PROFITABILITY OF MOMENTUM INVESTING STRATEGIES IN AN EMERGING MARKET

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Abstract

This paper examines the profitability of momentum strategies on the Nigerian stock market over a 20-year period, from 1996 to 2016, using all listed equities on the Nigeria Exchange Limited (NGX) All Share Index. It also evaluates whether or not the profitability of momentum strategies is conditional upon the state of the market. A momentum strategy creates and buys a portfolio of past winners and short-sells a portfolio of past losers to generate excess profit. Our result shows that the Nigerian stock market exhibits medium-term price momentum, with eight out of sixteen strategies recording statistically significant excess momentum returns. The main contribution to the profit is from investing in winner portfolios, all of which recorded positive returns, and mostly significant. Evidence also shows that momentum profits depend on the state of the market. The momentum effect follows the UP market with a mean return of 0.2938%, while it is insignificant in the DOWN market with a mean return of -0.0237%. This paper offers valuable insight into market behavior, highlights the opportunities for alpha generation, and contributes to our understanding of market efficiency in emerging markets.

Keywords: Momentum Strategy, Efficient Market Hypothesis, Jegadeesh and Titman, Nigeria Exchange Limited, Market Anomaly

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1. INTRODUCTION

The focus of this study is the momentum effect which was first reported by Jegadeesh and Titman (1993), who studied US stocks during the period 1965–1989 and found that momentum strategies generated statistically significant excess returns. They reported that the strategy of selecting stocks based on their past six months’ returns and holding them for six months generated an excess return of 12.01% per year on average. Importantly, their results also indicated that the strategy’s profitability was not due to systematic risk.
Since their seminal work, other researchers have studied the momentum phenomenon across international stock markets, and evidence shows that it is prevalent and persistent in almost all stock markets (Rouwenhorst, 1998, 1999; Chan et al., 2000; Griffin et al., 2003) and different asset classes (Miffre & Rallis, 2006; Jostova et al., 2012; Liu et al., 2020; Asness et al., 2012; Zaremba et al., 2019; Dohrnyskaya, 2021; Jia et al., 2022). This is a clear violation of the efficient-market hypothesis (EMH) which was strongly validated by a large body of work soon after it was developed in the 1960s. However, from the early 1980s, researchers started to observe several puzzling anomalies in financial markets that seemed to call into question the validity of the EMH and its fundamental assumptions. Apparently, the framework could not provide plausible explanations for these observations.

Several researchers have investigated the impact of different market states on the profitability of momentum strategies, but the results have been conflicting. While some studies reported that the momentum effect is not impacted by market states (Griffin et al., 2003; Pathirawasam & Kral, 2012; Gharalbeh et al., 2022; Ali & Joshi, 2022), other studies have provided evidence that momentum strategies are more profitable in specific market conditions rather than others (Rey & Schmid, 2007; Cooper et al., 2004; Huang, 2006; Siganos & Chelley-Steeley, 2006; Wang et al., 2009; Daniel & Moskowitz, 2013; Liu & Galvani, 2018).

The study will enrich the literature on the momentum effect in the equities market. It is the first study to investigate the momentum phenomenon of the Nigeria Exchange Limited (NGX). The output will therefore contribute to the current debate and fill a yearning knowledge gap. The study is also significant because of the strategic importance of Nigeria not only in Africa but globally. Currently, the largest economy in Africa, Nigeria’s gross domestic product (GDP) was estimated at $1.085 trillion at the end of 2022 in terms of purchasing power parity. However, when adjusted for the size of the informal economy it is estimated to be $2.023 trillion (+87%), which will make it the 18th largest economy globally (World Economics, n.d.). Driven by the growth of the Nigerian economy and rapidly expanding investment opportunities, the NGX, which is currently by far the largest in the West African sub-region and the third largest in Africa, holds the potential to become a major hub of regional/international capital market activities in the foreseeable future. It is therefore important to understand the key features of the exchange.

Lastly, the study will serve as a guide to market stakeholders including investors, fund managers, and regulators. If there is convincing evidence that indeed momentum strategies are profitable, then investors and fund managers can design feasible trading strategies to take advantage of the opportunities. On the part of regulators, appropriate intervention in the stock market would be motivated by the validity or otherwise of the EMH. If the market is found to be informationally inefficient, then there is a compelling case for the regulator to step in swiftly during stock market bubbles to moderate irrational exuberance and prevent catastrophic downturns.

The following research questions are addressed in this paper:

RQ1: Are momentum strategies profitable in the Nigerian stock market?
RQ2: Are momentum strategies conditional upon the states of the market?

Using monthly close prices of all listed equities on the NGX from April 1996 to December 2016, and the methodology of Jegadeesh and Titman (1993), this study confirms that the NGX exhibits momentum, similar to what obtains in other emerging markets as reported in the literature. We also tested for the impact of two different states of the market on the profitability of momentum strategies. A sample of five sub-periods was selected between 1996 and 2016, and classified as either an UP market or a DOWN market. UP market is defined as a period when the market’s two-year lagged return is non-negative, while a DOWN market is a period when the two-year lagged market return has been negative. The result indicates that momentum profits are driven by market conditions. The momentum effect follows the UP market while it is insignificant in the DOWN market.

The remainder of this paper is organized as follows. Section 2 reviews the theoretical foundation and related literature. This is followed by Section 3 which discusses the methodology of the study. Section 4 presents the empirical results and findings, followed by Section 5 where the findings are discussed and interpreted in the context of the literature. Section 6 presents a conclusion, makes policy recommendations, and gives suggestions for future research.

2. LITERATURE REVIEW AND HYPOTHESES

This study is anchored on EMH with the premise that prices of securities rapidly incorporate new information thereby precluding profit opportunities. In other words, prices always fully reflect the information available and no profit can be made from information-based trading (Lo & MacKinlay, 1999). This scenario reflects a random walk, whereby the degree of randomness of the sequence of prices reflects the level of informational efficiency of the market.

Price momentum was first demonstrated by Jegadeesh and Titman (1993), who reported that forming a zero-investment trading portfolio by buying stocks that have performed relatively well in the recent past (3-to-12 months) and simultaneously selling stocks that have performed relatively poorly in the past generates significant positive payoffs over various holding periods. That is, winners tend to remain winners and losers tend to remain losers in subsequent periods. Further to their evidence, several researchers documented similar results from stock markets across the globe using the strategy. Studies by Rouwenhorst (1998, 1999), Chan et al. (2000), and Griffin et al. (2003) supported this position.

Indeed, the momentum effect has had a tremendous impact on the financial markets globally. From the perspective of an investor, it presents a robust, effective, and tested trading strategy for almost all asset classes. Rouwenhorst (1998) reported that the momentum strategy was found to be effective when applied in 12 European countries.
Carhart (1997) tested the effect of momentum on the performance of mutual funds and reported that the persistence of mutual fund performance could be explained by the momentum effect, with the strategy yielding a monthly return of 0.67%. Similarly, the momentum effect was found in the commodity futures market (Miffre & Railis, 2006), in corporate bonds (Jostova et al., 2012), and in cryptocurrencies (Liu et al., 2020; Dobrynskaya, 2021; Jia et al., 2022). Asness et al. (2012) and Zaremba et al. (2019), demonstrated the existence of momentum across geography and asset classes by creating profitable momentum-based portfolios in the equities markets in the US, UK, and Europe, and for a variety of asset classes including stock indexes, treasury bills, government bonds, commodity futures, and currencies.

Studies on the momentum effect on the Nigerian stock market are sparse. However, insight could be gained from a couple of studies on emerging markets in which Nigeria was included in the sample. Rouwenhorst (1999) investigated the momentum effect using a sample of over 1700 firms from 20 emerging market countries. They found significant momentum returns of 1.43% per month in Nigeria, one of the highest reported in the study. In another study, van der Hart et al. (2003) examined the profitability of a broad range of stock selection strategies in 32 emerging markets over the period 1985–1999, with Nigeria included in the sample. They reported a six-month momentum profit of 1.01% for Nigeria which is significant at the 1% level. This supports the result of Rouwenhorst (1999). Overall, the results are in line with an average excess return of 1% per month in the US and a similar return for a diversified European portfolio reported by Jagadeesh and Titman (1993), and Rouwenhorst (1998) respectively, indicating that the NGX exhibits momentum at a similar level.

Hanauer and Lauterbsach (2019) in a more recent study validated the existence of the momentum effect in emerging markets. They used monthly stock returns from 28 emerging market countries over a period of 21 years to examine the effectiveness of various factors in predicting stock market trends. They found consistent abnormal returns linked to factors such as cash flow-to-price, gross profitability, composite equity issuance, and momentum. These abnormal returns were evident across portfolios sorted by equal- and value-weighted methods, as well as in cross-sectional analyses.

Chui et al. (2000) examined momentum profits in eight Asian markets. They report momentum profits of 0.376% monthly in common stocks listed on eight Asian stock markets during the period from 1976 to 2000. Their evidence shows that momentum strategies are highly profitable in the Asian markets except for Japan. They suggested that perhaps, foreign ownership could explain the absence of momentum effect in Japan. Griffin et al. (2003) studied momentum profits globally, using a sample of forty countries. They found large and significant annual momentum profits in Africa (19.62%), the Americas, excluding the US (9.41%), Europe (9.21%), and Asia (3.83%). They found it noteworthy that the price momentum in Asia was clearly weaker than that in other parts of the world.

Efforts have been undertaken by a number of researchers to offer a viable rationale for the momentum effect, yet a consensus has not been reached in the academic literature. Prominent financial models, such as the capital asset pricing model (CAPM) and the Fama-French 4-factor model have fallen short of providing a satisfactory explanation for momentum profits (Jagadeesh & Titman, 1993; Fama & French, 1996). In contrast, proponents of behavioral finance have sought to elucidate the momentum effect through the lens of investor psychology. Some researchers have proposed that investor overconfidence could account for the momentum effect (Daniel et al., 1998; Luo et al., 2021; Meier et al., 2021). Building on this line of thought, a recent study by Quy Duong and Bertrand (2023) focused on the momentum effect within the context of Vietnam. Their research presents empirical substantiation for the existence of momentum within Vietnam's equity market and suggests a link between momentum profits and investor overreaction. This highlights the nuanced interplay between investor behavior and market dynamics in shaping the momentum phenomenon.

Other researchers have investigated the impact of market states on the profitability of momentum strategies. Rey and Schmid (2007) studied the Swiss market using the largest blue-chip stocks in the Swiss Market Index (SMI) as a sample and investing in single stocks rather than deciles of stock. They reported that arbitrage portfolios investing in only one winner and one loser stock at the same time recorded annualized average returns of up to 44% and that the momentum effect was stronger during a strong bear market sub-period.

Griffin et al. (2003) investigated the linkage between macroeconomic risk and momentum in forty countries and reported the existence of large momentum profits. They observed that international momentum profits were generally positive in all macroeconomic states. However, using data on all New York Stock Exchange (NYSE) and American Stock Exchange (Amex) stocks listed on the Center for Research in Security Prices (CRSP) monthly file and selecting a sample period between January 1926 to December 1995, Cooper et al. (2004) reported that profits to momentum strategies depended on the state of the market. They defined a “UP” (“DOWN”) market as when the past 12-, 24- or 36-month market return is non-negative (negative) and observed that a six-month momentum portfolio was profitable only following periods of market gains.

Huang (2006) examined the impact of market states on momentum profit in an international context and corroborated the assertion that momentum profits came from UP markets. However, he gave a slightly different definition of the states of the market using international stock index return data and lagged industrial production growth. He suggested that a UP market was better defined based on the previous 1 or 2-year market returns rather than the previous 3-year market return.

Siganos and Chelley-Steeley (2006) using data from the London Stock Exchange (LSE) examined the magnitude of momentum profitability achieved following bull and bear markets. They reported that investors could gain stronger momentum profits by adopting the momentum in Asia market returns after poor lagged market returns; that is, momentum profits were more pronounced in bear markets. Their evidence also shows that the longer the duration used to
describe the bear state, the stronger the momentum returns that are realized. They reported that on the other hand, momentum profits became negative after strong market gains. This position is inconsistent with Cooper et al. (2004) and Huang (2006).

In their study of the impact of different states of the market on the profitability of momentum strategies, using weekly data from the Taiwan Stock Exchange (TWSE) over a 10-year period from 1997 to 2006, Wang et al. (2009) reported that market conditions in the formation period were positively associated with the profitability of the momentum strategies.

Pathirawasam and Kral (2012) examined the momentum effect at the Colombo Stock Exchange (CSE) from 1993 to 2008. Their result indicated that the states of the market in the formation period were not associated with the profitability of the momentum strategies. Their evidence also shows that momentum profits are significantly positive in the down market, but in contrast, are positive but not significant in the up market.

Daniel and Moskowitz (2013) investigated “momentum crashes” on the US stock market using a sample period of 1927 through 2013. They reported that momentum was affected by the state of the market, stating that during a “normal” market environment, price momentum was persistent in the equity market. On the other hand, in a bear market or “panic” state following market declines, particularly when volatility was very high, the momentum effect reversed upon a market rebound. They observed that this happens because as the market starts to rebound following a downturn, the losers experience strong gains, resulting in a “momentum crash” since momentum strategies short losers. They concluded that momentum is positive in a normal/bull market but negative in a bear market.

Dolvin and Foltice (2017) evaluated the profitability of momentum trading in the US equity markets from 1986 to 2015. They found that in the earlier part of their sample, 1986–2006, a period before the 2008 global financial meltdown, their results were in line with previous studies where momentum profits were pervasive. However, their results were different for more recent sub-periods post-2008 (i.e., 2007–2013 and 2010–2015). They found that the alphas for the “winner” portfolio, which in the past had been the highest, were negative during both sub-periods. They also noted that the shape of the return distribution had changed, now following a U-shaped curve rather than being monotonic.

Gharaibeh (2017) studied momentum in the Arabic market using data from January 1989 through August 2013. Evidence from the study shows the strong presence of momentum profits in the 10 Arabic markets, at all formation periods. Li and Galvani (2018) reported that momentum profits in corporate bonds were conditional upon the state of the market (UP/DOWN), thereby corroborating established evidence in the equities market. They found that momentum profits followed UP markets while losses followed DOWN markets. They noted also that momentum gains arose from low sentiment. Spulbar et al. (2019) studied the momentum effect in India and found evidence of a strong momentum effect in the short-term but which weakened in the medium term and ultimately disappeared after 12-month look-back and 12-month holding periods (J12K12).

Grobs and Kolari (2020) investigated momentum strategies at the industry level. They found evidence of momentum in industry portfolios, with portfolios that outperformed in the previous month significantly outperforming loser portfolios in the subsequent month. Similarly, Saflar et al. (2022), studied the momentum effect in the Moroccan industries and the impact of the states of the market on the momentum effect. They reported statistically significant momentum in the Moroccan industries. However, they observed that momentum was not affected by the states of the market as the phenomenon was noticeable in both UP and DOWN markets.

Ali and Joshi (2022) studied the momentum in India, specifically to evaluate the effect of a market slowdown on momentum profits. They divided the study period into boom and bust periods and selected 110 odd largest companies by market capitalization listed on the National Stock Exchange (NSE) of India for their investigation. Their result shows the statistical performance of momentum profits during both boom and bust periods. They conclude that momentum persisted irrespective of the state of the economy.

In Vietnam, Nguyen and Hoang (2022) evaluated short-term momentum using weekly return data. They reported that strategies that used a look-back period of four, eight, or 13 weeks and a holding period of one, four, eight, or 13 weeks were profitable. Evidence from the study revealed that momentum profits were maximal across large and medium-sized stocks. They concluded that momentum arose from time-series patterns in returns and that conventional risk did not explain the momentum effect. Chen et al. (2023) studied the momentum effect in the Taiwan market which has had a history of not exhibiting momentum. They reported the existence of momentum when a strategy that buys persistent winners and sells persistent losers was employed. They also opined that momentum strategies based on persistence are profitable in international markets, particularly those that do not normally exhibit momentum. Fan and Qiao (2023), reported evidence of profitable commodity momentum strategies in both the US and China, largely owing to a sector effect. However, while the momentum effect in the US market was more risk-based, in China, risk premia did not fully explain the momentum effect.

Based on the literature some common themes in the momentum literature can be highlighted. First, there is abundant evidence from studies across the world that the momentum effect is prevalent in the financial markets, although the strength of the momentum effect varies from one region/country to the other. Further, the momentum effect appears stronger in the developed markets (US and Europe), compared with Asia and other emerging markets (Butt et al., 2020). Asia exhibits the weakest momentum effect overall, with Japan not exhibiting momentum (Hanauer, 2014; Gao et al., 2021; Li et al., 2021; Li et al., 2022; Tabasam et al., 2022).

Finally, there are some aspects of the momentum literature on which researchers hold divergent views. This includes explanations for the momentum effect and the impacts of different states of the market on momentum.
Anchored on the literature, we hypothesize that:

H1: Momentum strategies are profitable on the Nigerian stock market.

H2: Momentum profits are not conditional upon the states of the market.

3. RESEARCH METHODOLOGY

Scholars employ diverse approaches to examine the momentum phenomenon within financial markets. These methodologies aid in dissecting and comprehending the existence, continuity, and fundamental catalysts of momentum. Research methods encompass scrutinizing historical data through empirical analysis, investigating time series patterns, comparing performance across different entities via cross-sectional analysis, employing established risk-factor models like Carhart’s 4-factor model, delving into behavioral finance theories, and harnessing the power of machine learning and data analytics. However, in this study, the empirical methodology has been chosen as the means to investigate the momentum effect.

3.1. Equity data

Monthly close prices of all listed equities on the NGX from April 1996 to December 2016 (20 years) were used. This includes close prices of all stock on the Premium Board, Main Board, and the Alternative Securities Market (ASeM), obtained directly from the NGX. The data were adjusted close prices, and all returns were computed from close to close. The historical annual NGX All Share Index data from 1996 to 2016 was also obtained. This was used to determine the trend of the stock market and to compute returns to the market to define the periods of the UP market and DOWN market respectively.

3.2. Formation of momentum portfolios

In forming momentum portfolios, the study adopts the methodology of Jegadeesh and Titman (1993), with slight modifications. The starting point is computing the ranking/formation period returns for all the listed equities. From the universe of stocks, the methodology of Jegadeesh and Titman (1993) was followed every month, to increase the power of the statistical tests because of the resulting larger sample size. The historical annual NGX All Share Index data from 1996 to 2016 was also obtained. This was used to determine the trend of the stock market and to compute returns to the market to define the periods of the UP market and DOWN market respectively.

At the beginning of each month \( t \), the securities are ranked in ascending order based on their cumulative returns in the past \( J \) months. Next, using these rankings, ten decile portfolios are constructed, comprising equal weights of the stocks selected into each of the ten portfolios formed. The top decile portfolio is called the “loser” decile and the bottom decile is called the “winner” decile. The returns from the “loser” and “winner” portfolios for each period are evaluated. The holding period returns of the decile portfolios are the equally weighted returns of the firms in the portfolio over the one-month holding period from the close price of the last trading day of the previous month through the last trading day of the current month.

Table 1. Matrix of different formation and holding periods yielding sixteen momentum strategies

<table>
<thead>
<tr>
<th>Formation period (J)</th>
<th>Holding period (K)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>J3K3 J3K6 J3K9 J3K12</td>
</tr>
<tr>
<td>6</td>
<td>J6K3 J6K6 J6K9 J6K12</td>
</tr>
<tr>
<td>9</td>
<td>J9K3 J9K6 J9K9 J9K12</td>
</tr>
<tr>
<td>12</td>
<td>J12K3 J12K6 J12K9 J12K12</td>
</tr>
</tbody>
</table>

Source: Author’s elaboration.

In addition to the winner and loser portfolios, we evaluated the returns to zero-investment (winner-minus-loser) portfolios, which is the difference between the returns of the winner and loser portfolios for each period. The zero-investment portfolio depicts a scenario where in each month \( t \), the strategy buys the winner portfolio and short sells the loser portfolio, holding this position for \( K \) months, where \( K \) is the holding period of 3, 6, 9, or 12 months. For each month \( t \), the momentum profit is obtained by computing the difference between winner and loser portfolio returns.

Consistent profitability of zero-cost strategies is an indication of market inefficiency. Overall, the combination of different formation \( J \) and holding \( K \) periods yielded a total of sixteen momentum strategies as shown in the matrix in Table 1. Portfolios with overlapping holding periods were used in line with much of the momentum literature (Rouwenhorst, 1998, Jegadeesh & Titman, 1993, 2001), whereby the investment strategy was followed every month, to increase the power of the statistical tests because of the resulting larger sample size. This implies that at any month \( t \), a series of momentum portfolios are held from the previous \( K-1 \) months. Therefore, for every month \( t \), the strategy buys the winner portfolio and sells the loser portfolio, as well as closes out the position initiated in month \( t-K \). For instance, in the sixth month, the monthly return of a six-month holding period portfolio is computed by using an equally weighted average of portfolio returns of the current month’s strategy, and the strategies from each of the last five months.

Table 2. Illustration of the process of forming momentum portfolios showing the link between the formation period, holding period, and gap period

<table>
<thead>
<tr>
<th>Momentum strategy</th>
<th>Formation period (J)</th>
<th>Gap</th>
<th>Holding period (K)</th>
</tr>
</thead>
<tbody>
<tr>
<td>J3K3</td>
<td>1 2 3 4 5 6 7 8 9</td>
<td>1</td>
<td>1 2 3 4 5 6 7 8 9</td>
</tr>
<tr>
<td>J6K6</td>
<td>1 2 3 4 5 6 7 8 9</td>
<td>1</td>
<td>1 2 3 4 5 6 7 8 9</td>
</tr>
<tr>
<td>J6K9</td>
<td>1 2 3 4 5 6 7 8 9</td>
<td>1</td>
<td>1 2 3 4 5 6 7 8 9</td>
</tr>
</tbody>
</table>

Source: Author’s elaboration.
Following the approach of several momentum effect studies in the literature (Jegadeesh & Titman, 1993; Asness, 1995; Fama & French, 1996; Griffin et al., 2003), a gap of one month is allowed between the end of the ranking period and the start of the holding period. This is to avoid the short-term, one-month reversal effect reported by Jegadeesh (1990), and Lehmann (1990). That is, the holding period begins one month after the end of the ranking period as illustrated in Table 2.

In analyzing the data, the average returns of all the winner minus loser portfolios for the different strategies adopted are determined, and the t-statistic is used to assess whether the returns are significant or not.

### 3.3. Evaluation of momentum portfolios

We tested for the significance of the results obtained from the winner, losers and zero-cost portfolios to ensure the robustness and validity of our inferences. The test is designed to either accept or reject the null hypothesis formulated at a 5% level of significance (or equivalently, a 95% level of confidence).

**H1**: Momentum investing strategies do not yield statistically significant excess profits on the NGX.

In other words, winners and losers have the same expected returns in the holding period; \((R_{\text{w}} - R_{\text{l}}) = 0\).

**H2**: Momentum investing strategies are equally profitable during UP markets and DOWN markets.

In other words, \((R_{\text{up}} - R_{\text{down}}) = 0\).

The t-test is implemented using the formulae in Eq. (2) below.

\[
t = \frac{x - \mu}{s/\sqrt{n}}
\]  

where, \(x\) is the mean return of the portfolio, \(\mu\) is the mean return of the population, \(s\) is the standard deviation of the sample, and \(n\) is the total number of observations made.

If the computed t-value exceeds the critical t-value at the 5% level of significance, the null hypothesis is rejected.

### 3.4. Momentum effect and the states of the market

To test for the impact of different states of the market on the profitability of momentum strategies, a sample of five sub-periods was selected between 1996 and 2016, and classified as UP market or DOWN market as appropriate. Following Cooper et al. (2004), a UP market is defined as a period when the market’s two-year lagged return is non-negative, while a DOWN market is a period when the two-year lagged market return is negative. Further support for this approach is provided by Siganos and Chelley-Steeley (2006). The NGX All Share Index data from 1996 to 2016 was used to compute the annual return and the lagged 2-year return of the market (see Figure 1). Five sub-periods, detailed in Table 3, were then selected from the 20-year sample, and classified as UP market or DOWN market as applicable.

#### Table 3. Classification of 5 sub-periods as UP or DOWN market

<table>
<thead>
<tr>
<th>Serial No.</th>
<th>Period</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>January 1999 to January 2000</td>
<td>DOWN market</td>
</tr>
<tr>
<td>2</td>
<td>January 2001 to January 2008</td>
<td>UP market</td>
</tr>
<tr>
<td>3</td>
<td>January 2009 to January 2012</td>
<td>DOWN market</td>
</tr>
<tr>
<td>4</td>
<td>January 2013 to January 2015</td>
<td>UP market</td>
</tr>
<tr>
<td>5</td>
<td>January 2016 to December 2016</td>
<td>DOWN market</td>
</tr>
</tbody>
</table>

Source: Author’s elaboration.
4. RESULTS

Table 4 highlights the average returns to the zero-cost momentum portfolios for the 16 strategies adopted for this study. The result shows that all winner portfolios from the sixteen strategies adopted recorded positive and significant momentum profits at a 5% level with an average return of 0.4136% per month. In addition, fifteen out of the sixteen loser portfolios recorded positive and significant momentum profits at a 5% level. Only the loser portfolio of the J3K3 strategy showed a positive but insignificant profit. The average return of the loser portfolios was 0.2360% per month.

Table 4. Returns and t-statistics of momentum portfolios

<table>
<thead>
<tr>
<th>Momentum strategy</th>
<th>J = 3</th>
<th>J = 6</th>
<th>J = 9</th>
<th>J = 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>win-los</td>
<td>0.613***</td>
<td>0.335***</td>
<td>0.287***</td>
<td>0.243***</td>
</tr>
<tr>
<td>win-los</td>
<td>0.253***</td>
<td>0.127*</td>
<td>0.124**</td>
<td>0.081*</td>
</tr>
<tr>
<td>t-stat</td>
<td>2.571</td>
<td>1.540</td>
<td>1.696</td>
<td>1.294</td>
</tr>
<tr>
<td>win-los</td>
<td>0.197***</td>
<td>0.110</td>
<td>0.097</td>
<td>0.062</td>
</tr>
<tr>
<td>t-stat</td>
<td>2.005</td>
<td>1.267</td>
<td>1.237</td>
<td>0.886</td>
</tr>
<tr>
<td>win-los</td>
<td>0.169***</td>
<td>0.080</td>
<td>0.044</td>
<td>0.043</td>
</tr>
<tr>
<td>t-stat</td>
<td>1.712</td>
<td>0.666</td>
<td>0.544</td>
<td>0.577</td>
</tr>
</tbody>
</table>

Note: *** significant at 99%, ** significant at 95%, * significant at 90% level. Source: Author’s elaboration.

For the zero-cost portfolios (winner minus loser), eight out of the sixteen strategies yielded significant profits at a 5% level (see Table 4), with an overall average return of 0.1776% per month. Of all the strategies, the zero-cost strategy that yielded the highest profit was the J3K3 strategy which had three three-month formation periods and three three-month holding periods, with a return of 0.613% per month. The lowest return was earned by the J12K12 with twelve months formation period and twelve months holding periods, yielding a return of 0.043% per month.

All the strategies with a formation period of three months (J = 3) yielded positive and significant profits at a 5% level irrespective of the holding period, with an average profit of 0.367%. Similarly, all strategies with a holding period of three months (K = 3) yielded positive and significant profits at a 5% level irrespective of the formation period, with an average profit of 0.308%.

Figure 2. Profitability of the sixteen momentum strategies

5. DISCUSSION

Evidence from this study shows that momentum investing strategies yield positive and significant returns on the NGX. The most profitable momentum strategy is the J3K3 with a profit of 0.613% per month, which is significant at the 1% level. This
return exceeds the momentum profits for the global market (0.53%) and emerging market (0.39%) reported by Griffins et al. (2003) and Rouwenhorst (1999) respectively. However, it is lower than the momentum profit reported by Jegadeesh and Titman (1993) in the US where the J12K3 strategy that skipped a week yielded the highest profit of 1.49% per month. This result is consistent with the literature that momentum profits are generally higher in developed markets than in emerging markets (Butt et al., 2020).

Further, evidence from this study shows that the momentum effect on the NGX is strong and significant at the short to medium-term horizon; that is, over a period of about 12-to-15 months covering both the formation and holding period. The momentum effect wanes significantly after this period and appears to reverse. It is not surprising therefore that the three-month formation, three-month holding period strategy produces the highest return of all the strategies. Further, all strategies with a combination of formation periods above six months ($f > 6$) and holding periods above three months ($k > 3$) yield insignificant returns. Clearly, momentum profits decline as the formation and holding periods increase (see Table 3 and Figure 2).

The superior profitability of the 3-month formation period strategies to longer-term formation strategies is a deviation from the literature which suggests that momentum strategies with longer formation periods are generally more profitable. Several momentum studies have adopted a six-month formation period in creating momentum portfolios based on this premise. A possible explanation for the progressive decline of the momentum effect as the formation and holding periods increase is perhaps the existence of a contrarian effect on the NGX which takes effect from about twelve to fifteen months rather than the much longer reversal period of three to five years reported by De Bondt and Thaler (1985).

Our result indicates that the major driver of the zero-cost return is the winner portfolio, as all winner portfolios showed positive and significant returns that exceeded the returns of loser portfolios. This is consistent with observations from most studies in the literature (Nnadi & Tanna, 2019).

Finally, on the NGX, momentum profits decidedly follow the UP market while they are insignificant in the DOWN market. The mean momentum returns from UP markets of 0.2938% per month is positive and statistically significant, while the mean return from the DOWN market is -0.0237%, and is statistically insignificant. The excess return of the UP market over the DOWN market is statistically significant at 0.3175% per month. There is no consensus in the literature regarding the impact of the state of the market on the momentum effect. While Cooper et al. (2004), Huang (2006), and Li and Galvani (2018) reported that momentum profits follow UP markets, Rey and Schmid (2007), and Siganos and Chelley-Steeley (2006) found evidence that the momentum effect follows the bear market. On the contrary, Griffin et al. (2003) and Gharaibeh et al. (2022), reported that international momentum profits are generally positive in all macroeconomic states.

6. CONCLUSION

This study investigates the momentum effect on the NGX from 1996 to 2016. The study is significant in that it contributes to the debate in the literature on the momentum anomaly which has been sparsely investigated in developing markets, particularly on the NGX. Further, Nigeria has the potential to be the top investment destination in Africa in view of its enormous growth potential. It is therefore important to gain an insight into the key features of the NGX among which is its level of efficiency and whether it exhibits momentum or not.

The result of the study indicates that the average returns of winners exceed the average returns of losers, giving a statistically significant momentum return, therefore adding new evidence to the existence of the momentum effect in emerging stock markets. Sixteen strategies were formed using a combination of formation and holding periods (3, 6, 9, and 12 months). Positive returns were generated by all sixteen strategies buying the best past-performing stocks and selling the worst past-performing stocks. The result shows that the excess returns on eight of the strategies were statistically significant at a 5% level, with the J3K3 zero-cost strategy (that is, three-month formation, three-month holding period) yielding the highest profits.

The study also investigated the impact of the UP and DOWN states of the market on the profitability of momentum strategies. The result indicates that momentum profits are driven by market conditions. Statistically significant mean returns were recorded during UP markets, while DOWN markets yielded negative and insignificant mean returns. Overall, the average momentum returns of UP markets exceed DOWN markets’ returns. This result supports the findings of several researchers who reported that the momentum effect follows the UP (or boom) market state while it is insignificant in the DOWN (or bust) market state.

A limitation of this study is the fundamental assumption that zero-cost momentum portfolios could be constructed by buying a portfolio of winners and short-selling a portfolio of losers without friction on the NGX. This is currently not feasible because there are restrictions on short selling on the NGX. Naked short-selling, which is more flexible and involves selling shares a broker does not own, without borrowing them or planning to borrow them, is prohibited. This scenario makes it quite challenging to implement momentum strategies as assumed in this study. In the first instance, the required securities may not be available to borrow at a given time. Secondly, the process of engaging in securities borrowing/ lending at the frequency required by the momentum strategy will not only be cumbersome but will likely impose additional costs.

Another limitation of the study is that it does not consider the effect of transaction costs on momentum trading strategies. Transaction costs are lower in developed markets compared to emerging markets (Humphrey-Jenner & Wu, 2013). This factor could significantly affect the profitability of momentum trading strategies in Nigeria in view of the high volume of transactions and the attendant cost required to sustain it.
Finally, the study does not take into cognizance the liquidity of stocks in constructing portfolios of winners and losers, as all stocks that have sufficient trading data are included in selecting samples of winners and losers. It should be noted that it may not be possible to trade illiquid stocks as frequently as required in implementing momentum strategies. The study recommends that future studies should consider exploring the impact of transaction costs and liquidity on the profitability of momentum strategies on the NGX. Further, following the observation in this study that the momentum effect is quite strong on the NGX, but only within 12-to-15 months of the formation and holding period, it would be useful if future research efforts were directed at investigating the contrarian effect on the NGX. This will help to better understand the link between the momentum and contrarian anomalies, and how they impact equity prices and profitability of momentum strategies.

REFERENCES