RELATIONSHIP BETWEEN SUNSPOTS, BUBBLES AND THE NIGERIAN CAPITAL MARKET

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ABSTRACT

This study assessed literature on sunspots and then empirically analyzed the existence of speculative bubbles with evidence from the Nigerian stock market. The study used data of remittances inflows (REMITR and foreign portfolio inflows (FPI) in the period 1990 to 2021. The surge and drastic decline of these financial assets within these periods informed the choice to empirically determine if it was speculative bubble driven and influenced. The Augmented Dickey Fuller unit root and co-integration analyses were employed to validate the existence and likelihood of speculative bubble in the capital market of Nigeria. The empirical result is quite revealing in that it confirmed the existence and likelihood of speculative bubbles of the financial assets in the Nigerian capital market. The study recommends that investors in the capital market need to take caution in their investment decision regarding portfolio/securities in order to avoid loss of wealth and output. Investors should always understudy markets trends and the causes in an economy prior to committing their financial resources as this could save them from the consequences of losing their wealth in risky assets whose prices may or may not fundamentally be driven in the financial market. The study contributed to knowledge in the context of developing countries like Nigeria in that it has established the existence and likelihood of speculative bubbles connected with foreign portfolio inflows and remittance inflows. It is suggested that future researchers need to focus research attention on the implication of remittances inflows on inflation and other monetary policy transmission mechanisms. As this will guide policy makers in fashioning out effective policies to gauge or carry out impact assessment in varying aspects of the Nigerian economy.

Keywords: Sunspots, Bubbles, Financial assets, Bubble Burst, Market Correction.

1.0 INTRODUCTION

The Nigerian Bourse refers to the stock exchange market in Nigeria, which serves as a platform for buying, selling, and trading securities, such as shares, bonds, and derivatives. It is officially known as the Nigerian Exchange Group (NGX). This financial institution plays a critical role in facilitating capital formation, liquidity, and economic growth by providing companies with access to long-term funding and offering investors opportunities to earn returns on their investments (Nwude, 2018).The NGX operates under the regulatory framework of the Securities and Exchange Commission (SEC) in Nigeria, ensuring

transparency, accountability, and fairness in its operations (Onyema, 2020). The exchange has evolved over time, incorporating technological advancements and promoting investor confidence, which contributes to the development of the Nigerian capital market (Adejumo et al., 2022).

The Nigerian Stock Exchange (NSE) represents a critical hub for capital market activities in Nigeria, serving as a barometer for economic performance. However, the bourse is not immune to the irrationalities described in psychological finance. One of the most prevalent biases on the NSE is herd behavior, where investors collectively follow market trends without robust individual analysis. This has been evident during periods of speculative bubbles and rapid sell-offs, such as the 2008 global financial crisis. Studies have shown that herd mentality can exacerbate market volatility and amplify losses (Shefrin, 2000; Nwaobia et al., 2023).The integration of behavioural insights into investment strategies could help mitigate these biases. For instance, educating investors about the dangers of cognitive errors and employing algorithmic trading systems could reduce the influence of psychological factors on market outcomes (Barberis & Thaler, 2003; Adediran, 2023).

The irrationality in psychological finance is a driving factor of sunspots, often leading to bubbles in asset prices in the financial market. The term, 'sunspots' can be traced to the work of a notable economist, William Stanley Jevons in 1875 during the 19th century where the author tried to associate business cycle patterns with sun weather (sunspots). Jevons (1878) emphasized that sun weather (sunspots) causes changes in weather outlook and affects agricultural outputs. Sunny weather (sunspots) slightly affects business activities and exerts positive effect on investment returns such as stock returns through the emotion, psychology and trading mood of investors in the trading of stocks in the market (Maurice, 1996).

It was Cass and Shells (1983) who later coined the term 'sunspots' in economics and finance literature. They described sunspots as extrinsic random variable which results to no swing in economic fundamentals of asset prices. Sunspots in the framework of economics, concerns social or psychological occurrences which induce economic action/choice beyond the intrinsic variables such as supply and demand situations, prices and consumer preferences (Ogbeide &Eburajolo, 2021). Factors such as anticipation of good economic outlook, consumer expectations, self-fulfilling prophecies, and the "animal spirits" of traders tend to represent sunspots. These further go to induce economic outcomes without showing actual economic situation.

Pigou (1927) posits that the idea behind sunspots is that a despotic variation in anticipation tend to influence an economy but such influence has no volatility in the economic fundamental of asset prices. Sunspots are factors which really do not have direct effect on an economy outcome. They induce other factors which further influence economic fundamental. The different expectations of investors regarding certain asset prices like stock price may cause immediate unreasonable indirect fluctuation in the value of asset prices like share prices, foreign portfolio investments and exchange rate in financial market. Hence, Aigbovo and Ezuem (2018),opine that sunspots do not emanate from variation in economic fundamentals of asset prices but are primarily influenced through investors' belief, emotion,

market psychology, self-fulfilling prophecies, herding which often drive bubbles. Sunspots indirectly influence bubbles and may not be quantifiably analyzed. Hence, sunspots effect analysis appears contentious in economics and finance literature. On the other hand, bubbles are induced by certain economic fundamentals and may be empirically testable (Ogbeide &Eburajolo, 2021).

Belief, emotion, market psychology, self-fulfilling prophecies and animal spirit (herding) are behavioural factors appears to be responsible in asset price speculation in stock market. Osamwonyi (2011), pointed out that the reasons for occurrence of bubbles is due to investors' belief. The author notes that belief causes them to increasingly demand for stocks in the expectation that stock price will continue to rise and become profitable for them in the short run and long run. This belief keeps the irrational investors in the unknown on how very high asset prices have reached until a drastic fall is experienced, which eventually leads to loss in wealth and output in the stock market. According to Osaze (2011), when stock market investors intentionally purchase stocks with the aim to resell them at a high price driven by speculation than for income purpose, stock market investment bubble occurrences are inevitable.

Yahaya, Abdulraheem, Isiaka, Aliu and Esau (2011) described stock market investment bubbles like a soap bubble which a child blows up into the thin-air. The soap bubble tends to rise continuously high and soonest it disappears into the thin-air. The reason for the disappearance of the soap bubble into the thin-air in a forever manner does not emanate from any substantial basis. The rises that normally herald bubbles are not influenced by market fundamentals but by sentiments, fads, trend-chasing, overconfidence, beliefs and psychological biases (Aigbovo&Ezuem, 2018).These factors contribute to asset prices exceeding their intrinsic values greatly in the market (Aigbovo&Ezuem, 2018).

Instances of market bubbles occurrences in Nigeria are obviously in the known. The 2004/2005 bank consolidation and subsequent innumerable initial public offers (IPOs) culminated in obvious bubbles in the financial sector of the Nigerian economy (Aigbovo&Ezuem, 2018).The recapitalization decision resulted in increased demands for huge number of shares in the Nigerian stock market. This behavioural disposition of investors made stock return got high in an unusual manner. The development further influenced confidence of potential and existing investors and excess demand for more shares in so much that the news of uncommon boom of shares prices of the stock market of Nigeria was trending in stock markets of both developed and developing countries. After a period of time, the astronomical sudden surge in prices of shares (financial bubble) was no longer sustained and investors started experiencing a bewildering and drastic decline in prices of stocks (financial bubble burst) in the stock market. This occurrence was presumed to be a mere market correction by a lot of the market participants. There was expectation that stock price sharp decline would soon amazingly bounce back in a matter of short time frame. It was a 'big blow'on the investors when in the month of March 2009, the stock market was announced to have lost over fifty percent (50%) in both market recapitalization and all share indices (Aigbovo&Ezuem, 2018).

Similarly, the possible diversification gains in stock prices in the Nigerian Stock Exchange (NSE) for US and UK investors, contributed largely to financial bubbles spread from the US and UK stock markets to Nigeria (Oloko, 2017). The involvement of alien investors permitted for the inclusion of Nigerian Stock Exchange (NSE) equities into the portfolio of international investors, triggered doors for bubbles contagion transmission (Oloko, 2017).Foreigners' active involvement in portfolio is capable of inducing financial bubbles in the stock market (Sanusi, 2010, Arunma, 2013; Garba, Usma & Sanusi, 2009).The unexpected loss of 67.67% in Market All-Share-Index (ASI) value and the Market Capitalization loss of about seventy percent from March 2008 to 27th April 2009 are likely to be bubble induced (Kighir, 2009; Chukwuma-Agu& Agu, 2009;Gwarzo, 2016; and Almudhaf, 2017).

The World Bank (2018) records reveal that remittances in the context of Nigeria have been increasing astronomically over the last decade. The Central Bank of Nigeria (2019) report indicates Nigeria received about $613 billion in 2018 and this has made it become one of the top five recipient countries of remittance inflows globally. The sudden increase in foreign portfolio investment (FPI) from US$117.00 million in 2004, to US$990.00 million in 2005 and thereafter increased in 2007 by 111.3% to US$4,880.00 million are important at having clear understanding of the escalation in the asset price and the eventual collapse of the Nigerian Stock Exchange (NSE) prices on March 2008 (Omotosho & Inuwa, 2009).

Holding a basket of portfolio with stocks of varying countries may result to the spread of bubbles effect via portfolio rebalancing (Iliyasu, Sanus& Suleiman, 2018). The high percentage of stock price loss in the Nigerian Stock Exchange (NSE)might have been influenced by bubbles spiral from the world stock markets; this however remains adequately uninvestigated on the empirical fronts (Iliyasu, et al. 2018). The occurrence of financial bubble is still a controversy in the finance and economic disciplines in that some persons are in the school of thought that it does not occur while others believed sternly that it does occur and without uncertainty, speculation and bounded rationality (Aigbovo&Ezuem, 2018). Thus, this study seeks to find out if the surge and sudden drastic decline of these variables are speculative bubble driven in the Nigerian capital markets. Apart from the introductory section, section two deals with literature review; section three is on methodology; section four dwells on the analysis and discussion while section five is conclusion and recommendations.

2.0 LITERATURE REVIEW
2.1 Conceptual Review
Cass and Shells (1983) who later coined the term 'sunspots' in economics and finance see it as extrinsic random variable which result to no swing in economic fundamentals of asset prices. Sunspots in the framework of economics concerns social or psychological occurrence which induce economic action/choice beyond the intrinsic variables like supply and demand situations, prices and consumer preferences(Ogbeide &Eburajolo, 2021). Factors like anticipation of good economic outlook, consumer expectations, self-fulfilling prophecies, and the "animal spirits" of traders tend to represent sunspots. These further go to induce economic outcomes without showing actual economic situation.

Different authors and scholars have attempted to define bubbles in varying forms in economics and finance literature. For instance, Iliyasu, Sanusi and Suleiman (2018) referred to bubbles as alterations of financial asset prices from their intrinsic (real) values. Bubbles are an explosive autoregressive behaviour in price series of assets in the financial market (Phillips, Wu & Yu, 2011). According to Knoop (2008), an asset bubble is concerned with a market where prices of asset rise very high above that which can be justified by the asset's financial fundamentals, viz-a-vz the feature of the asset such as the asset itself, the expected mean, net worth of the company and cash flows The principal thing associated with bubble is not the bubble part itself but the unavoidable collapse that necessary must follow as situated in the instability hypothesis of Minsky (1986)as cited in Humpe and Zakrewshi (2019). Financial bubbles are made up of three parts, namely, the price increase in financial assets, expansion of economic activity and continuous increase of money supply (Tikhonov, Pudovkina&Permjaova, 2016).

2.2 Instances of where Bubbles were driven with Herd Mentality and Animal Sprits in Nigeria

Bubbles occurrence may be positive or negative (Aigbovo et al. 2017). While positive bubbles may be seen as economic booms, negative bubbles are market crash (Aigbovo et al. 2017). According to Kindleberger (2000), bubbles occur and maintained through feedback process till it is no longer sustainable at a level later. Osamwonyi (2011) points out that existence of feedback is enhanced by cognitive psychology, natural and activities like the ponzi scheme. In Nigeria, the last half of the year 2016 to the last quarter of year 2017 witnessed unprecedented investments by liquidity traders and those driven by herd mentality in Ponzi schemes like Money Making Machine (MMM), Twinkers just but to list a few of them.

Some millions of Nigerian youths and adults saw the opportunity to make fast/ liquid cash. The liquidity was so high, that the drive to continued investing in these ponzi schemes was uncontrollable. What was causing the drive could not be fundamentally ascertained and analyzed within the ambit of stock market knowledge. The bubble in the form of investment in the ponzi scheme rose significantly high and crashed/burst when MMM Ponzi scheme operators announced that they were going for technical suspension. Eventually as the saying goes: what goes up comes down, became a reality; the ponzi scheme bubble burst and thus created panic (Ogbeide &Eburajolo, 2021). It put some financially greedy persons into unexpected financial desideratum. Huge financialloss was experienced and felt by those persons who were psychologically driven in the market for ponzi scheme investments in Nigeria (Ogbeide &Eburajolo, 2021).

In the same vein, in the past, a lot of Nigerians did join the bandwagon in the crazy days of share boom. Even petty traders and other low-income earners saw stocks as the new way to financial freedom and triumph and a source of getting to their Canaan land in life. Some invested all their life savings and end of service benefits (Asekome&Agbonkhese, 2015). Little did they know they were sliding to the path which lead to financial doom! An expected bubble greeted the emotion of investors, prices dwindled sharply, putting investors into frustration and financial quagmire. Indeed, the investors were duly rewarded in a negative manner. The investors reaped the painful consequences associated with herd mentality and blind imitation.

2.3 Causes of Bubbles Occurrence in the Stock Market

Bubbles are a part and parcel of financial market of the world. Bubbles do snowball into explosive price growth in the financial market. Bubbles are driven by both behavioural and non-behavioural factors. Behavioural factors have the likelihood of causing boom and bust in asset prices in the stock market. Stock market is always not efficient. Inefficiency in the stock market tends to promotes transaction costs such as asymmetric information and low transparency (Ogbeide &Eburajolo, 2021).

Information concerning securities trading may not be equally and freely available to investors and other participants in the stock market. Occurrence of this leads to the increase in the cost of getting better, current and profitable information (Iliyasu, et al. 2018). This results to herding behaviour by investors in that they may resort to copying the trading strategies of other market participants with the notion and belief that those participants are best informed and sophisticated (Porras, 2016; Guney, Kallinterakis& Komba, 2016).

Guney, Kallinterakis and Komba (2016) assert that this herding behaviour by investors could be within a market, among markets in the same economy or across international boundaries. Given these occurrences, it appears stock market bubbles are at variance with the random walk theory and efficient market hypothesis of Fama (1970).This is because price oscillations instead being in random form are either upward or downward trending when the financial bubbles are rising or falling before eventual crashes of the stock market. Albeit, Kindleberger (2000) succinctly juxtaposed that high stock prices that fail to crash are not in themselves bubbles but crashes only while other likely occurrence of it is mere stock prices depression.

Aigbovo and Ezuem (2018) categorized behavioural factors of financial bubbles into three, namely, self-fulfilling expectations, mispricing of fundamentals and the endowment of irrelevant explanatory factors with asset prices values. Self -fulfilling expectations leads to rational bubbles. Rationale bubbles occur when stock price rise significantly high, giving hope to investors that such price escalation will remain so infinitesimally into the future which affords them to sell the asset to make huge profits. They believed that such asset price escalation when bursts would enable demand for higher returnbecause of the risks emanating therefrom.

Mispricing of fundamental results to intrinsic bubbles: This happens when investors deliberately and persistently wrongly assess intrinsic value of assets (Floot& Obstfeld, 1991). Intrinsic bubbles most often cause asset pricing to rise very high for a considerable period of time and later crashes because of information dynamics. Intrinsic bubbles come from the risks investors face because of uncertainty in the immediate environments. Persistent overreaction that occurs after dividend news is an indication of intrinsic bubbles. Extrinsic rationale bubble is as a result of occurrence of uncertainty which makes investors to wrongly attach asset pricing values to factors considered as independent and which have significant effect intrinsic values.

Non-behavioural factors inducing bubbles are mainly macro-economic fundamentals such as exchange rate volatility, persistent swirl in inflation rate, reduced interest which attracts

liquidity trading, foreign direct investments and foreign portfolio investments inflows. These non-behavioural factors are potential causal factors of swings in stock prices of assets like shares and bonds in the capital markets within in an economy and across international boundaries. **Expansionary monetary policy may engender a bubble:** This may determine how Central bank's efforts to raise or lower short-term interest rates. When interest rates are very low regardless of the mechanism by which it is accomplished, investors tend to avoid putting their capital into savings accounts. They increase their capital by borrowing from banks to invest in financial assets like as stocks and real estate. This action in a short run heats up the market because of the demand for higher gain and the eventual declining of it leads to market crash.

2.4 Testing for Bubbles in the Stock Market

The existence of bubbles and deviation of asset prices from the intrinsic values in the stock market have been determined over time literature through varying estimation methods. Two common methods in literature for determining asset price bubbles and volatility are stationarity test and volatility test (see Diba and Grossman, 1987; Boubaker et al. 2007, Aigbovo et al. 2017; Iliyasu et al. 2018). The preliminary unit root tests are essential to determine existence of rational speculative bubbles. According to Aigbovo et al. (2017), the stationarity test is important because it provides an easy model to determining the presence of asset bubbles by checking the unit root property of the asset series. Diba and Grossman (1987) emphasized the relevance of stationarity tests in checking for rational bubbles in the stock market. In their perception, absence of unit root test result at level and first difference indicative an explosive rational bubble fails to occur. On the other way round, bubbles are replete in asset, if prices are more explosive than dividends (Boubaker, Nguyem,& Taouni, 2007).

Co-integration technique is often used to analyze the variables of interest to ascertain the long run movement despite the existence of random movement, in which case, there is absence of deviation from fundamentals. Absence of co-integration connotes the presence of speculative bubbles a serious deviation from the fundamentals (Njiforti&Akaolisa, 2010; Wang & Wen, 2010). If prices variability actually shows on the value of asset like share price in the stock exchange, a co-integration should be expected between dividend and share price. However, Shiller (2003) states that if dividend and stock prices refuse to co-integrate, it then suggests evidence of a bubble. But if a co-integration is observed between the stock price and dividend, it would imply there is absence of bubbles.

It is a further revelation that there wasn't serious deviation from intrinsic. Evans (1991) outlined the effect of this affirmation of no bubbles arising from the co-integration method. The author states that these tests only detect permanent bubbles and fail to capture the collapse and then tendency it will restart. In assessing deviation from fundamentals and volatility, the Autoregressive conditional heteroscedasticity (ARCH) and generalized autoregressive conditional heteroscedasticity (GARCH) are very instrumental. The ARCH and GARCH are useful in determining the degree of volatility, persistence clustering and leverage effects arising from the swing (Aigbovo et al. 2017).

2.5 Empirical Review

Several researches have been conducted to test the validity of bubbles in varying stock markets of the world. For example, Khuaymai-Ngarm (2015); Rasekhi, Elmi and Shahrazi (2016); Greenaway, McGrevy and Phillips (2016); Deng, Girardin, Joyeux and Shi(2017), Esobari, Garcia and Metallado (2017); Iliyasu et al. (2018); Aigbovo, Ozekhome and Isibor(2017); Ogbeide and Eburajolo (2021) have sought to test bubbles occurrence in a country-specific basis with inconclusive results in literature. Asekome and Agbonkhese (2015) empirically investigated macroeconomic variables, stock market bubble, meltdown and recovery with evidence from Nigeria between 2007 and 2013. They used variables such as gross domestic product (GDP), money supply (M2), exchange rate (EXR), capacity utilization (CAU), and inflation (INFR) on All Share Index (ASI). The ordinary least square multivariate regression method was used to analyze the data. The result shows that these exogenous variables contributed to volatility of All Share Index in Nigeria under the period.

Omotosho and Inuwa (2009) in research carried out reported the persistent rise in portfolio investments inflows was one of the elements that led to the escalation and consequent collapse of the Nigerian Stock Exchange (NSE) prices on March 2008. Oloko (2017) in a study opines that the possible diversification gains offered by the Nigerian Stock Exchange (NSE) for US and UK investors spread financial bubbles from US and UK stock markets to Nigeria. Kighir (2009) in empirical study reported that the Nigerian Stock Exchange (NSE) Market all share – index (ASI) loss 67.67% of its value from March 2008 to 27th April 2009; Market capitalization after reaching N12.6 trillion in March, loss about 70% (Gwarzo, 2016). According to the World Bank (2019) report, as a result of the Nigerian commercial banksheavy investment in the Nigerian Stock Exchange (NSE), their non- performing loans surged by 417.87% from 7.19% in 2008 to about 37.25% in 2009 and capital-asset ratio dropped by 77.28% from 17.95% in 2008 to 2009. This affirms the assertion of Iliyasu et al. (2018) that the bust of an asset price bubble is commonly accompanied by a financial crisis and resultant concomitant effects of wealth and output loss.

Iliyasu et al. (2018) carried out an empirical analysis of stock market bubble contagion with evidence from Nigeria. They employed monthly data on NSE- ASI and S & P 500 between 1995 and 2017. The result indicates that it took about five months for the bubbles contagion effect to spread to the NSE. The authors concluded that a sizeable percentage of the bubble episode experienced before March 2008 was influenced by bubble episode from the global stock markets. Aigbovo et al. (2017) investigated speculative bubbles in stock market with evidence from Nigeria using quarterly data in the period 2008Q1 to 2009Q4 on the variable such as All share index, (ASI), dividend and price dividend. They employed sequential analytical techniques ranging from unit root test and co-integration method to determine existence of random walks and fundamental deviation in asset prices in the period under reference. Similarly, the Generalized Auto Regressive (GARCH) models were used to determine the degree of volatility persistence, clustering and leverage effect emanating from such swings. The findings indicate evidence of speculative bubbles in the Nigerian stock market in the period considered. The authors also reported volatility persistence, asymmetric effects and a mean-reverting variance in the stock market of Nigeria.

Esobari, Garcia and Mellado (2017) sought to determine evidence of bubble occurrence across countries. They examined the association of bubbles in S &P500 of United State and 6 Latin American nations of Argentina, Brazil, Chile, Colombia, Mexico and Peru from 2005 to 2007. The study evidenced at least one explosive behaviour in countries like Brazil, Chile Colombia, Mexico, Peru and no evidence from Argentina market. The authors drew a conclusion that evidence of interdependence in the various countries' stock markets in the period of the bubbles were due to macroeconomic shocks. Daugherty and Jithendranathan (2015) averred in an empirical research found volatility spill-over from the United State markets to the African countries stock. Guney, Kallintherakis and Komba (2016) state that the financial bubbles effect from the United State was propelled through herding into Nigeria and Kenya. Christensen and Anderson (2015) empirically investigated the effect financial bubbles occurrence for about twenty- three nations of Latin America, Asia, Europe, Australia and United State from 1970 to 2015. The result shows absence of financial bubbles in the countries' stock market.

Austin (2016) used a price-to-earnings ratio test adapted from MalteVonMaravic model to test the existence of a bubble. The study used the risk-to-price earnings ratios of equities to test for bubble occurrence. The study finding indicates dot-com bubble and other three bubbles with less significance confidence. Olowe (2009) sought to know the association between share price returns swingsin Nigeria using the E-GARCH –in-mean model during financial sector reforms and stock market crash. The finding evidenced a nexus between stock returns and fluctuations in the Insurance sector reform while the global financial crisis had no effect on share price returns. Boubaker, Ngyuyen and Taouni (2007) empirically determine if speculative rational bubbles were common to the Tunisian stock market using data of listed firms from 1971 to 2005. Stationarity test (Augmented Dickey Fuller and Phillip-Perron tests) and co-integration techniques were used as estimation methods. The study evidenced an occurrence of intrinsic asset bubbles in the reference period. Humpe and Zakrewski (2019) empirically a temporary stock market bubbles with further evidence from Germany between 1973 and 2014. The result indicates no statistical evidence of a bubble temporary bubble in the German stock market in the reference period. From the literature reviewed, it is clear the studies have not empirically tested the existence and likelihood of speculative bubblesusing foreign portfolio inflows and remittances inflows. This research seeks to bridge this gap by assessing if the bewildering rise in remittances inflows in recent times and drastic fall in foreign portfolio inflow values in Nigeria are speculative bubble driven and influenced.

3.0 METHODOLOGY
3.1 Data
This study used the ex-post facto research design. Time series data were obtained from the World Bank Indicator and the Central Bank of Nigeria (CBN) statistical bulletin, various issues. Data on foreign portfolio inflows (FPI) and remittance inflows were collected from the stated secondary sources. Leaning on the estimation procedures of rational (speculative) bubbles in the studies of Diba and Grossman (1987, 1988); Boubaker, Nguyem and Taouni (2007), and Aigbovo et al. (2017);Ogbeide &Eburajolo (2021); this study employed the Stationarity test of Augmented Dickey and Fuller (1987) test and the co-integration technique of Engle and Granger (1987) to determine if the crash in foreign portfolio in the Nigerian

capital market was speculative bubble driven and the surge in remittance inflows in recent times is possibly bubble influenced in Nigeria.

3.2 Unit Root Test

A unit root test is used to determine if variables of interest are stationary. The principal unit root test commonly employed to determine the stationarity of variables are the Augmented Dickey Fuller (ADF) test and the Philips- Perron (PP) test. The Augmented Dickey-Fuller t-statistic (ADF) tests the null hypotheses that the variables of interest in this study have a unit root. The unit root test are first carried out at level and then followed by at first difference subject to results obtained. The hypothesis tested is stated in a null form and represented by the equation:

$$\Delta Y_{t} = \alpha_0 + \gamma Y_{t-1} + \alpha_2 t + \sum_{i=1}^{p} \emptyset \Delta Y_{t=1} + \varepsilon_i \qquad \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \ (1)$$

H_0:   The series does have unit root test

Thus, the selection criterion applicable is that when the value of the ADF test statistic is greater than the critical value at the 1% or 5% levels of statistical significance, the null hypothesis (H0) is rejected, thus implying the absence of a unit root. This would suggest that the variable of interest is stationary. On the other hand, if the ADF test statistic value is less than the critical value at the 1% or 5% level, the null hypothesis cannot be rejected, portraying that the presence of a unit root test and hence the variable of interest is not stationary. Therefore, the unit root test is conducted to determine the stationarity of the series so as to avoid spurious result through the use of Augmented Dickey-Fuller test. The estimation exercise implemented using E-views 8.0 package.

3.3 Johansen and Juselius Co-integration

Co-integration shows the long run relationship (co-movement) between variables. According to Sulaiman and Migiro (2019), the existence of co-integration implies that variables trend collectively over a long period of time. The condition upon which this test is premised is that the trace statistics and Eigen values should be greater 0.05 Mackinnon critical value for co-integration to hold.

4 Empirical Analyses
4.1 Unit Root Analysis
Table 1: Augmented Dickey Fuller (ADF) Statistics Unit Root Tests

Variables	ADF Test Statistics at Level		ADF Test Statistics at 1st Difference	
	t-ADF	P- value	t-ADF	P- value
FPI	-3.212696	0.9856	−3.212696	0.0000
REMITR	-2.971853	0.4384	-3.612199	0.0055

Source: Researcher's Computation, 2022 from E-view 8.0 version

At 5 per cent significant level, the result of the ADF unit-root tests provide very strong evidence of presence of unit root for all the variables, foreign portfolio inflows (FPI) and

remittance inflows. It is suggestive that the variables are not stationary at levels, portending existence of significant deviation from the fundamentals. This is a further reflection of speculative bubble of these financial assets in the reference period. But at first difference, remittance inflows (REMITR) and foreign portfolio inflows (FPI) displayed a stationarity result which implied the series are difference-stationary. The empirical result is a clear demonstration of speculative bubble appearance in these financial asset variables in the Nigerian capital market. The finding is consistent with Aigbovo et al (2017); Iliyasu et al (2018) where they confirmed occurrence of speculative bubbles of financial prices in the Nigerian stock market. The increasing values of migrants' remittance inflows in recent times in Nigeria may not be unconnected with the crave for greener pastures and consequent repatriation of funds to enhance family consumption and effectuation of capital projects like building hospitals, hotels, schools and other income generating business. Behaviourally, this has linkages with belief, mindset and herd mentality of get-quick syndrome of persons in the Nigerian contemporary society.

4.2 Co-integration Analysis
Table 2: Co-integration Test Result

Hypothesis	Trace statistics	Critical value at 5%	Maximum Eigen value	Critical values at 5%
R = 0	7.245875	15.49471	6.346609	12.26460
R ≤ 1	0.899266	3.841466	0.899266	3.841466

Source: Researcher's Computation, 2022 from E-view 8.0 version

Following establishment of the non-stationarity of time series in their levels and consequent confirmation of speculative bubble occurrence in the variables (remittance inflows and foreign portfolio inflows), this subsection seeks to establish if the variables are co-integrated. The trace test and maximum eigenvalue are employed. The result of the co-integration as presented in table 2, indicates no co-movement between the variables of interest used in the study. The finding is a further substantiation of the existence and likelihood of financial asset bubbles in the context of the Nigerian capital market. This perhaps, is largely influenced by market inefficiency, asymmetric information and other activities that could be sunspots driven in nature.

5. CONCLUSION AND RECOMMENDATIONS
This study conceptually assessed literature on sunspots and empirically investigated the existence of speculative bubbles with evidence from the Nigerian capital market. The confirmed the existence of speculative bubbles of the financial assets in the Nigerian capital market. Premised on the finding, the study recommends that investors in the capital market need to take caution in their investment decision regarding portfolio/securities in order to avoid loss of wealth and output. Investors should always understudy markets trends and the causes in an economy prior to committing their financial resources as this could save them from the consequences of losing their wealth in risky assets whose prices may or may not fundamentally be driven in the financial market.

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