



## INVESTIGATION OF MOMENTUM EFFECTS ON STOCKS RETURNS IN NIGERIAN EQUITY MARKET

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**Abstract:** This study investigates the effects of momentum on stocks returns in the Nigerian equity markets from 2013 to 2016. The study follows the approach of Ludvigson (2008) to introduce the buy and hold return specification for each stock and cumulative buy and hold return specification. The results show that momentum strategy appears insignificant in the Nigerian equity markets. Arbitraging between the bearish and bullish markets or taking long position in the best past stock and short position in the worst past stocks does not yield significant riskless profits. Therefore, investors cannot apply momentum strategy to make abnormal return; the occasional abnormal returns occur by chances.

**Keyword:** Asset pricing, Momentum, Momentum strategy, stock returns, equity market, Nigeria

### Introduction

When security prices at all times reflect all available, relevant information, the market in which they are traded is said to be efficient (Fama, 1965; 1970). Efficiency requires not only that prices reflect rationally to new information, but that they react spontaneously (McLaney, 2000). Prior research has found that investors are not able to make consistently high (abnormal) returns from trading in developed financial markets (Fama, 1998).

Since the inception of the stock market, investors have attempted to develop theories to explain the historical returns and to accurately predict the expected returns from an investment in shares. The widely accepted Capital Asset pricing Model (CAPM), independently developed by Treynor (1961; 1962), Sharpe (1964), Lintner (1965) and Mossin (1966), postulates that, given certain simplifying assumptions, the market portfolio is mean-variance efficient; implying that there exists a linear relationship between a portfolio's expected return and its beta; and that no other factors are necessary to explain expected return. If the model is correct and security markets are efficient,

security returns will on average conform to this linear relation. Schwert (2001) opined that any empirical results that seem to be inconsistent with maintained theories of Capital Asset pricing Model behavior is an anomaly.

The efficient market hypothesis (EMH) asserts that stock prices fully reflect all available information, This means that investors cannot make profits in the equity market by trading on public information including historical prices, This notion of market efficiency is crucial because it helps investors make choices among securities that reflect firms' activities based on the assumption that prices always incorporate all available information.

However, the EMH has been challenged by the empirical evidence that documents profitable trading strategies that are strong and pervasive for a long period of time. One of those anomalies is the momentum effect. Momentum refers to the predictability patterns in returns, and momentum trading strategies are designed to exploit the effect.

Momentum investors seek stocks that have recently risen significantly in price. They believe that these stocks will



continue to rise because of an upward shift in their demand curves. Conversely, those stocks that have recently fallen significantly in price are sold on the belief that their demand curves have shifted downward. **Investors** who call themselves contrarians do just the opposite of what most others are doing in the market. They buy stocks that others have shunned and think of as losers, and they sell stocks that others have feverishly pursued and think of as winners. They believe investors tend to overreact to news. That is, stocks that have plunged in price because of some recent piece of bad news (such as weak earnings) are thought to have fallen too far in price. Hence such stocks are viewed as being ready for a price rebound as investors realize that they overreacted to the bad news and subsequently drive the price upward toward the stock's fundamental value. Similarly, stocks that have risen rapidly in price because of good news (such as strong earnings) are thought to be risen too far in price. Hence such stocks are viewed as being ready for a price drop as investors realize that they overreacted to the good news and subsequently drive the price downward toward the stock's fundamental value.

Momentum investing strategies exploit historical trends in stock prices by buying winner stocks. Those stocks that earned the best returns over some short time horizon (typically the past three to twelve months), and simultaneously short selling losers. Those stocks that earned the worst returns over the same period (Jegadeesh and Titman, 1993) show that momentum portfolios produce significant abnormal profits, generating 1.3% per month in the US between 1965 and 1989.

The profitability of the momentum strategies is apparent evidence against the EMH because the only information needed to construct portfolios is historical prices, which are the simplest form of information and available to all market participants.

Proponents of the EMH have therefore tried to come up with explanations of momentum effects: the first explanation aims at its empirical nature, which says that momentum profits may be a result of 'data snooping' bias (Lo and MacKinlay, 1990), which was quickly dismissed by subsequent studies (Grundy and Martin, 2001; Rouwenhorst (1998, 1999)); the second explanation proposed in the literature is risk – that is, compensation for risk (Conrad and Kaul, 1998). This explanation was again overturned by subsequent studies such as

Jegadeesh and Titman (2001). In a similar vein, Fama and French (1996) showed that their Fama and French (1993) risk factors cannot explain the momentum profit even though these factors can successfully describe the returns of other anomalies such as the size effect. The third explanation is based on a relatively new school of thought in finance called the behavioural perspective. This explanation is developed based on investors' cognitive biases such as overconfidence or individualism (Barberis, Shleifer and Vishny. (1998) and Chui, Titman and Wei . 2010) or simply market's under-reaction to public news (Hong and Stein, 1999) that effect the stock price.

Stock market anomalies are cross-sectional and time series patterns in security returns that are not predicted by a central paradigm or theory. Theoretical reasoning for anomalies has its foundation in the assumption that markets should be rational and friction-free. In this theoretical framework, as noted by Fama and French (2008), a return pattern which cannot be explained by asset pricing model is referred to as an anomaly.

Behavioural interpretations contrast the theoretical explanation, stating that anomalies represent the risk left unexplained by an asset pricing model. Proponents of behavioural finance believe that some anomalies arise due to violations of the assumptions that markets are rational. Momentum in prices has been recognized as the most robust efficiency anomaly. It has been documented in stock exchanges the world over. Fama (1998) indeed recognizes the momentum phenomenon as constituting the chief embarrassment to Efficient Market Hypothesis.

Momentum strategy is said to be an investment strategy where past winners are bought and past losers are sold short. The basic idea of the strategy is that winners and losers maintain their historical pattern in future periods and buying the winners and short selling the losers should generate above average return

Proponents of traditional finance theory argue that such trading strategies are useless because of the stock market efficiency. They believe the market to be efficient when it comes to the pricing of financial assets. If the markets were efficient as the EMH asserts then it should not be possible to profit from historical trends using simple, costless strategy such as momentum trading. Against the backdrop of the behavioural arguments, others have suggested that the profitability of momentum strategies may simply be compensation for risk.



Conrad and Kaul (1998) argue that the momentum profit is attributed to the cross-sectional dispersion in (unconditional) expected return. In the article of Jegadeesh and Titman (1993), in which momentum phenomenon is initially introduced, they pointed out that the profitability gained by this strategy cannot be attributed to the systematic risks or delayed stock price reactions to common factors. However, previous studies have shown that momentum strategies have indeed been highly profitable (Jegadeesh and Titman, 1993; Chan, Jegadeesh and Lakonishok, 1996; Griffin, Ji and Martin, 2003).

The relevance of behavioural finance and its increased integration into the greater finance sphere, coupled with the persistent presence of the momentum anomaly in financial markets, provokes interest in this study topic and the desire to understand how financial markets function. Due to the perceived failure of rational models to explain the momentum phenomenon, behavioural finance is central to understanding its sustained presence in the markets.

A problem with behavioural models is, as Fama (1998) argues, their lack of a universal explanation for all anomalies. Since they are specifically designed and motivated by particular empirical findings, many explanations may not hold in out-of-sample tests or under different portfolio formations. Another problem with the behavioural school is that they are empirically difficult to test because we need a good measure of psychological biases (Chui et al. 2010) or a good database of public news in order to test market's under-reaction or overreaction to firm-specific news.

Vayanos and Woolley (2013) state that the momentum anomaly along with the contrarian anomaly are two of the most important anomalies in finance, therefore this study aims to understand why, and if momentum remains a significant financial anomaly in the Nigerian stock market. Our main motivation for this study derives from the fact that investors seem to be able to earn positive and significant returns by following a simple trading strategy, which seems to contradict the efficient market

hypothesis. We, therefore, want to investigate if there has been a momentum effect in the Nigerian equity market in recent years, and whether such a trading strategy is feasible and profitable for private investors. The rest of the paper is structured as follows: Section 2 reviews the related literature. Section 3 explains the data and methodology. Section, 4 provides the empirical results and section 5 presents the conclusion.

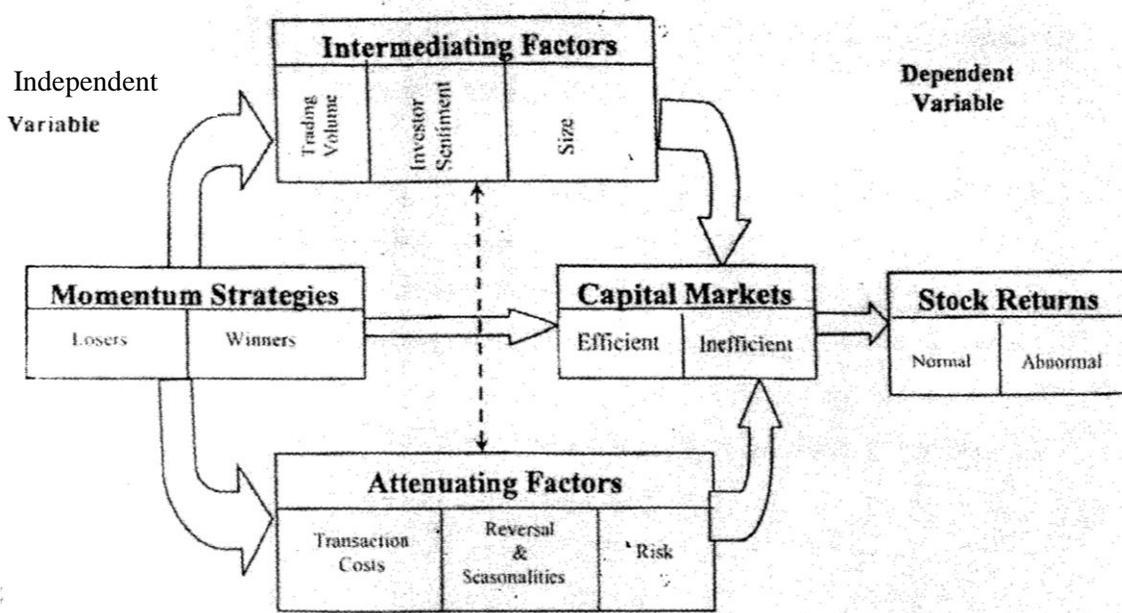
## **2. Literature Review**

### **Conceptual Framework**

The question that is being addressed in this study is at the center of finance; namely: how are asset prices established and how are they related to the fundamental values of underlying assets? Standard finance (EMH) posits that the price at which a commodity is exchanged is a function of the forces of demand and supply for the commodity. But unlike other commodities which are demanded because they possess intrinsic utility, shares have values only on the extent that the underlying companies are capable of generating cash flows to the shares in the future. The demand for shares is therefore derived demand, and the conclusion that a company's economic fundamentals drive share prices follows logically. The more profitable the prospects of the company the higher should its share price and vice versa.

Behavioural finance on the other hand recognizes that it is not only economic fundamentals that drive share prices. Irrational factors are increasingly claiming economists' attention as providing complementary, if not alternative and more potent explanations of the price formation process in financial assets. Mass psychology, fads, over-reaction, under-reaction and herding are irrational factors now contending to supplant risk as predictor of asset returns.

With the evidence from empirical testing and analysis overwhelmingly indicating that the irrational factors influence share prices, the research agenda in the field of asset pricing theory no longer is whether these factors are relevant but rather how to model and mesh them into a cogent, coherent and parsimonious theory of prices.



**Figure 1.1: The model of conceptual Framework**

This study posits that price momentum is a potent driving force determining asset returns in capital markets. If this is to hold, we expect to find that active momentum trading strategies mounted in the stock market should result in returns that are significantly different from the returns from a passive market strategy. The paper conceptualizes that price momentum can cause abnormal returns in the capital market (see figure 1.1). Our model also recognizes that various intervening factors could operate to amplify or ameliorate the basic momentum profitability. On one hand we have attenuating factors. The effect of these factors will be to dampen the incident of momentum on stock returns. Included in this category are risk, transaction costs and seasonality and reversibility. If the momentum strategies employed is too risky, or if they involve too frequent trading and consequently high transaction costs, then the profit could be illusory. In addition, any seasonality or reversibility discernable in returns means that any momentum profitability is at best transient, not permanent.

On the other hand, intermediating factors could operate to enhance the momentum profit. Size of the stock traded, the volume traded and investor sentiment prevailing in the market fall in this second category. Because theoretically, news gets out

less fast for small capitalization stock than big ones, for less traded stocks than most frequently stocks, it is conceptualized that small, and low trading volume stocks should exhibit more momentum. In addition, when the market is more optimistic, the momentum wave is likely to ride higher and longer.

#### **Financial Theory**

Stock market anomalies contradict the concept of market efficiency and thus an alternative model to understand how markets work is required. Any analysis of the functioning of financial markets must make assumptions about the behaviour of market participants. The desire to analyze the behaviour of financial markets and their participants has led to intense debate of standard finance theory versus an alternative option. Standard finance theory assumes in essence that investors are rational and thus investors make economic decisions whose outcomes are consistent with utility theory. Mongin (1997) defines the expected utility theorem as when;

The decision maker chooses between risky or uncertain prospects by comparing their expected utility values, i.e., the weighted sums obtained by adding the utility values of outcomes multiplied by their respective probabilities.



Pillars of standard finance theory include Modigliani and Miller's (1958) theorem on capital structures, the Sharpe-Lintner (1964-1965) capital asset pricing theorem, portfolio selection theory (Markowitz, 1952), and the option pricing theorem of Black, Jensen and Scholes (1973).

Kahneman and Tversky (1979) affirm that 'expected utility theory has dominated the analysis of decision-making under risk; it is generally accepted as a normative model of rational choice'. A central assumption of standard finance theory is that decisions are formed rationally and the cognitive biases of the investor do not affect asset prices, because errors are idiosyncratic and so average out over many agents, or that markets are sufficiently efficient to outweigh any potential for irrational investors to unduly influence the market.

Central to standard finance theory is the assumption that investors trade on the basis of rationality in an efficient market; commonly referred to as the Efficient Market Hypothesis (EMH). Within the EMH three levels of market efficiency are defined by Fama (1970); the weak form, semi-strong and strong form. The weak form of market efficiency implies future stock prices cannot be predicted in the long-run by past stock prices. The semi-strong form of market efficiency states that current stock prices are fully reflective of all publically available information. Thirdly, the strong form market efficiency implies that stock prices reflect both privately held and publically available information. Kendall (1953) had previously referred to this supposition as a random walk theory, stating that data behaves randomly with no pattern of returns discernible.

The main facet of standard finance theory challenged is the assumption of fully rational participants in the market and efficient financial markets. Alternatives to the four foundation blocks of standard finance are outlined by Statman (1999); investors are not rational under behavioural finance they are 'normal'; markets are not fully efficient but still difficult to beat; investors construct portfolios based on behavioural portfolio theory; and the asset pricing model takes cognitive errors and mental-accounting into consideration.

Thaler (1999) argues that we can 'enrich our understanding of financial markets by adding a human element'. Furthermore, Thaler (1999) alludes to modern asset pricing theorems being generated in the presence of psychology to model the behaviour

of the agents in asset pricing models, such as those devised by Barberis et al. (1998), Daniel, Limkriangkrai and Smith. (1998) and Hong and Stein (1999). Thaler (1999) states that;

It is possible to create a coherent theoretical model, one grounded in solid psychology and economics that can explain a complex pattern of empirical results. At the moment, no rival non-behavioural model can say the same,

The presence of anomalies in stock markets also suggests that markets are not fully efficient and certain trading strategies can 'beat' the market. Anomalies fall into two categories; calendar and fundamental. Calendar anomalies, as the name suggests refers to anomalies that occur around a certain time of the day, week, month or year. Examples of calendar anomalies include; the Weekend effect, the January effect, the Halloween effect, the lunar year effect and the turn-of-the month effect. Fundamental anomalies include; the momentum effect, the contrarian effect, and the size effect. As anomalies are becoming more frequent throughout financial markets, standard theories of finance struggle to explain them away with rational reasoning, thus the necessity to incorporate behavioural finance into asset pricing theories.

The momentum anomaly refers to the tendency for stocks that have performed well (poorly) in the previous period of time to continue to perform in a similar manner in subsequent periods of time; referred to as return continuation. An investment strategy that trades on the bases of momentum in stock markets is the strength-rule strategy. The strength-rule strategy takes a long position in past winners and shorts past losers. Early evidence of return continuation is documented by Cowles and Jones (1937), however, Jegadeesh and Titman's (1993) seminal study of momentum and the performance of the strength-rule strategy in US markets, is a pivotal resource and reference for several international momentum studies.

Behavioural finance incorporates aspects of investors' irrationality, such as cognitive biases and heuristics. Seldon (1912, cited in Sewell, 2010) wrote of Psychology in the Stock Market and argued that movement in stock prices depend significantly on the mental attitude of investors. To that effect, the expected utility theory is judged by Kahneman and Tversky's (1979) Econometrica paper to include a component that allows for the assumption that people underweight outcomes



that are probable in comparison with outcomes that can be obtained with certainty; prospect theory'. Rather than measure value of overall wealth, prospect theory measures the value associated with gains and losses.

Barber and Odean (1999) state:

One of the major contributions of behavioural finance is that it provides insights into investor behaviour when such behaviour cannot be understood under traditional theories.

Furthermore, Kahneman and Tversky (1972) introduced the representativeness heuristic, stating that many agents draw inferences from the distribution of impressions, as opposed to outcomes as such. In this process more dramatic, and thus perhaps less likely to recur outcomes are given greater (perhaps undue) weight. This idea of representativeness is later developed into the theory of the Law of Small Numbers (LSN). In essence, the LSN implies that the representative agent only views a small sample of all available information and makes a decision based on this observation, for them the sample is the population, reflecting the belief that the sample as it expands reflects the overall population from which it is drawn.

The study of behavioural finance is not limited to observation of individual investors but also includes the professional traders within the market. Haigh and List (2005) and Menkhoff, Schmidt and Brozynski. (2006) postulate that professional investors are subject to irrational, psychologically driven biases in investment decisions much like individual investors. Furthermore, Haigh and List (2005) affirm that the expected utility theory is not appropriate to model professional traders' behaviour; implying behavioural finance models may be more appropriate as they relax some of the assumptions of standard finance theory.

The role of brokers and analysts and the value of their recommendations and forecasts are highlighted by the early study of Cowles (1933) who finds that analysts' advice does contain investment value. Cowles (1933) seminal study has since been built upon by several researchers. Due to the reliance on professionals within the market, their actions are under significant scrutiny and analysis. Bird and Casavecchia (2007) state that individual and institutional investors rely heavily on the information analysts provide.

The main function of analysts is to disseminate recommendations based on the core company fundamentals and predicted forecast earnings; however, Forbes (2013) alludes to the dual function of analysts;

Financial analysts often wear two hats, a marketing hat for drumming up trade and hence commissions as well as a research hat for giving "independent" advice to clients regarding how best to invest their money.

The overarching aim of analysts is to add and create value in a stock by disseminating all relevant information and communicating this to the market. However, the conflicting nature of analyst work prompts debate surrounding the value and role analysts play in creating market trends. Brokers and analysts themselves may induce anomalies in stock markets by their very actions. Herding, overreaction and under-reaction are all actions observable by analysts; by this very process of trading based on anomalies such as the momentum trading strategy, momentum in the wider market becomes more pronounced as investors follow the advice of analysts and mimic their investment behaviour. Analysts also act as transmitters of noise and pertinent value-adding information in the market.

#### **What Causes Momentum**

Momentum is inherently challenging to explain within a traditional asset pricing model. Such a model requires that high average returns are simply compensated for some form of risk; but stocks that have risen recently, or have had positive earnings surprises, typically seem to have lower risk, not higher risk as would be required for risk to explain momentum (Grundy and Martin, 2001; Griffin, Ji, and Martin, 2003). Certainly the equity of a leveraged company becomes safer when good news increases the market value of the company relative to the burden of its debt.

Explaining momentum pricing has become one of the principal battle-fields in finance between the behaviourists and the rationalists (Scowcroft and Sefton, 2005). Although the size and duration of the momentum anomalies enjoy broad acceptance, no such consensus exists for the cause of the excess returns. Momentum arises more naturally within a behavioural asset pricing model. Such a model explains momentum as a result of the interaction of imperfectly rational investors, many of whom



are individuals lacking professional investment expertise, with rational arbitrageurs.

The behaviourists focus almost exclusively on the mechanics by which new information or news is embedded in prices if investors are prone to exhibiting various psychological biases. Daniel, Hirshleifer and Subrahmanyam (1998) considered the asymmetries induced by self-attribution bias – that is, the tendency of investors to attribute positive outcomes to skill and negative outcomes to bad luck. In contrast, Barberis, Shleifer and Vishny's (1998) investors exhibit conservatism. They are slow to update their prior beliefs in the event of good (bad) news. Lo and Mackinlay (1990, Chapter 5) found that most of the momentum effects can be attributed, not to simply cross-correlation, but to positive “cross-autocovariances” (that is, when one stock does well, the tendency for similar stocks, rather than that specific stock to do well later is what causes the above-average return to the momentum portfolios). The empirical observations suggest that as market conditions improve, news slowly diffuses into the prices of similar stocks – or stocks in the same industry; after all, industrial classification is simply a way of grouping similar stocks.

These observations relate well to those of Berk, Green and Naik (1999), who showed theoretically that changes in a company's growth opportunities that are related to the company's systematic risk can generate medium-term momentum in returns. Because growth opportunities are most likely to be correlated within industries, this mechanism induces an industry momentum effect.

Also relating to empirical observations is the paper by Lewellen and Shanken (2002), which starts by stating that investors do not know the true distribution of stock returns. Therefore, they must estimate the distribution from past data, and they update the distributions as new data become available. This distribution implies that, even though investors make entirely rational investment decisions based on their estimates of the distribution of returns, *ex post* returns may exhibit some correlation.

#### **Under-reaction and Over-reaction**

Behavioural explanations of momentum fall in two main categories. The first category stresses a process of gradual adjustment to news. Stock prices initially under-react to the news, then adjust over time so that the long-term response is the

appropriate rational one. The second category stressed that irrational investors may overreact to stories of dubious relevance. If overreaction develops gradually, then stock prices may delay momentum for a period of time but will eventually reverse and return to fundamental value.

Daniel, Hirshleifer and Subrahmanyam (1998) are of the view that under-reaction is most likely to occur when fundamental news arrives that has important implications for the future cash flows of a stock it is caused by the limited ability of most investors to access and process information, and by overconfidence that leads investors to cling to their original views even in the face of relevant new information. On the other hand, Daniel and Titman (2014) stressed that overreaction is more likely to be associated with “soft” or qualitative information. For example, if investors respond gradually to soft information (e.g. place undue credence in stories about a “new era” of productivity growth as a new economic model) or tend to buy stocks that have performed well recently

#### **Empirical Review and Evidence of Momentum**

Momentum in prices has been recognized as the most robust efficiency anomaly. It has been documented in stock exchanges the world over and has persisted even after wide publican. Fama (1998) indeed recognizes the momentum phenomenon as constituting the chief embarrassment to EMH.

The findings of Fama and French (1992, 1995, 1996) and Carhart (1997) from the US equity markets establishing the significance of size, value and momentum effects in explaining variations in stock returns generated a lot of interest from various equity markets with empirical studies testing the general explanatory power of the model and the individual significance of these non-market factors in explaining stock returns better than systematic risk (beta).

Hon and Tonks (2001) investigate the presence of abnormal returns through the use of trading strategies that exploit the predictability of short run stock price movements. Based on historical returns of the largest set individual securities in the UK stock market examined to date, their paper identifies profitable momentum trading strategies as investment tools over the period 1955-96. Their result show that returns on trading strategies cannot be accounted for by a simple adjustment for beta-risk. Although they find evidence of size effect in the UK



stock market, this phenomenon cannot explain the momentum profits. However, the paper finds that these profitable investment strategies are only apparent in the 1977-96, and are not present in the earlier 1955-76 period. The implication is that momentum is not a general feature of the UK market, but is only apparent over time periods.

The evidence of momentum is not restricted to the U.S.A. Rouwenhorst (1998) obtains similar numbers as those of Jegadeesh and Titman in a sample of 12 European Countries over the period 1980 to 1995. Strong and Xu (1999) follow the methodology of Jegedeesh and Titman (1993) to document profitable price momentum strategies to the U.K market that are consistent with market under-reaction to industry-or-firm specific news. Ryan and Overmayer (2004) adduce evidence from Germany showing that relative strength (momentum) strategies based on the constituents of the DAX 100 index are “extremely profitable”. In addition Ryan and Overmayer find that the profits are neither driven by differences to betas nor attributable to size and market-to-book characteristics nor are they caused by the presence of a delayed price reaction to common factors. On the other hand, Haugen and Baker (1996) and Daniel (1996) show that although there is evidence of strong book-up-to-market effect in Japan there is little or no evidence of a momentum effect.

It has been widely shown that investors tend to flock together. This herding behaviour is documented (among others) in Grinblatt, Titman and Wermers (1995) who find that the majority of mutual funds purchase stocks based on their own past returns i.e. buying past winners. Lakonishok, Shleifer and Vishny (1994) find evidence of pension fund managers either buying or selling in herds with evidence that they herd around small stocks.

In the event study area, it has been observed that conditional on the occurrence of a public event, stocks tend to experience post-event drift in the same direction as the initial event impact. The most studied events in this genre include earnings announcements (Bernard & Thomas 1989, 1990); stock issues (Loughran and Ritter 1995; and Spiess and Affleck-Graves, 1995); repurchase, (Ikenberry, Lakonishok, & Vermaelen, 1995); dividend initiation and omission (Michaely, Thaler, Womack 1995); and analyst recommendations (Womack, 1996).

Bernard (1992) and Chan et al. (1996) use the surprise contained in earnings announcements to show that the market under-reacts. Ranking stocks by standardized unexpected earnings (SUE) they find that stocks with higher earnings surprises also earn higher returns in the period after portfolio formation. Chan et al. (1996) found spreads of 4.2% in returns of extreme deciles formed on the basis of SUE. The findings support the hypothesis of drift to earnings announcements.

Apart from earnings, there is also evidence of price ‘drift’ following other corporate announcements. Ikenberry et al (1995) find that stock prices rise on the announcement of share repurchases but then continue to drift in the same direction over the next few years. Michaely et al (1995) documents drift evidence following dividend initiation and omission. Ikenberry (1990) finds evidence of drift following stock splits while Spiess and Affeck-Graves (1995) find evidence of drift following seasoned equity offering.

While momentum is associated to a large extent with under-reacting markets overreaction could also generate momentum. Daniel (1996) and Asness (1995) observe that in post-World War II U.S data the cross-sectional and aggregate overreaction effects observed are partly masked by a momentum effect (positive serial correlation) at one-year horizon. One of the first and influential papers in the overreaction category is DeBondt and Thaler (1985) who find that stock returns are negatively correlated at the long horizon of 3 to 5 years. Chopra, Lakonishok and Ritter (1992) support DeBondt and Thaler. Other contributions have been made by Fama and French (1996), Poterba and Summer’s (1998), Richard (1997) and Carmel and Young (1997) among many others.

#### **International evidence**

Internationally, momentum is reported in several markets. In a seminal paper, Jegadeesh and Titman (1993) employ the strength-rule strategy to determine if momentum is present in US stocks for the time period 1965 to 1989. At the beginning of each month  $t$ , securities are ranked based on their performance in the previous  $j$  months (three, six, nine or twelve months) and held for a period of  $K$  months (three, six, nine or twelve months). These securities then form ten equally-weighted portfolios. The highest return portfolios are referred to as ‘winners’ and the lowest return portfolios as ‘losers’. To



increase the robustness of their strategy, Jegadeesh and Titman (1993) use a second method to form a portfolio, whereby a week is skipped between the formation and holding period to avoid the bid-ask spread price costs and lagged reaction effects. Jegadeesh and Titman (1993) find that the optimal strategy consisted of ranking stocks based on the twelve months performance and holding 'winners' and selling 'losers' for three months, with a return of 1.31 per cent per month generated. Additionally, returns reported by Jegadeesh and Titman (1993) are not generated by short-selling.

Chan et al. (2000) finds statistical evidence of momentum in 25 countries. In the Australian market, Hurn and Pavlov (2003) observe significant momentum as do Schneider and Gaunt (2012). Drew et al. (2007) also document momentum in the Australian stock market between 1998 and 2002; Phua et al. (2010) and Durand et al. (2006) report similar findings.

Evidence of momentum in European stock markets is documented by van Dijk and Huibers (2002). Patro and Wu (2004) observe momentum in a multi-country study covering 1979 to 1998. Further evidence in support of momentum is reported in Balver and Wu (2006) for developed markets and Bird and Whitaker (2003) for European markets between 1990 and 2002. Hu and Chen (2011) report momentum profits are attainable in a study of 48 countries between 1999 and 2007; specifically the greatest momentum profit is achieved in the ninth month of a holding period following a ranking period of one or three months. Also, Fong et al. (2005) report momentum in a study of 24 countries between 1989 and 2001. Evidence of momentum in Canadian stocks is reported by Hou and McKnight (2004).

Evidence of momentum in less developed or emerging markets is also documented, Swinkles (2004) asserting that both emerging and developed markets exhibit similar momentum tendencies. Momentum in emerging markets such as Thailand, Malaysia, Brazil and India is documented by Naranjo and Porter (2007). Furthermore, van der Hart et al. (2003) report momentum in several emerging markets including; Morocco, Nigeria and Sri Lanka.

Evidence of momentum is also found in Asian markets. Ramiah et al. (2011) find evidence of momentum in Asian markets between 1992 and 2006; similarly, Chui et al. (2010) observe

momentum in Asian markets between 1980 and 2003. McNish et al. (2008) observe momentum in the Japanese and Hong Kong markets; conversely, Cheng Wu (2010) find momentum profits insignificant in Hong Kong. Ryan and Curtin (2006) also report weak evidence of momentum in Asian markets. Du et al. (2009) similarly observe weak evidence of momentum in Taiwan and Thai markets.

Novy-Marx (2012) documents the relevance of the length of test period to momentum returns. Novy-Marx (2012) reports that momentum is most profitable following a test period of intermediate-length, between twelve and seven months, prior to portfolio formation period. A test period length in excess of twelve months prompts an 'abrupt' drop-off in the size of momentum profits. Additionally, very short test period lengths have an equally negative effect on momentum profits.

Evidence also suggests that momentum is not limited to stock returns but is present in the real estate market (Genesove and Mayer, 2000; company stock options (Heath et al. 1999); futures market (Locke and Mann, 2004); currencies (Okunev and White, 2003), exchange traded funds (Moskowitz et al. (2012) and bonds (Asness et al. 2013).

### 3. Methodology

#### Research Design

The research is quantitative in design. The nature of the quantitative research paradigm is to demonstrate that a relationship exists between variables.

#### Population and Sample

The target population addressed by this study comprised all companies quoted on the Nigerian Stock Exchange from 2013 to 2016; and sixty companies that are continually traded made up the sample size.

#### Data

The raw stock price data for this study is gathered from NSE through the [www.capitalassets.ng.com](http://www.capitalassets.ng.com). This is reliable data source for stock prices current explore in Nigeria. The monthly closing prices adjusted for dividends of each company that are trading on the NSE during the period of January 2013 to December 2016 are downloaded. The choice of the period is motivated by the fact that we to investigate if momentum effects exist in the recent years in Nigeria. Sixty companies that are consistently traded for the period are selected. Therefore, any



company that does not trade consistently during the formation and testing periods is excluded from the sample.

### Hypothesis

The hypothesis is stated in null form:

There is no momentum effects in the Nigerian equity market, alternatively the understudied market is efficient.

### Model Specification

A model is a simplified or idealized representation of the real world. All scientific inquiry is based to some extent on the use of models. In this section, we therefore, describe the model – that is, the set of simplifying assumptions – on which regression analysis is based.

To-date, there is no risk-based explanation that completely accounts for momentum returns. Although a number of authors have found that long term reversals are not robust to risk adjustment (Fama and French, 1996; Lee and Swaminathan, 2000; and Grinblath and Moskowitz, 2003), the intermediate return continuation has been a more resilient anomaly. Fama and French (1998) cannot explain the phenomenon using a three factor pricing model. Grundy and Martin (2001), studying the risk of momentum strategies, conclude that factor models cannot explain mean turns. Indeed the unexplained persistence of intermediate term momentum returns is viewed as one of the most serious challenges to asset pricing literature (Korajczyk and Sadka, 2004). Nevertheless, despite the burgeoning evidence to the contrary, proponents of risk based explanation have not given up (Conrad and Kaul, 1998; and Moskowitz and Grinblatt, 1998).

The study follows the approach of Ludvigsson (2018) to introduce the buy and hold return specification for each stock and cumulative buy and hold return specification. This method has been considered appropriate because it overcome the bid and ask bias in the market adjusted return.

Thus. “Buy and Hold Return Specification”:

$$R_{(B\&H)j} = \left[ \prod_{t=-12}^0 (1 + r_{jt}) - 1 \right] - \left[ \prod_{t=-12}^0 (1 + r_{mt}) - 1 \right]$$

(1)

Nigerian Stock Exchange

3 Month-Holding Period      6 Month-Holding Period      9 Month-Holding Period

Where-  $R_{(B\&H)j}$  is buy and hold return for security j at time t and it is synonymous to market adjusted return.  $r_{jt}$  is return on security j at time t and  $r_{mt}$  is the return on market at time t, and  $\Pi$  is the multiplication operator.

$$r_{jt} = (cp_t - cp_{t-1}) / cp_{t-1}$$

(2)

$$r_{mt} = (cmt_t - cmt_{t-1}) / cmt_{t-1}$$

(3)

Where-  $cp_t$  and  $cmt_t$  are monthly closing price at time t and monthly closing market index at time t respectively.

Cumulative Buy and Hold Return Specification

$$CAR_{(B\&H)P,t} = \frac{1}{n} \sum_{j=1}^n \left[ \prod_{T=1}^t (1 + r_{jt}) - 1 \right] - \left[ \prod_{T=1}^t (1 + r_{mt}) - 1 \right]$$

$$p = W, L; T = 3, 6, 9 \quad (4)$$

Where-  $CAR_{(B\&H)P,t}$  is the cumulative buy and hold return for either winners’ or losers’ portfolio at time t; and n is the number of stocks in the portfolio.

### 4. Results

The thrust of this study is to test whether momentum effects exist in the Nigerian stock market. To achieve this objective, we estimate the buy-hold and cumulative buy-hold equations in section 3 for winners’ portfolio, losers’ portfolio and zero-investment portfolio, and then compute the t-statistic for each case to confirm the rejection or otherwise of the null hypothesis that there is no momentum effects, alternatively the understudied market is efficient. However, we observed portfolio formation period of 12 months that precede the testing period or the holding period of 3, 6 and 9 months. The formation period ranges from January 2012 to December 2012, while the testing period starts from January 2013 to September 2016. The computed CARs for these periods are presented in table 1.

**Table 4.1-Results of Momentum Strategy for NSE over the Period 2013 to 2016**

Momentum Strategy



| Year    | Winner | Loser | Zero-Cost | Winner | Loser | Zero-Cost | Winner | Loser | Zero-Cost |
|---------|--------|-------|-----------|--------|-------|-----------|--------|-------|-----------|
| 2013    | 0.17   | 0.20  | -0.03     | 0.21   | 0.11  | 0.10      | 0.08   | -0.03 | 0.12      |
| 2014    | 0.01   | 0.05  | -0.04     | -0.02  | 0.09  | -0.10     | -0.10  | 0.10  | -0.20     |
| 2015    | 0.33   | 0.12  | 0.21      | 0.07   | 2.30  | -2.20     | 0.31   | 0.14  | 0.17      |
| 2016    | 1.79   | 0.27  | 1.52      | 0.05   | -0.01 | 0.06      | -0.05  | 2.24  | -2.30     |
| AVERAGE | 0.57   | 0.16  | 0.42      | 0.08   | 0.62  | -0.50     | 0.08   | 0.61  | -0.50     |

**Note that CAR of zero-cost portfolio is computed by subtracting the CAR of losers’ portfolio from the CAR of winners’ portfolio.**

The table displays the abnormal return/loss for a holding period of 3, 6 and 9 months each year from 2013 to 2016. The investors who maintained long position over a period of 3 months consistently made positive return throughout the sampling period. Likewise, those who maintained short position over this same period made positive gain. On the average, the 3-month long position provides average return of 57 percent, while the 3-month short position produces 16 percent. Meaning that under the 3-month holding period, the winners’ portfolio earns more than the losers’ portfolio. The zero-cost portfolio under the 3-month holding period earns abnormal losses -3 percent and -4 percent respectively for years 2013 and 2014, while in 2015 and 2016 3-month holding period, the strategy yields abnormal return (21 and 152 percent respectively). However, we observed that the zero-cost strategy under the 3-month holding period produces average return of 42 percent. Furthermore, under the 6-month holding period, the winners’ portfolio earns abnormal loss only in 2014; while the losers’ portfolio produces abnormal loss only in 2015. Nevertheless, on the average, each of the portfolios generates positive return (8 percent for winners and 62 percent for the losers). Thus, the decision to borrow pays better than the decision to lend. However. The combination of the two decisions (zero-cost strategy) for the 6-month holding period yields negative average return (-50 percent). Finally, under the 9-month holding period, the winners’ portfolio generates abnormal losses in 2014 and as well 2016; conversely, the losers’ portfolio only generates loss in 2013. Though both portfolios have positive average return each, but the average return on the zero-cost portfolio is negative (still -50 percent). Therefore, there is evidence that the Nigerian equity market is characterized with abnormal losses when the stocks are held for 6 or 9 months, but when they are held for 3 months, the investors stand the chances of marking abnormal return. The next important aspect of this investigation is to test whether these abnormal gain/loss are by accident (chance) or induced by momentum strategy. Therefore, we now test for momentum effects by calculating the t-statistics for CAR each holding period. Table 2 produces the results.

**Table 4.2-Test of Momentum Effects for the Holding Period**

| <b>95% Confidence Interval</b> |    |       |        |          |           |       |       |  |
|--------------------------------|----|-------|--------|----------|-----------|-------|-------|--|
| Holding Period                 | df | Mean  | T-stat | Std. Dev | Std-Error | Lower | Upper |  |
| 3MONTHS                        | 3  | 0.42  | 1.12   | 0.37     | 0.74      | -0.77 | 1.60  |  |
| 6MONTHS                        | 3  | -0.55 | -0.97  | 0.56     | 1.12      | -0.77 | 1.60  |  |
| 9MONTHS                        | 3  | -0.53 | -0.92  | 0.58     | 1.16      | -2.38 | 1.31  |  |

**Note that the critical t-statistic at 5% and 10% are 3.18 and 2.35 (using one-tail test) respectively**

The statistical test results for the momentum strategy are reported in table 2. The table shows that the mean of 3-month holding period is positive; while the two other holding periods display negative return. In addition, the abnormal return of the 3-month holding period is less volatile around its mean than that of the other two holding periods. Even though the value of the upper confidence interval is positive, the t-statistic for each holding period is less than the critical value both at 5% and 10 percent. This suggests that the momentum effects do not exist over the period 2013 to 2016. Therefore, an arbitrageurs cannot sufficiently make abnormal profit by



taking long position in the stocks that perform best in the past and short position in the stock that perform worse in the past. It is overtly evident that the momentum strategy does not exist in the Nigerian equity market, but the holding period of 3 months favors investors mostly. This is demonstrated in figure 1.

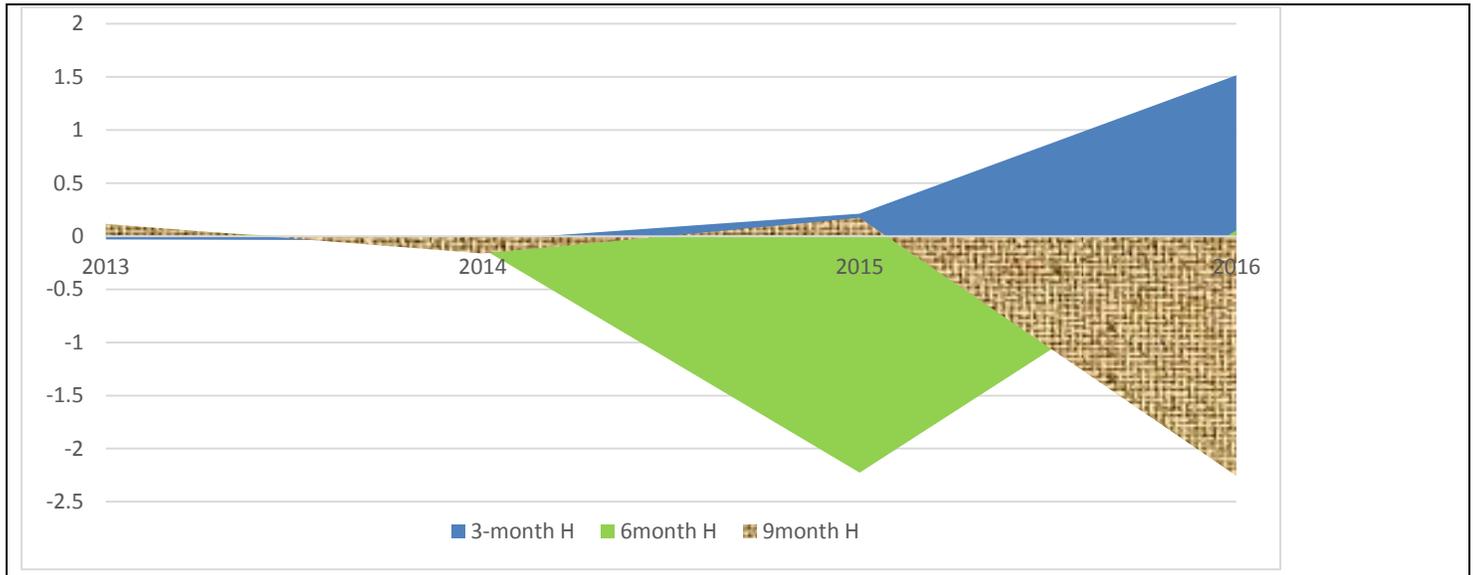
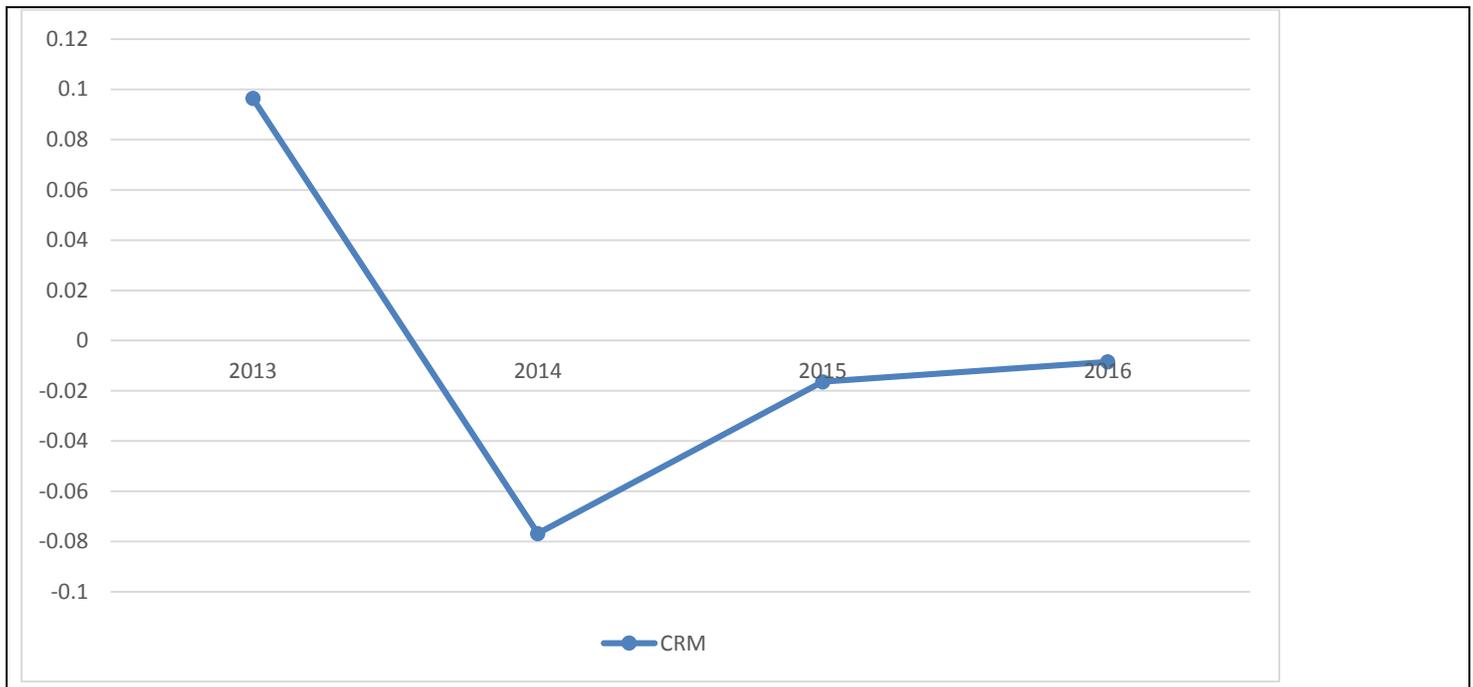


Figure 4.1- Movement of Momentum Strategy represented by Area Plot

We proceeded to analyze the effects of bearish and bullish markets on the profitability of the momentum strategy. To achieve this, we first decompose the market into two as shown in figure 2.



**Figure 4.2-Decomposition of the NSE**

As shown in the figure above the cumulative market return (CMR) is only positive in 2013. In the period of 2014 to 2016, the CMR appears consistently negative throughout. This implies that the market is bullish in 2013, but bearish in 2014 to 2016. Thus, the results of the bearish and bullish effects on the profitability of the momentum strategy are presented in table 3.

**Table 4.3-The Effect of Bullish and Bearish markets on the Momentum Strategy (2013 to 2016)**

| <b>Holding Period</b> |  | 3-Month | 6-Month | 9-Month | ACAR   |            |
|-----------------------|--|---------|---------|---------|--------|------------|
| Market-Condition      |  |         |         |         |        |            |
| OVERALL               |  |         | 0.03    | 0.08    | -0.002 | 0.04(1.56) |
| BULLISH 2013          |  |         | 0.05    | 0.09    | -0.03  | 0.03(0.96) |
| BEARISH 2014-2016     |  |         | 0.03    | 0.08    | 0.01   | 0.04(1.84) |

**Note that the figures in parentheses are the t-statistics**

The cumulative average returns for the t (3, 6 & 9) periods are calculated over the two market conditions and overall condition. The bearish market displays positive average return for all the holding periods, while the bullish market reveals positive return for 3 month and 6 month holding periods. The calculated t statistics are asymptotically low in the two cases, suggesting that

the momentum strategy is not profitable in the two market conditions.

#### **5. Conclusive Remark**

The momentum strategy appears insignificant in the Nigerian equity market. Arbitraging between the bearish and bullish markets or taking long position in the best past stock and short



position in the worst past stocks does not yield significant riskless profits. On the average the zero-cost strategy for 6-month and 9-month holding periods fail to generate positive return. This implies that when the stocks were held for these two periods, their market values do not deviate from their intrinsic values, thereby negating the under reaction hypothesis. However, for the 3- month period, the strategy produced positive abnormal return, meaning that the under reaction hypothesis is valid for this period. Finally, we conclude that investors cannot apply momentum strategy to make abnormal return in Nigeria. Therefore, the occasional abnormal returns occur by chances. However, we cannot have a firm conclusion of momentum effects outside the dominant US markets until we have a good database whose quality is internationally comparable

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Appendix

| Year | Month | Year | Month | Year | Month | Year | Month | CRM      | CRM      | CRM      | CRM      | ACRM     |
|------|-------|------|-------|------|-------|------|-------|----------|----------|----------|----------|----------|
| 2013 | JAN   | 2014 | JAN   | 2015 | JAN   | 2016 | JAN   | 0.134421 | -0.01833 | -0.14701 | -0.165   | -0.04898 |
| 2013 | FEB   | 2014 | FEB   | 2015 | FEB   | 2016 | FEB   | 0.172783 | -0.04329 | -0.12869 | -0.13763 | -0.03421 |
| 2013 | MAR   | 2014 | MAR   | 2015 | MAR   | 2016 | MAR   | 0.052303 | -0.04546 | 0.072837 | 0.057303 | 0.034246 |
| 2013 | APR   | 2014 | APR   | 2015 | APR   | 2016 | APR   | 0.011088 | -0.0271  | 0.147859 | 0.020299 | 0.038036 |
| 2013 | MAY   | 2014 | MAY   | 2015 | MAY   | 2016 | MAY   | 0.127353 | 0.070874 | 0.081888 | 0.094137 | 0.093563 |
| 2013 | JUN   | 2014 | JUN   | 2015 | JUN   | 2016 | JUN   | 0.087067 | 0.101783 | -0.03634 | 0.173706 | 0.081555 |
| 2013 | JUL   | 2014 | JUL   | 2015 | JUL   | 2016 | JUL   | 0.005251 | 0.015244 | -0.12281 | 0.016287 | -0.02151 |
| 2013 | AUG   | 2014 | AUG   | 2015 | AUG   | 2016 | AUG   | 0.004455 | -0.02249 | -0.11435 | -0.06832 | -0.05018 |
| 2013 | SEP   | 2014 | SEP   | 2015 | SEP   | 2016 | SEP   | -0.03465 | -0.02118 | 0.035223 | 0.012011 | -0.00215 |
| 2013 | OCT   | 2014 | OCT   | 2015 | OCT   | 2016 | OCT   | 0.037647 | -0.09657 | -0.01371 | -0.01268 | -0.02133 |
| 2013 | NOV   | 2014 | NOV   | 2015 | NOV   | 2016 | NOV   | 0.062866 | -0.16889 | -0.11882 | -0.10867 | -0.08338 |
| 2013 | DEC   | 2014 | DEC   | 2015 | DEC   | 2016 | DEC   | 0.096381 | -0.07678 | -0.01637 | -0.00847 | -0.00131 |

|                   |          |          |          |            |
|-------------------|----------|----------|----------|------------|
| OVERALL           | 0.034246 | 0.081555 | -0.00215 | 0.04(1-56) |
| BULLISH 2013      | 0.052303 | 0.087067 | -0.03465 | 0.03(0.96) |
| BEARISH 2014-2016 | 0.028227 | 0.079718 | 0.008684 | 0.04(1.84) |



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BEARISH

| Year | Month | Year | Month | Year | Month | CRM      | CRM      | CRM      | CRM      |
|------|-------|------|-------|------|-------|----------|----------|----------|----------|
| 2014 | JAN   | 2015 | JAN   | 2016 | JAN   | -0.01833 | -0.14701 | -0.165   | -0.11012 |
| 2014 | FEB   | 2015 | FEB   | 2016 | FEB   | -0.04329 | -0.12869 | -0.13763 | -0.1032  |
| 2014 | MAR   | 2015 | MAR   | 2016 | MAR   | -0.04546 | 0.072837 | 0.057303 | 0.028227 |
| 2014 | APR   | 2015 | APR   | 2016 | APR   | -0.0271  | 0.147859 | 0.020299 | 0.047019 |
| 2014 | MAY   | 2015 | MAY   | 2016 | MAY   | 0.070874 | 0.081888 | 0.094137 | 0.082299 |
| 2014 | JUN   | 2015 | JUN   | 2016 | JUN   | 0.101783 | -0.03634 | 0.173706 | 0.079718 |
| 2014 | JUL   | 2015 | JUL   | 2016 | JUL   | 0.015244 | -0.12281 | 0.016287 | -0.03043 |
| 2014 | AUG   | 2015 | AUG   | 2016 | AUG   | -0.02249 | -0.11435 | -0.06832 | -0.06839 |
| 2014 | SEP   | 2015 | SEP   | 2016 | SEP   | -0.02118 | 0.035223 | 0.012011 | 0.008684 |
| 2014 | OCT   | 2015 | OCT   | 2016 | OCT   | -0.09657 | -0.01371 | -0.01268 | -0.04099 |
| 2014 | NOV   | 2015 | NOV   | 2016 | NOV   | -0.16889 | -0.11882 | -0.10867 | -0.13213 |
| 2014 | DEC   | 2015 | DEC   | 2016 | DEC   | -0.07678 | -0.01637 | -0.00847 | -0.03387 |

BULLISH

| Year | Month | CRM      |
|------|-------|----------|
| 2013 | JAN   | 0.134421 |
| 2013 | FEB   | 0.172783 |
| 2013 | MAR   | 0.052303 |
| 2013 | APR   | 0.011088 |
| 2013 | MAY   | 0.127353 |
| 2013 | JUN   | 0.087067 |
| 2013 | JUL   | 0.005251 |
| 2013 | AUG   | 0.004455 |
| 2013 | SEP   | -0.03465 |
| 2013 | OCT   | 0.037647 |
| 2013 | NOV   | 0.062866 |
| 2013 | DEC   | 0.096381 |