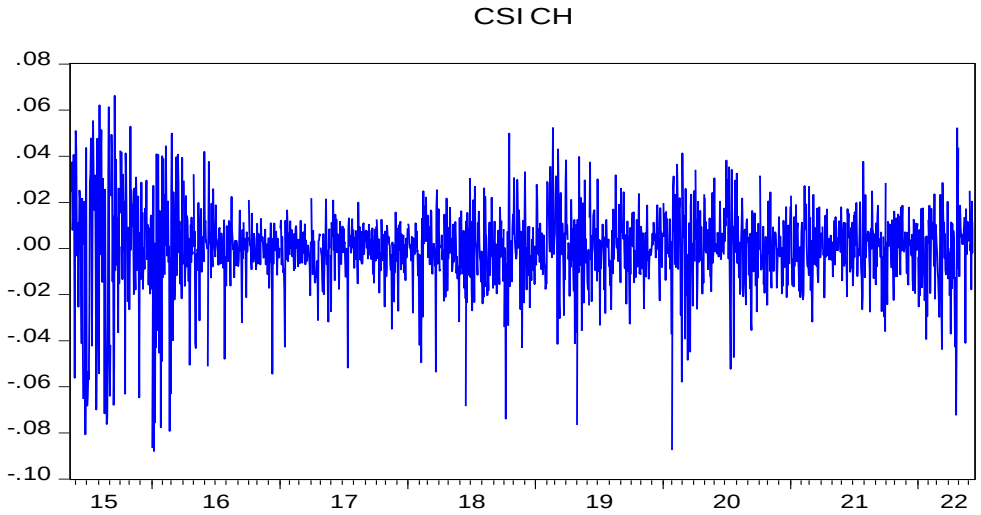

Figure 6. Volatility Clustering Test for China Capital Market returns

A cursory look at figures 1-6 revealed as follows; that Nigeria and South Africa exhibited wide swings for almost all the period under study though at a reduced rate in South Africa, suggesting that in the two African countries, periods of high volatility are followed be the same magnitude of volatility for a prolonged period. For the USA market, it exhibited a period of relative tranquility from May 2015 to last quarter of 2019, intercepted with high volatility close to the end of 2019 to 2020. It then witnessed another calmness from 2020 to 2022. Germany and UAE appear to be relatively calm in their respective markets, though with seemingly exceptionally low volatility in UAE as indicated in the small positive and negative returns. It followed with high volatility occasioned by large positive and negative returns close to end of 2019 (short and long) then return to period of calmness from 2020 to 2022. China showed period of high volatility from 2015 to 2016, then at a reduced rate from 2016 to 2017. Thereafter China market exhibited a prolonged period with high volatility due to large positive and negative from 2017 to 2022.The implication of the above stylized movements is that all the countries under study exhibited property of stock returns distribution called volatility clustering or volatility pooling; a kind of heteroscedasticity. This means that volatility shocks in the current period influence the expectation of volatility in some periods in the future. Therefore, persistent volatility clustering suggests weak form inefficiency (Okpara, 2010). Finally, to parameterize the suspected ARCH effects, the researcher employed EGARCH.

Table 7. Estimation of models using EGARCH

Parameter Estimates	**ASI_NG**	**JSE_SA**	**DJI_USA**	**DAX_GER**	**DFM_UAE**	**CSI_CH**
Mean Eqn						
ω	-3.38E-05	-0.000159	0.000456	8.27E-05	-0.000245	-0.000232
	*0.8581	*0.5014	*0.0082	*0.7191	*0.2556	*0.5339
Variance Eqn						
ω	-1.414485	-0.470631	-0.665371	-0.321961	-0.581535	-0.332935
	*0.0000	*0.0000	*0.0000	*0.0000	*0.0000	*0.0000
α	0.347470	0.140742	0.266303	0.110266	0.229345	0.156009
	*0.0000	*0.0000	*0.0000	*0.0000	*0.0000	*0.0000
γ	0.064907	-0.127483	-0.156859	-0.140435	-0.076695	-0.048037
	*0.0000	*0.0000	*0.0000	*0.0000	*0.0000	*0.0000
β	0.877592	0.959430	0.951391	0.973487	0.955486	0.973788
	*0.0000	*0.0000	*0.0000	*0.0000	*0.0000	*0.0000
Log likelihood	5896.634	5685.763	6017.993	5588.811	5698.353	4709.026
Dw Stat	1.879809	2.079733	2.301931	2.001128	2.011089	1.933793
AIC	-6.716801	-6.163606	-6.736127	-6.213480	-6.432037	-5.452784
SIC	-6.698091	-6.145638	-6.717682	-6.195136	-6.413465	-5.433817
ARCH LM Test	0.6936	0.2390	0.6489	0.3767	0.4996	0.6379

*Probability values

Table 7 shows that the leverage effects or asymmetric parameter γ are negative and significant for USA. South Africa, Germany, UAE, and China markets, suggesting presence of leverage effects in the markets, implying that bad or negative news cause more volatility than good or positive news of the same magnitude. For Nigeria, the asymmetric coefficient γ is positive and significant, indicating that good news has more impact on volatility than bad news of equal magnitude. This contradicts or invalidates the leverage effect theory which states that the effect of bad news on volatility is higher than the effect of good news of the same magnitude. Furthermore, the persistent parameter β is positive and significant, also are relatively large for all the markets under study, indicating that the various capital market volatility is persistent, confirming that volatility takes a long time to die following the crisis in the respective markets. Magnitude effect ($\propto$) (volatility clustering) coefficient of EGARCH is positive and significant. That means the conditional volatility will rise or fall when the absolute value of the standardized residual is larger (smaller). Hence, persistent volatility clustering suggests weak form inefficiency. However, since the lagged values of the return series are positively and significantly different from

zero and the error terms (by the rule of thumb, DW<2) are not independently distributed. The researcher affirms that the various capital stock markets are weak form inefficient. Table 7 above also found that the ARCH- LM tests for the serial correlations were insignificant at 5% critical level for all the countries under study, suggesting that the asymmetry models are sufficient in modeling the serial correlation structure in the conditional mean and variance. This indicates there is no further ARCH effect in the estimated ARCH-GARCH models, as well as suggesting that the models are correctly specified. The AIC and SIC were found to maintain small criterion value for all the variants of ARCH in the countries under study, affirming the suitability of the models, hence are best fit models.

CONCLUSIONS

This study is aimed at placing more emphasis on behavioural finance theory as a guide for investment in the capital market. This does not completely deem totally demystifying the efficient capital hypothesis as a theory of capital market investment. To achieve this, the study made use of various econometric tools and made the following observation: that there is high volatility in each country under study. Also, large movements in stock returns do not follow with the same magnitude of negative movement. It was found that there is an existence of volatility clustering in the price series, also that the price series in all the markets do not follow random walk. It was discovered that all the countries under study exhibited property of stock returns distribution called volatility clustering or volatility pooling, a kind of heteroscedasticity. This means that volatility shocks in the current period influence the expectation of volatility in some periods in the future. It was revealed that for USA. South Africa, Germany, UAE, and China markets, there are presence of leverage effects in the markets, implying that bad or negative news cause more volatility than good or positive news of the same magnitude., whereas in Nigeria, the good news has more impact on volatility than bad news of equal magnitude, contradicting or invalidating the leverage effect theory which states that the effect of bad news on volatility is higher than the effect of good news of the same magnitude. It was also found that the conditional volatility will rise or fall when the absolute value of the standardized residual is larger (smaller). Hence, persistent volatility clustering suggests weak form inefficiency. This study focused on the unending controversy that information is freely available and instantaneously reflected on the prices of assets, hence forms a guide on the investment decision of the capital market. This argument lies in the random walk theory that the market is efficient such that all information from both the past, present, and unpublished have already reflected in the market price of the security, hence basis for the efficient market hypothesis. Though efficient market hypothesis argument has stood the test of time in the field of finance, scholars are of the opinion that the behaviour of investors could affect the performance of the market, hence the behavioural finance theory, that sees investors as both rational and exhibit behavioural biasness while evaluating and pricing securities and that financial markets are informationally inefficient (Kumar, 2017). This, therefore, forms the foundation of this study to ascertain the solidity and the immutability of the behavioural finance theory in capital market investment. To address the above concern, the researcher employed various tools that are suitable for financial time series. From the results of these tools employed, none of the markets under study follow the random walk theory within the scope of the study, hence rational investors cannot use the past data or information about the market to predict the outcome of the market. The results of EGARCH and volatility clustering tests also revealed that all the countries under study exhibited property of stock returns distribution called volatility clustering or volatility pooling, a kind of heteroscedasticity. This means that volatility shocks in the current period influence the expectation of volatility in some period in the future, suggesting nonconformity of the random walk theory. This of course is the reason the global market is dynamic and unpredictable. The failure of the various results to corroborate the random walk theory shows that investors are rational and unpredictable. These results have placed more emphasis on behavioural finance theory as a veritable tool that can guide economic agents on capital market investment decisions. That means the behaviour of investors makes share prices deviate from the economic fundamentals or assumptions. Considering the above findings, the researcher boldly advocates for a paradigm shift to behavioural finance theory, where emotions and psychology or mindsets of investors influence investment decision-making process and financial markets, hence a veritable guide for decision on stock market investments. Therefore, the researcher went ahead to suggest that emotional and psychological checks be carried out on all investors of the stock market, mostly when an innovation or new policy is promulgated. The researcher suggests further studies should have been on all the well-developed capital markets around the world both developed, emerging, developing and underdeveloped nations. This will help to validate possible inferences, theories and policy making. The study is limited to Nigeria, South Africa, USA, Germany, United Arab Emirate, China, and Nigeria Stock Markets. The researcher had wished it was extended to all developed capital markets around the world but was hindered by unavailability of data to the researchers.

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