IMPACT OF MARKET LIQUIDITY ON INVESTOR HERD BEHAVIOR IN THE NIGERIAN STOCK MARKET: 2007 – 2017

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ABSTRACT

This paper studies the nature and extent of investor herding, as well as the role of asset liquidity in herd formation in the Nigerian Stock Market. Using daily data for the period 2007-2017, the paper applies the market returns dispersion approach on 29 listed stocks across six sectors (agricultural, banking, building materials, conglomerate, insurance, and petroleum marketing sectors) traded on the Nigerian Stock Exchange (NSE) to detect the presence of investor herding behaviour. Bivariate vector autoregressive (VAR) model, and a pairwise Granger causality tests were employed to analyze the relationship between herding and asset liquidity. Results show significant evidence of investor herding behaviour in 12 out of the 29 assets spread across the six sectors, and significant evidence of adverse herding in eight other assets. Asset liquidity was found to exert a significant impact on herd formation. In general, investors were found to herd more under the condition of high and medium liquidity, in line with previous findings. Results of variance decomposition analysis indicate that the variance of the average equity market liquidity is affected by return clustering. This effect is most pronounced in petroleum marketing sector. Given the potential adverse effects of herding, especially in bubble formation, regulators could reduce the incidence of irrational herd formation by improving the flow, and reducing the cost, of information in the market.

Keywords: Herding, Liquidity, Stock market, Nigeria.
JEL Classification: G02, G14, G15

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I. Introduction

Equity markets play critical roles in emerging market economies. They provide the institutional platform necessary for bridging the long-term financing gap of the somewhat bourgeoning industrial and commercial activities that support the economy's material progress. An efficient equity market bridges this gap by guaranteeing optimal valuation of risks associated with long-term financing, continuously, thereby attracting investors. An efficient market, therefore, continuously delivers prices of financial assets that reflect not only the fundamentals but also associated macroeconomic news and information that investors consider as important to the determination of asset returns. This is as a result of the investors atomistically attempting to continuously optimise, each searching for, and incorporating, every available information when placing their bids or asks. The extent to, and the condition under which investors acquire and incorporate the relevant information before investment decision, therefore, has an important implication on the efficiency of the market outcome (pricing, trading volume and returns).

Under the condition of increased economic uncertainty, dearth of analyst and/or earnings forecasts, a significant deviation of equity prices and returns from their fundamentals could occur. Irregular and late releases of relevant information by listed firms (e.g., their sales figures, revenue forecasts, etc.), especially under the condition of macroeconomic uncertainties could be an important cause of the ineffectiveness of analyst advice, thereby causing daily investment decisions to be based on other influences. Such other influences include investor herding, which refers to the tendency of investors to copy the actions of other investors instead of relying on private information.[1] Herding can therefore, result for several different reasons (including absence or high cost of analyst and earnings forecasts, for instance).[2] Herding in financial markets happens when a group of investors trade in the same direction over a period of time (Nofsinger & Sias, 1999). In this case, they alter their individual private beliefs to correlate more closely with the publicly expressed opinion of others (Cote & Sanders, 1997).

Herding behaviour in financial markets is not exclusive to investors. There is ample evidence of analysts herding (see, for instance, Graham, 1999; Cote & Sanders, 1997; Hong et al., 2000; Ashiya & Doi, 2001; Welch, 2000). Although the reasons behind herding behaviour are diverse (Spyrou, 2013), informational reasons appear to be important. Investor herding behaviour, therefore, is potentially an important feature of emerging stock markets, including Nigeria's, in which information is not only scarce and costly but is also operating under macroeconomic uncertainty.

Pervasive investor herding in financial markets has a number of significant adverse economic implications, making it an important concern for market regulators. For

[1] Indeed, herding theory is rooted in Keynes' (1930) *Treatise on Money*, where *herding behaviour* is conceived to be a response to uncertainty and individuals' perceptions of their own ignorance. Keynes argues that people may follow the crowd because they think that the rest of the crowd is better informed. This, according to him, can generate instability, and in financial markets, herding is a key factor generating speculative episodes (Badderlay, 2010).

[2] Cote & Sanders (1997) found that forecast ability is inversely related to herding behaviour. This implies that investors in markets that are characterised by low forecast ability (manifested in earning forecast inaccuracy, high costs, unavailability, and general unreliability) can be expected to have high investor herding.

instance, it has been argued that herding in markets may sometimes destabilise prices[3] and lead to bubble-like episodes in financial markets (Spyrou, 2013), which in turn could lead to substantial welfare losses when these bubbles burst. Chang (2010) argues that the herding behaviour he detected involving local investors copying qualified institutional foreign investors in emerging markets can be destabilising since asset prices initially overshoot and later revert.

Given the prevalence of empirical evidence of herding during financial crises (e.g., Kabir, 2017; Galariotis, Krokida, and Spyrou, 2015; Economou, Kostakis & Philippas, 2011; and Bowe & Domuta, 2004), this tendency of herding to produce or feed bubble-like speculative investment episodes, raises a question relating to its potential to cause financial crisis, especially in less developed financial markets.[4] During the past decades, herding behaviour has received much attention from both academics and practitioners. Most of the large theoretical and empirical works on herding concentrate on studying herding behaviour in the European, Asian and the US's financial markets, with little attention given to African markets. The literature, therefore, as noted by Spyrou (2013), has comparatively little about investor herding in markets other than the major equity markets.

This paper adds to the literature by providing empirical evidence on investor herd formation in the Nigerian stock market, a market that is relatively ignored in herding literature. Studies on the Nigerian stock market are, surprisingly, yet to analyse investor behaviour in the stock market in the light of group mentality, despite the glaring imperative, including the speed and pattern of its growth since the turn of the 21st century. For instance, in 2007, Standard & Poor's (S&P) described the Nigerian equity market as the fastest growing in the emerging markets. Four key developmental issues are central here: first, the Nigerian capital market was transformed by the far-reaching reforms across some of the sub-sectors listed on the Exchange between 2004 and 2007. Accordingly, market capitalisation increased from N1.4 trillion in 2004 to N10.2 trillion in 2007, an annual growth of over 66% (SEC, 2009). Between 2005 and 2007, the recapitalisation of banks and insurance companies raised over $10 billion in new issues, thereby increasing market capitalization. Secondly, the enactment of the Pension Reform Act of 2004 triggered strong growth in annual contributions to pension funds, some of which were invested in the market. The third is a set of three events that led to improved national sovereign credit profile and international investors' confidence in the Nigerian capital market. These events include the implementation of national economic and financial reforms; the elimination of sovereign debt owed to the Paris Club; and the accompanying growth in foreign reserves position. These achievements encouraged companies in other sectors also to approach the capital market to raise equity to fund the growth and expansion of their businesses. Such growth, for instance, stimulated by the successful consolidation of the banking and insurance sectors, built domestic and

[3] Gutierrez & Kelley (2008) computed a herding measure based on the LSV measure using data between 1980 and 2005 and found that buys herd tend to destabilise prices but sell herds stabilise prices.

[4] In particular, herding behaviour may result in more optimistically biased earnings estimates and reduced perceptions of risk. Consequently, investors may earn abnormally low stock returns because of this misperception and the associated increased uncertainty about earning streams (Olsen, 1996).

foreign investor confidence and generated unprecedented interest and participation in the stock market.

Against this background, this paper aims to investigate the presence of investor herding behaviour in the NSE and the role of market liquidity in herd formation. The rest of the paper is organised as follows. Section II reviews the theoretical and empirical researches on herding behaviour. Section III outlines the theoretical framework and describes the empirical methodology of the paper. Section IV conducts the empirical estimations and discusses the findings, while section V concludes the paper and proffers some policy recommendations.

II. Review of Theoretical and Empirical Literature

The diverse theoretical models used in explaining herding behaviour in financial markets can be broadly classified into two groups. The first group is of those theories that view herding as rational or near rational behaviour, while the second group of models views herding as irrational behaviour.

According to Spyrou (2013), the theoretical literature fails to provide for the interplay between the various sources of herding. Secondly, empirical evidence is inconclusive on the presence of herding, such that some studies found limited evidence of institutional investor herding while others find some evidence of the opposite behaviour that institutional investors predominantly exhibit anti-herd behaviour. Thirdly, the key empirical methodologies used in measuring herding behaviour have limitations that could reduce our understanding of the process of herd formation. For example, while Bikhchandani & Sharma's (2000) distinction between spurious herding (where investors take similar investment decisions because of similarity of information) and intentional herding (say, because of information cascades, or in order to preserve reputation or protect remuneration) is theoretically important, the key methodologies often fail to enable empirical implementation

The group of theories that views herding as a rational investment decision under certain circumstances tend to argue that money managers may copy the actions of other fund managers in order to preserve reputation or compensation or both. Individual analysts, analogous to a bank run situation, know that if they deviate substantially from what appears to be a market consensus, may lose (due to the principle of self-fulfilling prophecy) and may be fired. Hence, they will ignore whatever private information they have and herd with the market consensus. Herding is, in this case, therefore, a rational decision, which is intentional. It may, however, lead to inefficient outcomes, increase market fragility, produce excess volatility, and raise systemic risk. Spurious herding, which results from investors taking similar decisions because of the similarity of information on the fundamentals, may lead to efficient outcomes (Kabir, 2017; Spyrou, 2013; Bikhchandani & Sharma, 2000).

There are a number of elegant theoretical models suggesting that herding can be rational but lead to a socially inefficient outcome. For instance, the reputational-based learning model of Scharfstein & Stein (1990) used the labour market to demonstrate that reputational concerns of a manager may lead to rational but socially inefficient herd

behaviour. To the manager, herding is insurance against underperformance. Graham (1999) shows that when public information strongly contrasts the analysts' private information, analysts with high reputation have the incentive to hide under market consensus, hence herd to protect their reputation. However, those with low ability are more likely to herd with the consensus. Froot, Scharfstein & Stein's (1992) model of positive information spillover explains the basis of herding by speculators that have a short trading horizon. It demonstrates that it is rational for such speculators to try to learn what other investors know instead of allocating resources to search for private information, which requires time. As the number of such speculators that acquire this information (even of poor-quality) rise and such information become fully disseminated in the market, it becomes profitable for those speculators that acquired this information earlier.

The informational cascades models show that it is optimal for investors to disregard their private information and follow the observable actions of others before them. Investors that enter the market later may, for instance, mimic the trading behaviour of the investors that enter the market earlier, inferring that the earlier investors have private information. Similar to Froot, Scharfstein & Stein's (1992) model of positive information spillover, the implication of the informational cascade may influence the investment decision of perfectly rational investors and can lead to the creation of bubble-like episodes. Using a general sequential choice model, Bikhchandani, Hirshleifer & Welch (1992) show that where a decision maker acts only on the information obtained from previous decisions, ignoring private information is entirely rational, despite the possible undesirability of the social outcome.

The class of theoretical models that view herding as irrational behaviour show that investors or a subset of investors are irrational and their actions may produce herd behaviour and bubble-like episodes in financial markets. As Baddeley *et al.* (2004) demonstrated, in the presence of information scarcity, asymmetry and the employment of standard heuristic rules, even experts may resort to herd behaviour (Spyrou, 2013). Shleifer & Summers (1990) show how the actions of rational arbitrageurs influence noise traders to herd irrationally.[5] In this model, herding generates irrational price bubbles.

The empirical literature on herding behaviour can be grouped into those that investigate herd behaviour by institutional investors, such as Koetsier & Bikker (2017), Lakonishok, Shleifer & Vishny (1992) and Sias (2004) among others, and those that employ market price data using the rational asset pricing to detect deviations from rationality. These include studies such as Christie & Huang (1995) and Chang, Cheng & Khorana (2000) among others. These studies primarily focused on the potency of herding behaviour on stock markets and reported mixed findings in support of herding behaviour (Bekaert, Ehrmann, Fratzscher, & Mehl, 2012; Kabir, 2017 Galariotis, Rong, & Spyrou, 2015).

Empirical evidence on the presence of herding is inconclusive, such that some studies found limited evidence of institutional investor herding while others find some evidence

[5] Under such conditions, some shifts in investor demand for assets and changes in investor sentiments appear to be irrational. Such conditions are generated, say, where a fraction of investors herd and the rational arbitrageur's herd because it is rational at that time. The effect of the higher demand for assets raises the return away from fundamentals, which then attracts more irrational noise traders, taking the prices further away from fundamentals. At this point, the rational arbitrageurs exit the asset when prices near the top to take profits.

of the opposite behaviour showing that institutional investors predominantly exhibit anti-herd behaviour. Numerous empirical studies have attempted to understand herding behavior in financial markets including, Babalosa & Stavroyiannisb (2015), Banerjee (1992), Cakan, Demirer, Gupt & Marfatia (2017), Hwang & Salmon (2004), Shleifer & Vishny (1992), Patterson & Sharma (2007), Wermers (1999), Chang, Cheng & Khorana (2000), Duasa & Kassim (2008), Kabir, (2017), Guney, Kallinterakis & Konba (2017), Koetsier & Bikker (2017) and Galariotis, Rong & Spyrou (2015). Most of the empirical studies analyse herding behaviour and its implications in developed markets. The studies that aimed at detecting the herding behaviour in the developed markets produce mixed evidence. For instance, Lakonishok, Shleifer & Vishny (1992) analyse the tendency of the pension funds managers to herd using the US data and found no evidence of herding. Patterson & Sharma (2007) found no evidence of market-wide herd behaviour on the NYSE.

On the contrary, Hwang & Salmon (2004) provide supporting evidence of the presence of herding behaviour in developed stock markets (USA and South Korean Markets). Wermers (1999) analyses the propensity of mutual funds managers toward herding in the USA stock market and provides evidence that weakly supports the presence of herding behaviour. One issue that is increasingly becoming important in the herding literature is the role of asset liquidity in herding formation. It is argued that herding is more likely to occur under the condition of high liquidity. This is because speculative and noise traders, as well as institutional investors, prefer to herd in assets with high liquidity. Galariotis, Krokida & Spyrou (2015) demonstrated that investor herding is more detectable under the condition of high liquidity.

Almost all the studies that aimed at detecting the presence of herding behaviour in the developing stock markets support that herding is persistent in the emerging stock markets. Chang, Cheng & Khorana (2000) document the presence of the herding behaviour in the stock markets of South Korea and Taiwan. Hwang & Salmon (2004) also provide supporting evidence of the presence of the herding in the stock market of South Korea. Baek (2006) argues that different forces drive investments in Asia and Latin America. In Asia, investments are driven by investors risk appetite and market mood, which explains the significantly high volatility of Asian stock markets), while in Latin America, portfolio investments are very sensitive to the fundamentals. Chen, Rui & Xu (2003) found that herding exists in the Chinese market for A- and B- shares separately. Duasa & Kassim (2008) present the evidence of herding for capital market in Malaysia. My & Truong (2011) found that in Vietnamese stock market, herding behaviour of investors was asymmetric, conditional on the direction of the market movement. Most of the studies that aimed to investigate the existence of the herding in developing markets are done for Asian countries. Chaudhary & Sam (2018) found that, increasingly, herding behaviour has significantly contributed to the declining value of accounting information in the Karachi Stock Exchange. Qasim et al. (2018) also found evidence of herding in Pakistan. This implies that it is incorrect to make conclusions about the presence of herding behaviour in the developing stock markets based on only evidence from the Asian countries (Inna, 2009).

III. Data and Methodology

The data used in this paper are of daily prices for twenty-nine (29) stocks listed on the NSE, across six sectors for the period January 2007 to November 2017 as summarised in table 1.

Table 1: Sample size across sectors

S/N	Industry (no. of Firms)	Data Span		Total Observations
		From	To	
1	Agriculture (3)	Jan. 4, 2007	Nov. 30, 2017	2412
2	Deposit banks (9)	Nov. 27, 2007	Nov. 30, 2017	2413
3	Building & Construction Materials (3)	Jan. 4, 2007	July 7, 2017	2547
4	Conglomerate (4)	Jan. 4, 2007	Nov. 30, 2017	2669
5	Insurance (6)	Nov. 29, 2010	Nov. 29, 2017	1620
6	Petroleum Marketing (4)	Jan. 4, 2007	Nov. 30, 2017	2652

The data was obtained from NSE and was transformed into a time series of continuously compounded returns R_t, calculated as:

$$R_{i,t} = \log(p_t) - \log(p_{t-1}) = \log\left(\frac{p_t}{p_{t-1}}\right), \quad (1)$$

Where p_t and p_{t-1} are the index values at times t and t-1. The market return is an equally weighted average of individual returns.

To test the existence of herding behaviour in the Nigerian stock market, this paper uses the methodological approach proposed by Chang, Cheng & Khorana (2000) and Tan, Chiang, Mason & Nelling (2008). This approach views herding as more likely to occur during market turmoil when, due to uncertainty and noise, market participants are more likely to conform to market consensus. Thence, individual returns will tend to cluster around market return thereby reducing dispersions. By examining the nature of dispersion of returns, herding amongst investor could be detected. Chang, Cheng & Khorana (2000), therefore, proposed the following model relating market return and its dispersion as a means of detecting herding amongst investors:

$$CSAD_t = \alpha + \gamma_1 \left| R_{m,t} \right| + \gamma_2 R_{m,t}^2 + \varepsilon_t \quad (2)$$

Where $CSAD_t$ is the cross-sectional absolute deviation of returns, which measures the return distribution. It is obtained from equation (3):

$$CSAD_t = \frac{1}{N} \sum_{i=1}^{N} \left| R_{i,t} - R_{m,t} \right| \quad (3)$$

Where, N represents the number of stocks; $R_{m,t}$ is the cross-sectional average return on N stocks at time *t;* and $R_{i,t}$ is the return on stock *i* at time t.

If the coefficient on the linear part of the model (i.e., γ_1) in equation (2) is found to be positive and statistically significant, then it validates the assumptions underlying the rational asset pricing models, suggesting that the relation between market portfolio return and asset return dispersion is linear and increasing. Hence, implying a linear relationship between $CSAD_t$ and $|R_{m,t}|$. On the contrary, if the coefficient on the non-linear part (i.e., γ_2) is statistically significant, two cases arise depending on its sign. First, if the coefficient is negative, herding behaviour is detected. Second, if the coefficient is positive, then, adverse herding[6] is detected.

Measuring Liquidity

As noted earlier, the influence of asset's liquidity on herding behaviour is increasingly recognised in the herding literature. Studies such as Galariotis, Rong & Spyrou (2015), Hur, Chung & Liu (2018), and Hur & Chung (2018) empirically recognize this by conditioning the Herding Model of Chang, Cheng & Khorana's (2000) on Karolyi, Lee & Van Dijk's (2012) measure of illiquidity. They found that this conditioning has improved the model's ability to uncover evidence of herding. The theoretical basis for the inclusion of liquidity is the belief that liquidity helps predict equity returns and that state of the market environment has an influence on investors' herd behaviour. In general, it is expected that herding thrives better under the condition of high market liquidity.

In this paper, we use Amihud's (2002) measure of illiquidity and take into account the sensitivity of price response to the trading volume. Following Galariotis *et al.* (2015), therefore, we construct the liquidity of a given stock as equation (4), while the average market liquidity as defined in equation (5):

$$Liq_{i,t} = -Log\left(1+\left(\frac{|R_{i,t}|}{P_{i,t}VO_{i,t}}\right)\right) \tag{4}$$

$$Liq_{m,t} = \frac{1}{N}\sum_{i=1}^{N} Liq_{i,t} \tag{5}$$

Where: $R_{i,t}$, $P_{i,t}$ and $VO_{i,t}$ are the return, price and trading volume of ith stock at time t. Equation (6) allows testing of herd behaviour *conditional on the level of*

[6] According to Gębka and Wohar (2013), adverse herding occurs when investors overemphasise their own view or focus on views dominant among a subset of actors, who may herd jointly moving in and out of positions, excessively ignoring market information. This results in increased dispersion in returns across assets

liquidity by augmenting equation (2). We, therefore, follow Galariotis *et al.* (2015) to estimate it in the following form:

$$CSAD_t = \alpha + \gamma_1 \left| R_{m,t} \right| + \gamma_2 R_{m,t}^2 + D_1 \gamma_3 R_{m,t} + D_2 \gamma_4 R_{m,t} + \varepsilon_t \quad (6)$$

Where: D_1 and D_2 are dummy variables constructed based on the extent of the liquidity estimated. D_1 takes the value of 1 if liquidity lies in the upper 25% of the distribution and zero otherwise; D_2 takes the value of 1 if liquidity lies in the lower 25% of the distribution and zero otherwise. A statistically significant and negatively signed γ_2 indicates herding during *medium* liquidity; γ_3 captures herding during high liquidity; while γ_4 captures herding when liquidity is low.

Further Supplementary tests

To further ascertain the relationship between market liquidity and herding, variance decompositions of CSAD and Market Liquidity measures are estimated from an unrestricted Vector Autoregressive (VAR) model of the two variables. In addition, Granger Causality tests are conducted specifically to provide evidence on whether market liquidity causes herding behaviour of investor, or vice-versa. We performed Granger causality tests by using the standard methodology proposed by Granger (1969 & 1986) and Engle & Granger (1987). The following equations were estimated:

$$\Delta y_t = \alpha + \sum_{i=1}^{k} \delta_i \Delta y_{t-1} + \sum_{i=1}^{k} \beta_i \Delta x_{t-1} + \varepsilon_t \quad (8)$$

$$\Delta x_t = g + \sum_{i=1}^{k} \delta_i \Delta x_{t-1} + \sum_{i=1}^{k} \beta_i \Delta y_{t-1} + \omega_t \quad (9)$$

F-test for the joint insignificance of the coefficients β_i & γ_i, $i = 1...k$ is then performed. For each pair of equity liquidity and return clustering, say x_t & y_t, we performed two Granger causality tests in order to identify unilateral causation (x_t causes y_t *or* y_t causes x_t), bilateral causation (x_t causes y_t *and* causes x_t) or no causation.[7]

IV. Empirical Results and Discussion of Findings

Preliminary Analysis

Our empirical analysis begins with the estimation of the various measures of dispersion, CSAD, for each stock in the six sectors under study. These are shown in Figures 1A to IF in

[7] The application of Granger test critically requires that the lag lengths applied in the OLS regression are optimal (Hamilton, 1994; Gujarati, 2004; Wooldridge, 2006). We addressed this by testing for lag lengths within an autoregressive framework for each variable and using various lag length selection criteria (see MacDonald & Kearney, 1987; Lyons & Murinde, 1994).

the Appendix. A cursory look at the CSAD plots suggests that variability of dispersion appears to be fairly spread across the sample period, except for a few stocks (which are shown in figures Cross-Sectional Dispersion)

Table 2A: Descriptive statistics for the computed $CSAD_t$

PANEL A

	AGRICULTURE			BUILDING MATERIALS		
Statistic	Livestock	OKOMUOIL	PRESCO	AshakaCem	CCNN	WAPCO
Mean	3.92E-06	3.09E-06	3.31E-06	2.81E-06	2.96E-06	2.60E-06
Median	3.44E-06	2.58E-06	2.72E-06	2.20E-06	2.29E-06	2.05E-06
Max.	4.65E-05	9.17E-05	8.00E-05	3.30E-05	3.35E-05	6.31E-05
Min.	***0***	***0***	***0***	***0***	***0***	***0***
Std. Dev.	3.19E-06	3.53E-06	3.44E-06	2.73E-06	2.84E-06	2.94E-06
Skewness	2.182569	8.57579	6.297103	1.962922	1.842967	7.073707
Kurtosis	22.05088	182.5444	115.8343	12.49724	12.3043	127.3767
Obs.	2411	2411	2411	2544	2544	2544

PANEL B:

	BANKING								
Statistic	Diamond	Fidelity	GTB	UBA	Zenith	SKY	IBTC	Sterling	WEMA
Mean	3.93E-06	3.49E-06	2.88E-06	3.56E-06	3.01E-06	3.46E-06	3.20E-06	4.16E-06	4.14E-06
Median	3.05E-06	2.82E-06	2.11E-06	2.58E-06	2.15E-06	2.57E-06	2.36E-06	3.25E-06	3.29E-06
Max.	2.19E-05	3.88E-05	5.49E-05	6.50E-05	6.45E-05	1.82E-05	6.33E-05	2.51E-05	1.97E-05
Min.	***1.78E-09***	***6.47E-10***	***1.45E-10***	***1.14E-09***	***5.08E-10***	***8.35E-10***	***6.19E-10***	***1.23E-09***	***1.12E-09***
Std. Dev.	3.33E-06	2.92E-06	2.96E-06	3.80E-06	3.12E-06	3.04E-06	3.08E-06	3.43E-06	3.47E-06
Skewness	1.284702	1.862473	4.820628	4.863939	5.196096	1.336497	4.249003	1.130591	1.175203
Kurtosis	4.800714	13.54651	61.34159	54.85137	75.75764	4.982961	65.09946	4.422722	4.526819
Obs.	2410	2410	2410	2410	2410	2410	2410	2410	2410

PANEL C

	INSURANCE					
Statistics	ALLCO	ContInsure	CostodyIns	NEM	Mansard	SUNNIS
Mean	5.52E-06	4.58E-06	5.15E-06	5.15E-06	5.34E-06	5.04E-06
Median	4.26E-06	0.000000	3.65E-06	4.12E-06	3.92E-06	3.42E-06
Max.	3.03E-05	0.000618	2.92E-05	2.73E-05	3.05E-05	3.76E-05
Min.	***0.000000***	***0.000000***	***0.000000***	***0.000000***	***0.000000***	***0.000000***
Std. Dev.	4.75E-06	5.30E-05	4.71E-06	4.36E-06	4.55E-06	4.98E-06
Skewness	1.386992	11.48582	1.364796	1.165647	1.081664	1.866400
Kurtosis	5.428245	132.9241	5.018863	4.654314	4.253760	7.749865
Obs.	1619	1619	1619	1619	1619	1619

PANEL D

	PETROLEUM MARKETING				CONGLOMERATE			
Statistics	CONOIL	MOBILE	OANDO	TOTAL	PZ	TRANS	UACN	UNIL
Mean	2.40E-06	2.39E-06	3.28E-06	2.29E-06	2.95E-06	3.42E-06	2.65E-06	2.70E-06
Median	1.60E-06	1.72E-06	2.30E-06	1.70E-06	2.05E-06	2.64E-06	1.95E-06	2.00E-06
Max.	1.66E-05	3.12E-05	4.98E-05	1.66E-05	3.06E-05	3.77E-05	2.90E-05	1.91E-05
Min.	***0.000000***	***0.000000***	***0.000000***	***0.000000***	***0.000000***	***0.000000***	***0.000000***	***0.000000***
Std. Dev.	2.68E-06	2.58E-06	3.29E-06	2.41E-06	2.97E-06	3.08E-06	2.48E-06	2.41E-06
Skewness	1.843298	2.161577	2.450993	1.687142	2.541225	1.780849	2.066872	1.546754
Kurtosis	6.975303	12.79001	21.14080	6.545137	15.86767	10.57849	12.68907	6.755131
Obs.	2651	2651	2651	2651	2668	2668	2668	2668

Panels A – D in Table 2A present descriptive statistics for the series generated using equation (3): $CSAD_t = \frac{1}{N}\sum_{i=1}^{N}\left|R_{i,t} - R_{m,t}\right|$, for each firm across the six sectors under study. The $CSAD_t$ is cross-sectional absolute deviation which is a measurement of returns distribution. Where, N-represents the number of observations, $R_{m,t}$ is the average (market) return of assets at time *t* and $R_{i,t}$ is the return on stock *i* at time t.

Table 2B: Descriptive Statistics for the Market (Sector's) Return

Statistics	Agric.	Banking	BM	Conglomerate	INSUR.	Pet. Mkt.
Mean	0.000107	-0.000306	-0.00011	-5.20E-05	4.44E-05	-0.000131
Median	0.000000	-0.000379	0.000000	-1.54E-05	0.000144	0.000000
Max.	0.030998	**0.022368**	0.065798	**0.072747**	0.024836	0.028470
Min.	-0.109023	-0.023837	**-0.076629**	-0.066735	-0.020445	-0.044027
Std. Dev.	**0.008490**	0.005731	0.007779	0.007051	0.005176	0.005975
Skewness	-1.874233	-0.010974	-0.123931	0.117113	**0.012171**	-0.151579
Kurtosis	26.69498	4.113784	9.097902	10.97695	3.895504	5.621646
Obs.	2411	2410	2544	2668	1619	2651

Table 2B reports the descriptive statistics of the computed Cross-Sectional Dispersion (CSAD) of returns for individual stocks around the prices return. Figures 1A to 1F in the Appendix plots the CSAD for all the sectors. As Table 2 (panels A to D) shows, in all the sectors, except the banking sector, CSAD have a minimum CSAD of zero, suggesting that there was at least one point in time during the sample period when each of the individual returns had no dispersions from the market return. For these sectors, therefore, it means that individual returns, at that particular time, were fully in line with the market returns. While the zero lower bound of returns in these sectors may be interpreted as indicative of investor herding, the absence of zero dispersion in the banking sector can only be cautiously interpreted as indicating least probability of experiencing herding. It may also imply that individual investors in the banking subsector have the highest ability to

differentiate themselves from the market probably because of the relative availability of information on fundamentals compared to those of other sectors.

Table 2B also reports the descriptive statistics for each sector's market return. It shows that conglomerates recorded the highest maximum daily market return about 7.3%, while the banking sector stocks have the lowest maximum daily market return about 2.2% during the sample period. Agriculture recorded the highest daily loss about 10.9%, while insurance recorded the lowest daily loss about 2.0%. Measured by the sample standard deviation, agriculture stocks appear to have the least volatility of 0.8% while insurance stocks have the highest of 5.1%. Figure 2 in the Appendix shows the scatter plots of cross-sectional dispersion of each sector's returns and market returns. The plots clearly show that, as expected, low dispersions (conformity with aggregate market behavior by individual investors) are associated with low market returns.

Herding Behavior in the Nigerian Stock Market

Table 3 presents coefficient estimates, of equation 2, for detecting the existence of herding behavior within each of the sectors under study. This equation is estimated for each of the 29 stocks, thereby allowing us to detect whether investment decisions on each of these 29 stocks were as a result of following the market trend (herding) or are in line with the rational asset pricing models' predictions. The fifth and sixth columns report the value of the estimated coefficients on the linear and non-linear term for each of the twenty-nine stocks.

The results show that there is evidence of herding in twelve out of the twenty-nine stocks. This is reported in the sixth column, which shows that for these 12 stocks, the coefficient on the non-linear term is negative and significant, suggesting that during the period under study, increased uncertainty led investors in these stocks to conform to the market consensus. Also, results reveal the existence of "adverse investor herding behavior" in eight stocks of the remaining seventeen stocks. This is because the coefficient on the non-linear term (6th column) is positive and statistically significant, suggesting increased investor tendency to rely on their own opinion. It captures increased investor individuality when forming their trading decisions. The results for all stocks in agriculture, banking, building materials, conglomerates, insurance (except CONTINSURE), petroleum marketing are in accordance with the predictions of the rational asset pricing since the coefficient of the linear term is positive and significant confirming the positive and linear relationship between and $|R_{m,t}|$. Therefore, with the exception of CONTINSURE, the assumptions underlying the rational asset pricing models (RAPM) holds in all. It is also interesting to note that when trading Stocks in Agriculture and Building materials, investors exhibited adverse herding during the sample period. The greatest tendency for herding appears to be in banking, insurance and petroleum marketing stocks.

Table 3: Herding Behavior in the Nigerian Stock Exchange

SECTOR	S/N	VARIABLE	α	γ_1	γ_2	Remarks
AGRICULTURE	1	LIVESTOCK	3.48E-0* (36.1552)	*4.06E-05* (2.82085)*	0.002729* (11.4884)	ADVERSE HERDING
	2	OKUMUOIL	1.89E-06* (21.4483)	*0.000150* (11.3878)*	0.004174* (19.17008)	ADVERSE HERDING
	3	PRESCO	2.66E-06* (28.3288)	*5.56E-05* (3.95803)*	0.004461* (19.2699)	ADVERSE HERDING
BANKING	4	DIAMOND	3.09E-06* (22.8760)	*0.000274* (5.76211)*	**-0.01056* (-3.4162)**	**HERDING**
	5	FIDELITY	2.90E-06* (24.4104)	*0.000195* (4.67509)*	**-0.00766* (2.82050)**	**HERDING**
	6	GTB	2.17E-06* (18.2123)	*0.000187* (4.45168)*	-0.003062 (-1.12308)	RAPM
	7	IBTC	2.74E-06* (21.8783)	*9.00E-05** (2.0471)*	0.002220 (0.776881)	RAPM
	8	SKY	2.73E-06* (22.1078)	*0.00027* (6.22564)*	**-0.01346* (-4.76797)**	**HERDING**
	9	STERLING	3.28E-06* (23.5878)	*0.00027* (5.45921)*	**-0.00801** (-2.52482)**	**HERDING**
	10	UBA	3.01E-06* (19.5206)	*9.82E-05*** (1.81262)*	0.003846 (1.09224)	RAPM
	11	WEMA	3.51E-06* (24.7934)	*0.000217* (4.3561)*	**-0.00910* (-2.8141)**	**HERDING**
	12	ZENITH	2.55E-06* (20.1469)	*7.80E-05*** (1.7519)*	0.003623 (1.25127)	RAPM
BUILDING MATERIAL	13	ASHAKACEM	2.11E-06* (26.1979)	*9.62E-05* (6.60319)*	0.002627* (5.72399)	ADVERSE HERDING
	14	CCNN	1.97E-06* (25.5919)	*1.58E-05* (1.14187)*	0.009022* (20.6466)	ADVERSE HERDING
	15	WAPCO	2.04E-06* (24.6568)	0.000143 (9.5777)	0.00189* (4.0111)	ADVERSE HERDING
CONGLOMERATE	16	PZ	1.92E-06* (21.7840)	0.000184* (10.7472)	0.001776* (3.367767)	RAPM
	17	TRANS	2.33E-06* (25.0374)	0.000213* (11.8051)	-5.49E-05 (-0.09882)	ADVERSE HERDING
	18	UACN	1.78E-06* (23.6877)	0.000170* (11.6831)	-0.000107 (-0.23762)	ADVERSE HERDING
	19	UNIL	1.87E-06* (25.9104)	0.000154* (10.9941)	0.000742*** (1.72050)	RAPM
INSURANCE	20	ALLCO	4.91E-06* (20.3178)	8.91E-05 (0.99899)	0.009193 (1.43361)	RAPM
	21	CONTINSURE	1.96E-05* (7.27225)	**-0.005979* (-6.0203)**	0.334693* (4.6897)	ADV HERD
	22	COSTODYINS	3.85E-06* (16.1935)	0.000382* (4.35991)	**-0.008779 (-1.39314)**	**HERDING**
	23	NEM	3.93E-06* (17.8031)	0.000409* (5.02443)	-0.01535* (-2.6245)	**HERDING**
	24	MANSARD	4.09E-06* (17.7479)	0.000422* (4.95412)	-0.01647* (-2.69247)	**HERDING**
	25	SUNNIS	3.36E-06* (13.4496)	0.000515* (5.59404)	-0.01445** (-2.18243)	**HERDING**
PETROLEUM MARKETING	26	CONOIL	7.69E-07* (10.3427)	0.000442* (21.2232)	-0.00770* (-6.86273)	**HERDING**
	27	MOBILE	1.10E-06* (14.8121)	0.000320* (15.3339)	-0.00238** (-2.12611)	**HERDING**
	28	OANDO	1.79E-06* (18.9273)	0.000329* (12.3806)	0.001990 (1.39123)	RAPM

	29	TOTAL	8.66E-07* (12.7878)	0.000392* (20.6498)	-0.007280* (-7.12456)	**HERDING**

The numbers in parenthesis are standard errors values of the coefficients. *, **, and *** indicates significance at 1%, 5% and 10%, respectively.
Source: Authors computations

Herding and Liquidity Conditions in the Nigerian Stock Exchange

Table 4 presents the estimates of equation (6), where herding is conditioned on the liquidity conditions prevailing in the market. The third column shows herding under the condition of medium liquidity, the fourth column shows herding under low market liquidity, while the fifth column shows herding when liquidity is high. Overall, the regressions yield negative coefficient under the condition of high liquidity, suggesting the existence of herding behavior. This implies the tendency for an investor to herd on market consensus for shares with high liquidity.

Specifically, results in Table 4 detect herding activity for the sampled period under medium and high liquidity conditions. That is, the negative and statistically significant coefficients of γ_2 for the Banking (Diamond, Fidelity, Sterling, and WEMA), Insurance (COSTODYINS, Mansard, NEM, and Sunnis), and Petroleum marketing (Conoil, Mobile, and Total) that indicate the existence of herding activity for low liquidity stocks. In addition, the negative and statistically significant coefficients of γ_3 for Agriculture (OKOMUOIL) and Banking (UBA) indicate the existence of herding formation under the condition of high liquidity. With the exception of Insurance (CONTINSURE), the coefficients of γ_4 are all negative and indicate that there is herding under condition of low liquidity.

Table 4: Herding and Liquidity

SECTOR	FIRMS	COEFFICIENTS		
		γ_2 Medium Liquidity	γ_3 (Low Liquidity)	γ_4 (High Liquidity)
Agriculture	LIVESTOCK	0.003830* (0.000219)	6.98E-07* (1.33E-07)	-2.88E-06* (1.42E-07)
	OKOMUOIL	0.004632* (0.000219)	**-1.77E-07 (1.33E-07)**	-1.38E-06* (1.41E-07)
	PRESCO	0.005213* (0.000226)	4.77E-07* (1.37E-07)	-1.97E-06* (1.46E-07)
Banking	DIAMOND	-0.010290* (0.003087)	2.65E-07*** (1.64E-07)	-4.48E-07* (1.65E-07)
	FIDELITY	-0.007027* (0.002696)	1.04E-08 (1.44E-07)	-8.76E-07* (1.44E-07)
	GTB	-0.002971 (0.002730)	9.80E-08 (1.45E-07)	-1.28E-07 (1.46E-07)
	IBTC	0.002618 (0.002851)	1.31E-07 (1.52E-07)	-5.77E-07* (1.53E-07)
	SKY	-0.012996* (0.002795)	5.90E-07* (1.49E-07)	-6.85E-07* (1.50E-07)
	STERLING	-0.007242** (0.003142)	1.91E-07 (1.67E-07)	-1.10E-06* (1.68E-07)
	UBA	0.004086 (0.003525)	**-2.76E-08 (1.88E-07**)	-2.48E-07 (1.89E-07)
	WEMA	-0.007837** (0.003084)	1.02E-06* (1.64E-07)	-1.91E-06* (1.65E-07)
	ZENITH	0.004040 (0.002888)	1.30E-07 (1.54E-07)	-6.14E-07* (1.55E-07)
Building Materials	ASHAKACEM	0.004756* (0.000438)	7.22E-07* (1.18E-07)	-2.25E-06* (1.26E-07)
	CCNN	0.004314* (0.000432)	1.56E-06* (1.17E-07)	-2.34E-06* (1.24E-07)
	WAPCO	0.010586* (0.000431)	4.17E-07* (1.17E-07)	-1.69E-06* (1.24E-07)
	PZ	0.002890* (0.000513)	9.69E-07* (1.29E-07)	-1.35E-06* (1.30E-07)
	TRANS	0.000838 (0.000551)	5.83E-07* (1.38E-07)	-1.17E-06* (1.39E-07)

Conglomerate	UACN	0.000643 (0.000444)	4.42E-07* (1.11E-07)	-1.01E-06* (1.12E-07)
	UNILEVER	0.001562* (0.000425)	2.30E-07* (1.06E-07)	-1.22E-06* (1.07E-07)
Insurance	ALLCO	**0.011144*** (0.006358)**	7.34E-08 (2.84E-07)	-1.59E-06* (2.89E-07)
	CONTINSURE	**0.316147* (0.070954)**	3.02E-07 (3.17E-06)	**1.58E-05* (3.22E-06**)
	COSTODYINS	-0.006951 23(0.006255)	4.40E-07 (2.79E-07)	-1.29E-06* (2.84E-07)
	MANSARD	-024.013798** (0.25006)	5.10E-07*** (2.68E-07)	-1.98E-06* (2.73E-07)
	NEM	-0.013143** (0.005766)	5.82E-07** (2.57E-07)	-1.53E-06* (2.62E-07)
	SUNNIS	-0.012423*** (0.006556)	8.54E-07* (2.93E-07)	-1.25E-06* (2.98E-07)
Petroleum Marketing	CONOIL	-0.007294* (0.001123)	4.04E-07* (1.09E-07)	-2.83E-07** (1.11E-07)
	MOBILE	-0.001726 (0.001116)	5.18E-07* (1.09E-07)	-4.85E-07* (1.10E-07)
	OANDO	**0.002593*** (0.001434)**	1.25E-07 (1.40E-07)	-5.12E-07* (1.42E-07)
	TOTAL	-0.006876* (0.001024)	1.88E-07*** (9.97E-08)	-3.23E-07* (1.01E-07)

Table 5 presents the estimates of equation (2) at a more aggregate (sectorial) level. It provides evidence of investors' herding behaviour at the sector level for the six sectors under study. Except for agriculture and petroleum marketing, the results for the aggregate estimate of equation 2 supports the hypothesis that herding behaviour is more visible at the group level, where investors take similar trading decisions. The γ_2 estimates are negative and statistically significant at the 1% level, while γ_1 coefficients for agriculture, banking, building materials, conglomerates, insurance, petroleum marketing are positive and significant, which is in line with the rational asset pricing model.

Table 5: Herding Behavior in the Nigerian Stock Exchange

SECTOR	α	γ_1	γ_2	R^2	DW	F-stat.
AGRICULTURE	-2.05E-06* (8.03E-08)	0.000336* (1.20E-05)	*0.000543** *(0.000198)*	0.435418	2.022930	928.1653 (0.0000)
BANKING	-1.22E-06* (5.95E-08)	0.000309* (2.09E-05)	**-0.003524* (0.001359)**	0.313760	2.114749	549.8019 (0.0000)
BUILDING MATERIAL	-1.75E-06* (6.45E-08)	0.000331* (1.16E-05)	**-0.001580* (0.000366)**	0.377115	2.034500	768.5962 (0.0000)
CONGLOMERATE	-1.49E-06 (5.48E-08)	0.000308 (1.07E-05)	-0.001894 (0.000328)	0.355796	2.040897	735.6668 (0.0000)
INSURANCE	-2.26E-06* (1.04E-07)	0.000570* (3.82E-05)	-0.000927 (0.002745)	0.452157	2.014283	666.4635 (0.0000)
PETROLEUM MARKETING	-1.16E-06* (4.88E-08)	0.000251* (1.37E-05)	*0.002263** *(0.000737)*	0.382410	2.055379	819.5060 (0.0000)

$$CSAD_t = \alpha + \gamma_1 \left| R_{m,t} \right| + \gamma_2 R_{m,t}^2 + \varepsilon_t$$

Source: Authors' computation

To gain further insight into the empirical role of liquidity on herd formation, we follow Galariotis *et al.* (2015) to examine the correlations between measures of liquidity and those of dispersion. Also, we examine variance decompositions from an unrestricted bi-variate VAR model of CSAD and liquidity[8] as well as undertake Granger-causality

[8] The VAR model was estimated at both industry and firm levels. The results were qualitatively similar leading to the same conclusions. We, therefore, present the industry-level results in Table 6.

analysis. Figure 3 (in the appendix) presents the scatter plots of the CSAD measure and the average liquidity across all sectors, which indicates their correlation. The plots show that high liquidity (on the horizontal axis) is associated with low dispersion (on the vertical axis) in all the sectors, consistent with the findings above that herding thrives more with high market liquidity. The variance decomposition analysis is shown in Table 6. It shows which variable has a greater contribution in explaining the variations of each following a shock. The results appear to suggest that except in the case of the insurance sector, CSAD has a relatively more considerable influence in the variation of market liquidity compared to the role of liquidity on CSAD. For instance, the highest non-idiosyncratic variation occurred in the petroleum marketing sector, where up to 4.8% of the variations in liquidity was attributable to changes in the dispersion of the sector's returns from market return. This result suggests that where individual returns have significant deviations from that of the market (perhaps due to fundamentals), adverse herding could improve liquidity.

Table 6: Variance Decomposition (VDC) of CSAD and Liquidity

		VDC of CSAD		VDC of LIQUIDITY	
SECTOR	***Horizon***	**CSAD**	**LIQUIDITY**	**CSAD**	**LIQUIDITY**
Agriculture	***Short (1)***	100.0000***	0.00000***	2.35E-06*	100.0000*
	Medium (15)	99.99535*	0.004650*	0.011448	99.98855
	Long-term (30)	99.99535	0.004650	0.011448	99.98855
Banking	***Short (1)***	100.0000*	0.00000*	0.008472*	99.99153*
	Medium (15)	99.97718	0.022819	0.039993	99.96001
	Long-term (30)	99.97718	0.022819	0.039994	99.96001
Building Materials	***Short (1)***	100.0000*	0.00000*	0.013869*	99.98613*
	Medium (15)	99.98158	0.018421	0.088403	99.91160
	Long-term (30)	99.98158	0.018421	0.088403	99.91160
Conglomerate	***Short (1)***	100.0000*	0.00000*	0.680583	99.31942
	Medium (15)	99.99502*	0.004985*	0.719628	99.28037
	Long-term (30)	99.99502*	0.004985*	0.719628	99.28037
Insurance	***Short (1)***	100.0000*	0.00000*	0.007868	99.99213
	Medium (15)	99.98889	0.011107	0.011860	99.98814
	Long-term (30)	99.98889	0.011107	0.011860	99.98814
Petroleum Marketing	***Short (1)***	100.0000*	0.00000*	4.617832	95.38217
	Medium (15)	99.88443	0.115574	4.851447	95.14855
	Long-term (30)	99.88443	0.115574	4.851447	95.14855

Source: Authors' computations

A careful examination of the results reveals that CSAD, as a proxy for herding, appears to have a greater effect on liquidity than liquidity has on herding. The results of the pairwise Granger test for Causality are shown in Table 7. It is clear from the table that liquidity was found to *Granger-cause* herding in Agriculture (at 10% level of significance), Conglomerates (at 10% level of significance) and Petroleum Marketing (at 5% level of significance) while bi-directional *Granger-causation* was found in Insurance (at 10% level of significance). There was no evidence of causation in Banking and Building Material sub-sectors.

Table 7: Granger Causality Tests between CSAD and Average Liquidity

SECTOR	Obs.	LIQ does not Cause CSAD	CSAD does not Cause LIQ	Remarks
Agriculture	2407	0.9484 (0.05298)	0.8711 (0.13806)	*LIQ G-Causes CSAD*
Banking	2406	0.7214 (0.32661)	0.6977 (0.36000)	*No G-Causation*
Building Materials	2540	0.8241 (0.19353)	0.3788 (0.97116)	*No G-Causation*
Conglomerate	2665	0.9256 (0.07732)	0.7160 (0.33411)	*LIQ G-Causes CSAD*
Insurance	1614	0.9134 (0.09056)	0.9689 (0.03164)	*Bi-directional G-Causation*
Petroleum Marketing	2648	0.3578 (0.02819)	0.8122 (0.20803)	*LIQ G-Causes CSAD*

***Source**: Authors' computations*

The Table reports F-Stat (with p-values in parenthesis) of Pairwise Granger Causality Tests with two lags. The Null Hypothesis is that each variable "does not Granger Cause" the other. The test examines how much current and lagged values of CSAD (Liquidity) are explained by the current and lagged values of Liquidity (CSAD). It does not suggest that one variable is the effect of the other; it merely indicates that one variable contains information about the other. The lag length was chosen based on the Akaike information criterion and the Schwarz criterion.

V. Conclusion and recommendations

This paper sought to investigate the existence of investor herding behaviour and to determine the role of market liquidity in herd formation in the Nigerian stock market. We used equity price data for the six (6) industrial sectors (Agriculture, Banking, Building materials, Conglomerate, Insurance, Petroleum Marketing) of the Nigerian stock market for the period between January 2007 and November 2017.

Empirical results provide significant evidence of herding behaviour of investors. The results show two firm shreds of evidence. First, there is significant evidence of investor herding behaviour in the Nigerian stock markets at both the firms and sectoral levels. This finding is consistent with those of previous studies, including Hwang & Salmon (2004) who found evidence of herding in South Korea. Second, the liquidity of stocks is empirically significant in detecting herd formations. Higher and medium liquidity levels were found to be significantly associated with increased herd formation. This finding is also in line with the findings of Galariotis, Rong & Spyrou (2015). Given the potentially destabilizing role investor herding plays in triggering and nourishing financial bubbles, the existence of herding in the Nigerian stock market raises policy concern for the regulators and underscores the need for closer monitoring. Given the role of information scarcity in the formation of herding behaviour, this finding also points to the need for increased efficiency and quality of the informational environment for firm level analysis in the market. To this effect, there is a need for regulators to increase investment in market infrastructure that improves efficiency and reduces the cost of information in the market. Consequently, higher flow of firm-level information could increase the incidence of adverse herding, which could go a long way in reducing market fragility.

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APPENDIX

Figure 1 A – 1F: Cross Sectional Absolute Deviation (CSAD)

Figure 1A: Agricultural Sector.

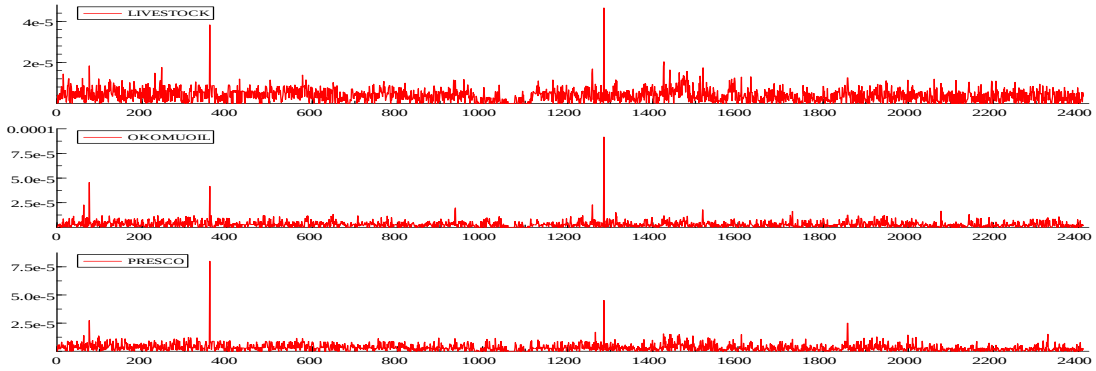


Figure 1B: Building Materials Sector.

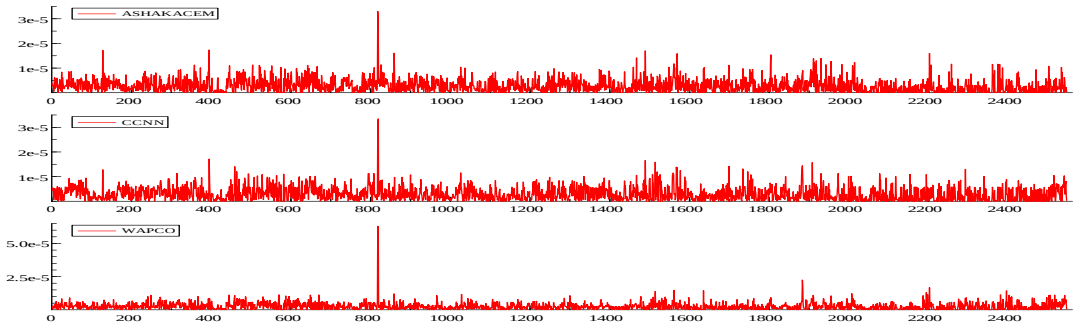


Figure 1C: Banking Sector.

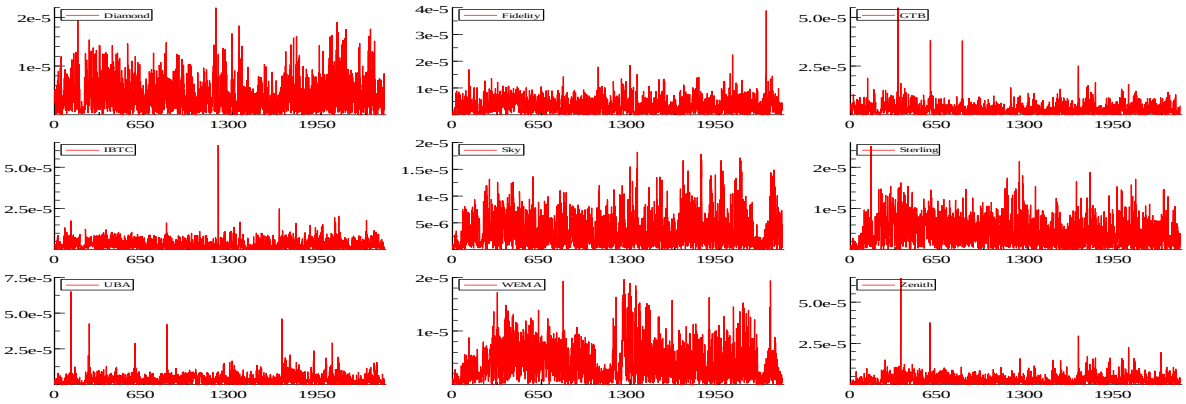


Figure 1D: Conglomerate Sector.

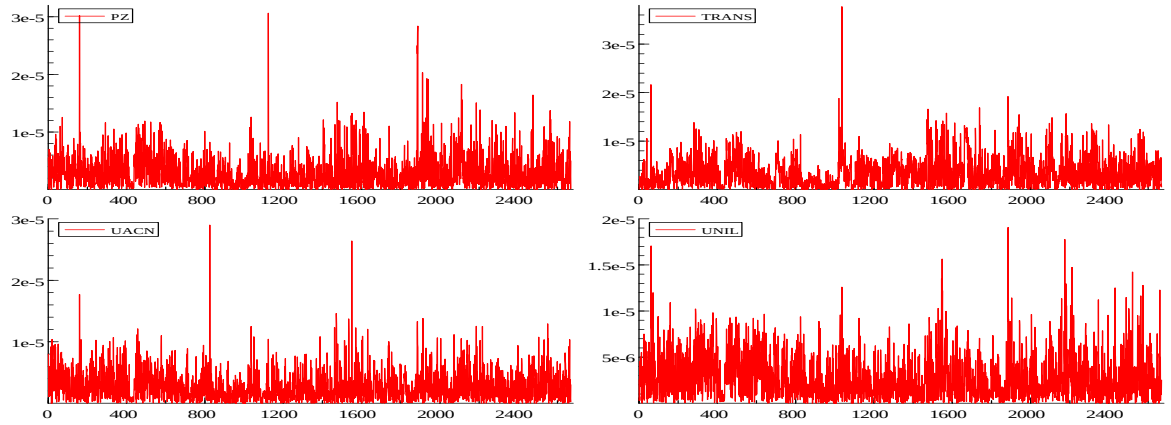


Figure 1E: Insurance Sector.

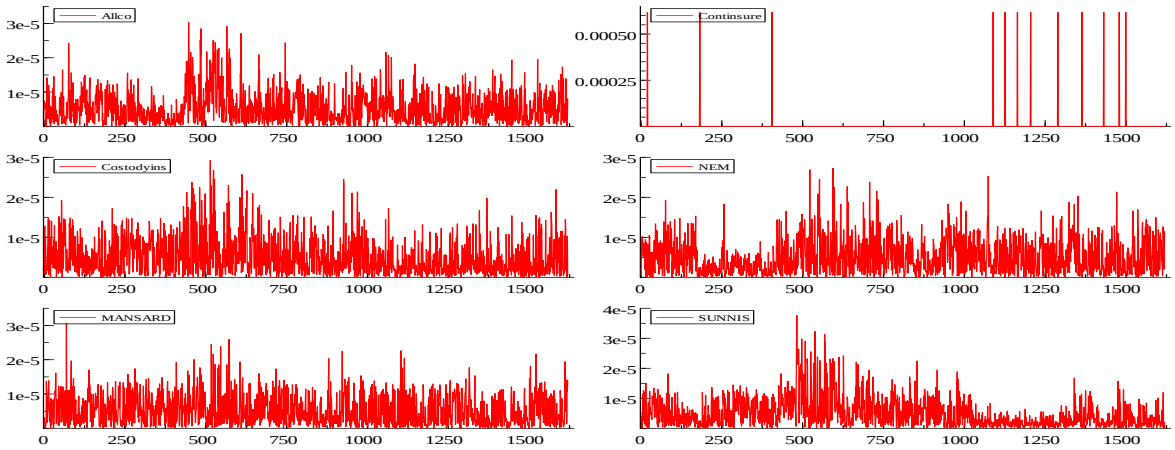


Figure 1F: Petroleum Market Sector.

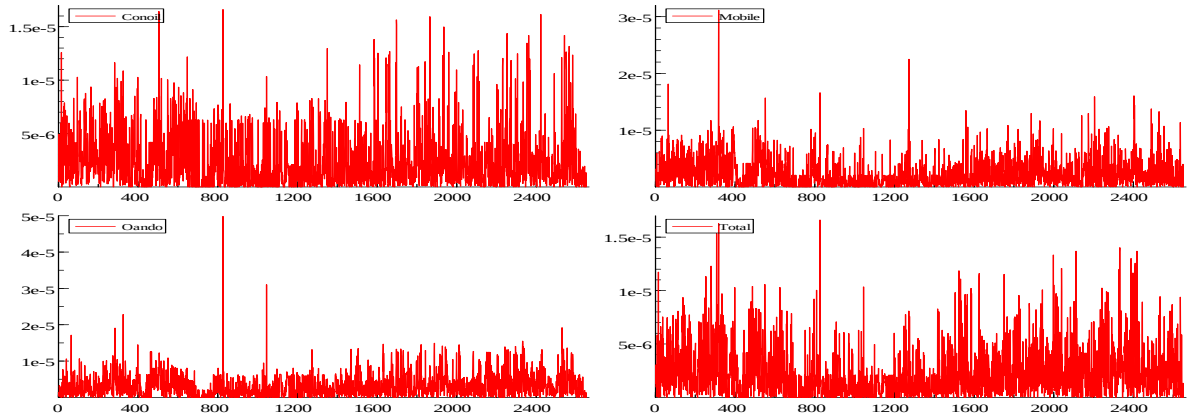
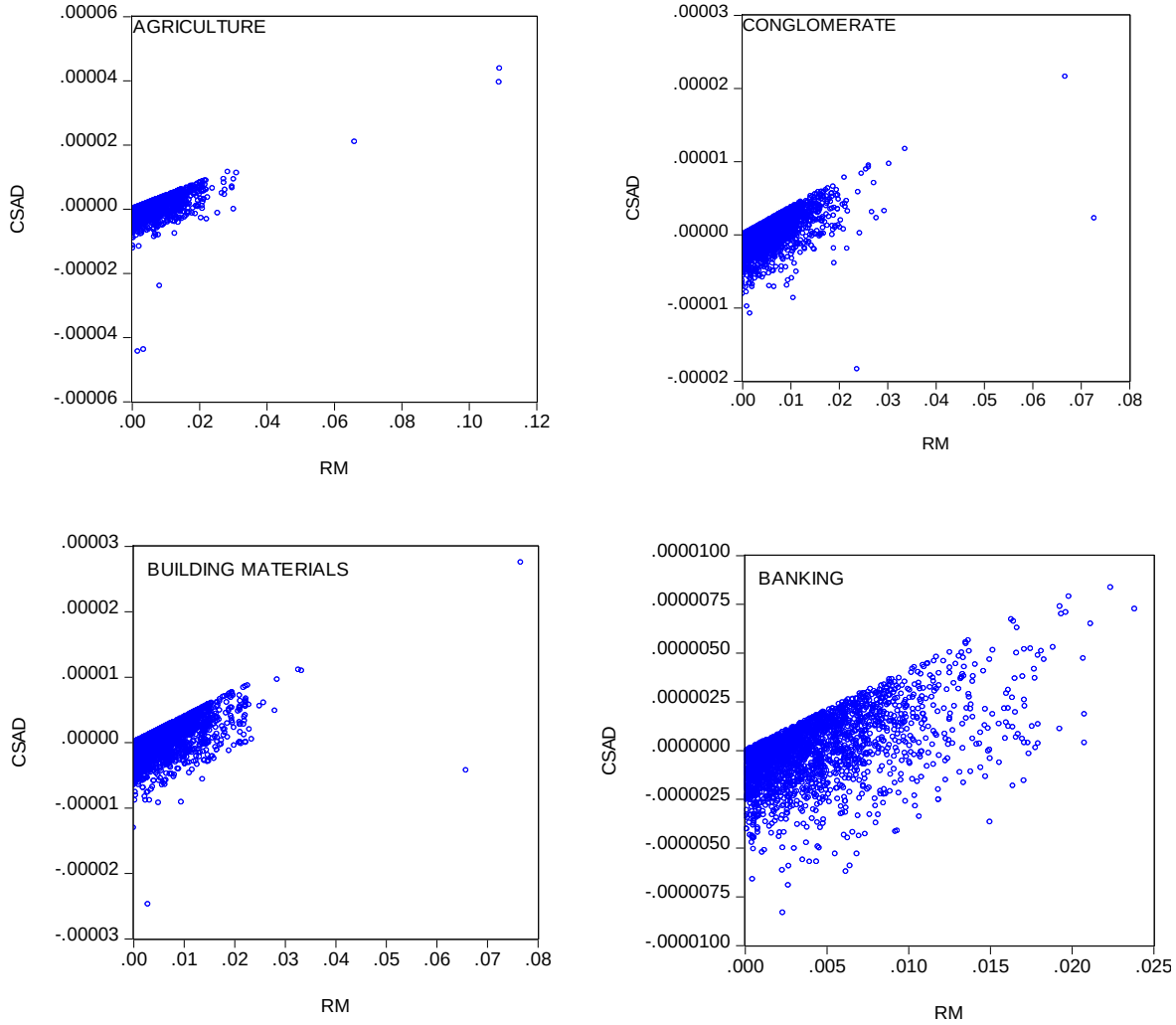


Figure 2: Cross Sectional Average Deviation and Market Portfolio Return



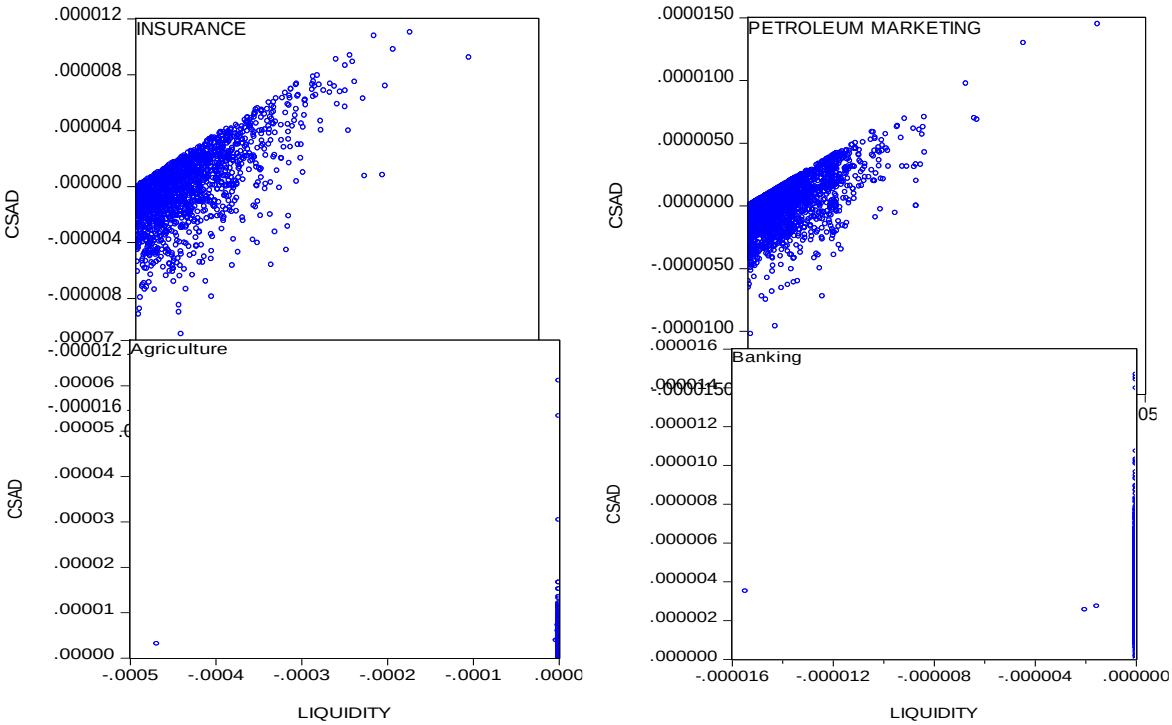


Figure 3: Cross Sectional Average Deviation and Liquidity