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# Momentum Strategies and Stock Returns: A Case of Saudi Stock Market*

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## Abstract

This paper investigates the presence of momentum profits in the Saudi stock market. The study applied a quantitative method by utilizing monthly closing prices of 194 listed firms on Tadawal (Saudi Stock Market). The data from January 2010 to February 2019 is taken from the Tadawal market database for analysis. The sample is further divided into two equal sub-samples based on the structural changes that occurred in the Saudi stock market. Moreover, the high- and low-value traded portfolios are also constructed to examine the presence of momentum profits. Sixteen investment strategies are formed for each sample. The results show a very strong presence of momentum profits in the Saudi stock market for the full sample as well as for the sub-samples. The momentum profits are observed for a longer investment horizon. The results confirm that the short or medium-term formation of portfolios produces negative momentum returns for high-value traded stocks. The low-value traded stocks portfolios give similar results to the full sample results in terms of momentum profits. The results suggest that an investor should keep an eye on the past performance of desired stocks for at least three-nine months in which they are willing to invest.

**Keywords:** Momentum Profits, Value Traded Stocks, Emerging Market, Frontier Market

**JEL Classification Code:** G14, G15, G11

## 1. Introduction

The prime interest of the financial market's investors is the predictability of stock return. In early 1970, it was broadly concluded that stock returns are unpredictable at large. Later on, during 1980, the efficiency of stock markets was seriously questioned when the researchers found the predictability of stock returns (De Bondt & Thaler, 1985). Jegadeesh and f (1993) further confirmed the regularities and predictability of stock returns during the 1990s. In developed markets, the presence of momentum profits is strong evidence of stock predictability. According to Jegadeesh and Titman (1993) buying recent outperforming stocks (winners) and selling current underperforming stocks (losers) is called momentum because outperforming securities always remain winners, and underperforming securities remain losers.

The presence of momentum profits in developed markets is also documented in recent studies (Fama & French, 2012; Novy-Marx, 2012). Jegadeesh and Titman (1993) documented that higher returns firms with three months to 1-year time horizons remained higher returns firms over low returns firms for the same time horizon. De Bondt and Thaler

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(1985) found return reversals over longer horizons. Over long-time horizons of three to five years, firms with poor returns performed well over firms with good returns for the same time horizons. Literature explained this phenomenon through market overreaction to information or microstructure biases. Dubois and Bacmann (1998) suggested that over-reaction to firm-specific information causes abnormal profits of a short-term contrarian. The lead-lag structure arises from investors' delayed reaction to common factors. They empirically showed that abnormal contrarian profit is due to overreaction to specific information, and not due to lead-lag structure.

Daniel et al. (1998) and Hong and Stein (1999) briefly presented the behavioral explanations for the link between stock market over- and under-reaction and momentum profits. Hong and Stein (1999) argued that there are two types of investors, one is smart (well informed), and the other is a technical analyst. Smart investors react to new information first, followed by technical investors, resulting in driving the stock price in the same direction. The stock prices go up in two stages; initially, under-reaction and occurrence of momentum profits later on in the case of positive news released about the firm. Daniel et al. (1998) believed that investors have their own information and rely on their stock selection skills very highly. This overconfidence causes over-valuation of stock prices when investors overreact to new information. The market realizes in the long run that stock is over-valued, therefore makes necessary corrections. It causes momentum profits initially and contrarian profits in longer horizons.

The presence of momentum profits is mostly studied in the context of developed markets in previous literature (Jegadeesh & Titman, 1993). However, researchers have turned the focus on momentum profits in the emerging and developing markets since the start of the twenty-first century Sehgal & Jain, 2011, 2015; Syamni et al., 2021). Most of these studies find the presence of short-term momentum profits in emerging and developing markets. However, few studies explain the cause of short/long-term momentum profits in these markets, especially in the Middle East markets context. The current study examines the short, intermediate, and long-term momentum profits in the Saudi Arabian stock market during 2010–2019 following the momentum strategies of Jegadeesh and Titman (1993). It also examines how high- and low-value traded stock affects the momentum profits in the short, intermediate, and long run.

Moreover, the study compares the results of the full-sample period with equally divided sub-sample period results in terms of momentum profits. The sample split into two sub-sample is based on the structural changes that occurred in the Saudi stock market during these periods. The Saudi Arabian stock market is one of the largest markets in the Middle East region, with a market capitalization of USD 456 billion in 2017. Moreover, some recent development in the Saudi Arabian capital market makes this investigation more interesting, as the government eased foreign ownership rules in the share market. Further, the Saudi Stock market becomes increasingly important for global investors due to "Vision 2030" by Crown Prince Mohammad Bin Salman to make the economy more diversified.

The remainder of the paper as follows. A brief survey of the relevant literature provides in section 2. Section 3 discusses the data and methodology used in the study. Section 4 analyzes the results. Section 5 concludes the paper.

## 2. Review of Literature

The efficient market hypothesis (EMH) explains that there should be no transaction costs in trading assets; costless information is available to all the participants, and securities are fairly priced based on current information. Malkiel and Fama (1970) proposed three models to describe EMH: the "fair game" model, the sub martingale model, and the random walk model. The fair game model states that an asset's estimated returns depend on the level of risk of this asset; the sub martingale model states that an asset's estimated future value is always equal or greater to the current price of this asset; last, the random walk model affirms that the evolution of the price of an asset follows a "random walk pattern": in other terms, it always reflects the information available at this time. However, the efficient market hypothesis theory has been challenged by many authors (De Bondt & Thaler, 1985; Fama & French, 2012; Gharaibeh, 2021; Jegadeesh & Titman, 1993; Novy-Marx, 2012). Among the arguments against the efficient market hypothesis (EMH), one empirical anomaly is often stated: the asset price reversal or continuation; it is also called contrarian or momentum profit.

The presence of momentum profits in the US market was first identified by Jegadeesh and Titman (1993) for the investment horizon of three to 12 months. Many researchers have followed the approach of Jegadeesh and Titman (1993) and provided evidence of momentum returns, in short, medium, and long term investment horizon. In these papers, the research shows that momentum profits are related to the volume of trade, size of firms, investor's behavior, credit ratings, and growth volatility of firms. Fama and French (2012) found that momentum profits decrease from smaller to bigger stocks in almost all markets, including North America, Asia Pacific, and Europe, except Japan.

It is also evident in the recent literature that a medium-term investment horizon based on past performance produces momentum profits for big and liquid stocks (Novy-Marx, 2012). Some researchers also explain the behavioral aspects of investors, which cause momentum phenomena in the financial markets. For example, Chui et al. (2010) argued that individualism, cultural or psychological factors are also

related to momentum profits. Researchers also believe that the state of the market is one of the potential sources of momentum profits. They find that when markets go up, then it produces momentum returns (Daniel et al., 1998).

The presence of momentum returns in the International markets is confirmed by several studies, but some studies find that short-term trading strategies are not profitable in Pacific Basin markets except Japan and Hong Kong (McInish et al., 2008). Some studies also examine momentum profits in the emerging and frontier markets. The emerging markets are different from the developed markets in several ways. These aspects include weak institutionalization, market illiquidity, and presence of non-institutional investors, expensive information, and weak corporate governance. Moreover, the emerging market is also different from the developed market with respect to culture, religion, and political biases. Mørck et al. (2000) examined that stocks move in the same direction in the emerging market as compared to developed markets due to political influences and private property rights.

Some studies found mixed results about moment effects in Indian stock markets. Sehgal and Jain (2011) reported the presence of momentum returns in the Indian markets for the investment horizon of three to six months. Sehgal and Balakrishnan (2002) examined short-term momentum and long-term reversal effects in the Indian stock market. Chowdhury (2016) examined the momentum effect in the Saudi Arabia market over 1st Jan 2000 to 31st December 2015. The results revealed that 871% is the monthly average momentum return of Saudi Arabia for 16 years from January 2000 to December 2015. Further, he found that cross-sectional contrarian and time-series momentum profits are present in the Saudi Arabian stock market. Still, cross-sectional contrarian return has a higher value than time-series momentum gains. However, there are few studies conducted on other GCC countries about momentum effects. The findings of these papers are relevant to the Saudi market since Saudi Arabia is one of the members of the GCC region. Gharaibeh (2021) examined the Amman Stock exchange across 23 indices from 2005 to 2015. The results showed that late strategy has higher returns as compared to early-stage strategy, but the CAPM model is unable to explain this return.

Saudi Arabia is a frontier market, and the presence of momentum profits in this market is highly relevant for international investors. It is considered a frontier market because of some restrictions on international investors. Otherwise, it has the full potential to become an emerging market. Since the Saudi markets were opened to foreign investors in June 2015, it is therefore expected that it will be upgraded to the world standard. Thus, academicians and practitioners overwhelmingly attempt to investigate contrarian and momentum profits in this market. This paper also attempts to find out the momentum effect in the Saudi market during the last decade from 2010–2019. Most importantly, it examines the momentum returns after the liberalization of Saudi's stock market and the entry of foreign investors in 2015.

## 3. Method and Design

The sample period for this study ranges from January 2010 to March 2019. The study includes 194 listed firms on the Tadawal Stock Exchange, Saudi Arabian stock market, from all sectors except mutual funds and other financial certificates. The selection of firms is based on the consistency of firms being listed on the Saudi stock exchange throughout the sample period. The monthly stock price data are collected from the Tadawal database. The monthly stock returns are calculated based on two consecutive months closing stock prices.

$$\text{Monthly Returns}_t = \text{Log}\left(\frac{\text{closing Price}_t}{\text{closing Price}_{t-1}}\right)$$

The study follows the methodology of Jegadeesh and Titman (1993) to calculate momentum returns for the full sample. The study considers 3, 6, 9, and 12 months formation and 3, 6, 9, and 12 months holding period strategies. The formation period is denoted as "J" and the holding period is denoted as "K." Thus, in total 16J × K investment strategies are formed. The investment strategies based on the momentum effect are dynamic and move between two main pillars, namely winner and loser portfolios. To construct momentum portfolios, stock returns are ranked at the beginning of each month; the ten most outperforming stock returns are accumulated as winner portfolios, on the contrary, ten least performing stock returns are combined as losers portfolios. Using the percentage method of stocks to form winner and loser portfolios in emerging markets is also found in Chui et al. (2010). The same process of momentum portfolio formation is applied to all subsequent K months, i.e., 3, 6, 9, and 12. All portfolios are equally weighted and zero-cost portfolios. These portfolios take the opportunity of long position for winner portfolios and short position for loser portfolios.

The sample period is further divided into two sub-sample periods ranges from 2010–2014 and 2015–2019. The division of the sample period is based on the policy of stock market liberalization in Saudi Arabia, and foreign investors are allowed to invest in the Saudi stock market in June 2015. The same investment strategies 4J × 4K are formulated on both samples to find out the momentum effects before and after the entry of foreign investors in the Saudi stock market. Moreover, to examine the impact of the value of trade on momentum returns, the study constructs

additional momentum portfolios based on high and low traded value for full and sub-samples.

## 4. Empirical Findings

### 4.1. Descriptive Results

Table 1 presents the descriptive statistics of basic study variables in three different panels. Panel A shows the results for the full sample period during 2010–2019. It shows that monthly stock returns are positively skewed with an average of 0.01%. However, the sub-sample periods reveal interesting results. On the one hand, in the first sub-sample period (Panel-B 2010–2014) before the liberalization of the stock market in Saudi Arabia, the average monthly stock returns (0.03%) are positive and higher than the full sample results.

On the other hand, the second sample period (Panel-C, 2015–2019) shows unexpected results with negative average monthly returns (–0.008%). During this period, the overall market has also not performed well as compared to the full sample and first sub-sample period. It shows that the liberalization policy and entry of foreign investors in the Saudi stock market have not been encouraged by the local investors; therefore, the market underperformed. One possible explanation of these findings is an early stage of financial market liberalization. It may take some time to facilitate or protect the foreign investor's interest to get their confidence. These results motivate to examine the behavior of momentum profits in the Saudi stock market not only for the full sample period but for sub-samples, especially after the entry of foreign investors.

### 4.2. Momentum Returns

Table 2 presents the average momentum returns for the full sample period. It shows that the average momentum returns are positive and significant for all strategies except J6K3, which is insignificant. The short sale of the loser portfolio boosts the returns of price momentum strategies (Chui et al., 2010). The results confirm the short-term momentum return presence in the Saudi stock market, as the JK3 family outperforms the other momentum strategies. The J3K9 produces the highest moment return of 0.26% as compared to other formations. The results confirm the definition of medium-term momentum in the existing literature (Jegadeesh & Titman, 1993), i.e., winner outperforms the loser portfolio, and winner remains winner and loser remain loser for 3 to 12 months holding period. It is also noted that J6K3 does not produce momentum returns; however, as the holding period increases, the J6K12 strategy produces the second-highest momentum profits after J3K9. It shows that the medium-term investment strategy produces high momentum returns as the holding period increases. Moreover, the initial winner portfolio returns are weak in J3K3, but it gets stronger as time increases, and J12K12 produces the highest return for the winner portfolio, i.e., 0.39%. However, it could not produce the highest momentum profits in the end because loser portfolios return also increases simultaneously as time increases.

The first sub-sample period (2010–2014) momentum results are presented in Table 3. This time period is considered to be stable as compared to the other half of the sample period. The market has performed well during this period. The results

**Table 1:** Descriptive Statistics

| Variables | No. of obs | Mean | St.dev | Min | Max | Skew | Kurtosis |
|---|---|---|---|---|---|---|---|
| **Panel A-Full Sample 2010–2019** | | | | | | | |
| Stock Rerurn | 18,165 | 0.011% | 0.336% | –0.522% | 0.6% | 0.091 | 2.062 |
| Market Return | 18,165 | 0.323% | 11.267% | –100.0% | 300.8% | 2.024 | 48.308 |
| Value of Trade* | 18,165 | 31.9 | 72.2 | 0 | 1,280.0 | 6.875 | 66.072 |
| **Panel B-Sub-sample 2010–2014** | | | | | | | |
| Stock Rerurn | 9,162 | 0.029% | 0.339% | –0.522% | 0.574% | 0.011 | 2.015 |
| Market Return | 9,162 | 0.995% | 11.778% | –100.000% | 300.770% | 3.168 | 70.885 |
| Value of Trade* | 9,162 | 38.6 | 76.1 | 0 | 1,280.0 | 6.629 | 65.833 |
| **Panel C-Sub-sample 2015–2019** | | | | | | | |
| Stock Rerurn | 9,003 | –0.008% | 0.332% | –0.522% | 0.574% | 0.172 | 2.135 |
| Market Return | 9,003 | –0.361% | 10.680% | –74.100% | 141.220% | 0.429 | 13.015 |
| Value of Trade* | 9,003 | 25.0 | 67.2 | 0 | 942.0 | 7.283 | 65.837 |

(*) Value of trade is presented in Million of SAR.

**Table 2:** Momentum Returns-Full Sample

| | Holding Period-K | 3 | 6 | 9 | 12 | |
|---|---|---|---|---|---|---|
| **Formation Period–J** | | | | | | |
| | Loser | –0.0360 | –0.0309 | –0.0560 | –0.0037 | |
| 3 | Winner | 0.0281 | 0.0912 | 0.2058 | 0.2407 | |
| | W-L | 0.0642 | 0.1221 | 0.2618 | 0.2444 | 0.2618 |
| | *t*-stat | (20.25)*** | (26.25)*** | (48.06)*** | (35.78)*** | |
| | Loser | 0.0426 | 0.0063 | 0.0074 | 0.0091 | |
| 6 | Winner | 0.0433 | 0.1096 | 0.1931 | 0.2648 | |
| | W-L | 0.0006 | 0.1032 | 0.1857 | 0.2557 | 0.2557 |
| | *t*-stat | (0.52) | (25.43)*** | (35.14)*** | (41.52)*** | |
| | Loser | 0.0267 | 0.0585 | 0.0352 | 0.103 | |
| 9 | Winner | 0.0452 | 0.1702 | 0.2304 | 0.3123 | |
| | W-L | 0.0184 | 0.1116 | 0.1952 | 0.2093 | 0.2093 |
| | *t*-stat | (5.53)*** | (22.78)*** | (43.75)*** | (34.58)*** | |
| | Loser | 0.0461 | 0.0787 | 0.0886 | 0.1586 | |
| 12 | Winner | 0.1231 | 0.2210 | 0.3179 | 0.3981 | |
| | W-L | 0.0770 | 0.1423 | 0.2293 | 0.2395 | 0.2395 |
| | *t*-stat | (26.24)*** | (42.34)*** | (57.79)*** | (38.42)*** | |

*** is equivalent to a significance level of 1%; ** is equivalent to a significance level of 5%; and * is equivalent to a significance level of 10%.

**Table 3:** Momentum Returns- Sub-Sample (2010–2014)

| | Holding Period-K | 3 | 6 | 9 | 12 | |
|---|---|---|---|---|---|---|
| **Formation Period–J** | | | | | | |
| | Loser | 0.0175 | 0.1326 | 0.1453 | 0.2617 | |
| 3 | Winner | 0.0931 | 0.2358 | 0.4166 | 0.4516 | |
| | W-L | 0.0755 | 0.1032 | 0.2712 | 0.1899 | 0.2712 |
| | *t*-stat | (16.50)*** | (22.55)*** | (38.25)*** | (26.22)*** | |
| | Loser | 0.1230 | 0.1987 | 0.2542 | 0.2867 | |
| 6 | Winner | 0.0809 | 0.2146 | 0.3143 | 0.3944 | |
| | W-L | –0.0421 | 0.0159 | 0.0600 | 0.1077 | 0.1077 |
| | *t*-stat | (–3.99)*** | (5.37)*** | (8.64)*** | (12.18)*** | |
| | Loser | 0.1059 | 0.2068 | 0.2213 | 0.3496 | |
| 9 | Winner | 0.1206 | 0.2896 | 0.4742 | 0.5178 | |
| | W-L | 0.0147 | 0.0828 | 0.2528 | 0.1681 | 0.2528 |
| | *t*-stat | (2.34)** | (13.99)*** | (34.78)*** | (21.81)*** | |
| | Loser | 0.1273 | 0.253 | 0.3475 | 0.4235 | |
| 12 | Winner | 0.1470 | 0.3057 | 0.4385 | 0.4557 | |
| | W-L | 0.0197 | 0.0527 | 0.0910 | 0.0322 | 0.0910 |
| | *t*-stat | (26.24)*** | (42.34)*** | (57.79)*** | (38.42)*** | |

*** Is equivalent to a significance level of 1%; ** is equivalent to a significance level of 5%; and * is equivalent to a significance level of 10%.

are not much different from the overall sample period results. The J3K9 momentum strategy has outperformed the rest of the momentum strategies. All other strategies are positive and significant, except J6K3, which is negative and significant. It shows that in the JK6 family, losers become winners in short-run J6K3; however, in the long run, loser remains losers and winner remain winners. The results also reveal that in every strategy, the momentum returns are weak in the short run, but as time passes, the momentum profits increase considerably. The JK12 family produces the weakest momentum returns among all other strategies. It confirms the findings of the existing momentum literature that the longer formation period does not produce momentum returns in the long run. (Jegadeesh & Titman, 1993).

Table 4 presents the results of momentum profits for the second sub-sample period 2015–2019. The results of this time period are quite different from the overall sample and first sub-sample period. Though all momentum strategies are positive and significant, the JK9 family outperforms the other strategies. Contrary to the full and first sub-sample results, the short-term strategy produces minimal momentum profits as compared to different strategies. All winner and loser portfolios of the JK3 family produce negative returns. However, the overall momentum return of the JK3 family is positive and significant, which shows that the momentum returns still prevail. The long-term investment strategy produces higher momentum profits as compared to the short-term strategy. The J9K12 is posting the highest momentum profits, i.e., 0.334% among all. The J6K12 momentum return is 0.33%, which is not far behind the J9K12 momentum profits. The shift of momentum profits from short or medium-term investment strategy to long-term may be due to the presence of foreign investors in the market. The entry of foreign investors into the Saudi stock market produces different results in terms of momentum profits as compared to other time-period. However, it is too early to conclude that foreign investors can change the behavior of the market.

### 4.3. High and Low Value Traded Stocks and Momentum Returns

The formation of portfolios based on high and low value traded stock depicts interesting results regarding momentum profits in the full sample (Table 5). The short and medium-term investment strategies of high-valued traded stock of JK3,6 and 9 families produce negative and significant momentum returns except for J3K9 and J6K9, which are positive and insignificant. However, the JK12 family is posting positive and significant momentum profits and outperforms the other momentum strategies.

**Table 4:** Momentum Returns-Sub-Sample (2015–2019)

| | **Holding Period-K** | **3** | **6** | **9** | **12** | |
|---|---|---|---|---|---|---|
| **Formation Period–J** | | | | | | |
| | Loser | –0.0704 | –0.13792 | –0.2325 | –0.2633 | |
| 3 | Winner | –0.0433 | –0.1022 | –0.1044 | –0.1104 | |
| | W-L | 0.0271 | 0.0356 | 0.1281 | 0.1529 | 0.1529 |
| | *t*-stat | (10.70)*** | (10.36)*** | (23.97)*** | (19.27)*** | |
| | Loser | –0.0404 | –0.2080 | –0.2915 | –0.2369 | |
| 6 | Winner | –0.0057 | 0.0102 | 0.0423 | 0.0961 | |
| | W-L | 0.0346 | 0.2183 | 0.3339 | 0.3331 | 0.3339 |
| | *t*-stat | (7.89)*** | (38.75)*** | (47.88)*** | (36.01)*** | |
| | Loser | –0.0708 | –0.1838 | –0.2475 | –0.2321 | |
| 9 | Winner | 0.0248 | 0.0811 | 0.0428 | 0.1025 | |
| | W-L | 0.0957 | 0.265 | 0.2904 | 0.3347 | 0.3347 |
| | *t*-stat | (29.83)*** | (52.76)*** | (62.03)*** | (55.56)*** | |
| | Loser | –0.0153 | –0.0743 | –0.1406 | –0.1578 | |
| 12 | Winner | 0.0768 | 0.0614 | 0.1031 | 0.0652 | |
| | W-L | 0.0921 | 0.1358 | 0.2437 | 0.2231 | 0.2437 |
| | *t*-stat | (16.98)*** | (27.34)*** | (44.99)*** | (33.27)*** | |

*** Is equivalent to a significance level of 1%; ** is equivalent to a significance level of 5%; and * is equivalent to a significance level of 10%.

**Table 5:** Momentum Returns of High/Low Value Traded Stocks

| | HP-K | 3 | 6 | 9 | 12 | 3 | 6 | 9 | 12 |
|---|---|---|---|---|---|---|---|---|---|
| **FP–J** | | | | | | | | | |
| **Panel A-Full Sample** | | | | | | | | | |
| | | **High Value traded** | | | | **Low Value traded** | | | |
| 3 | W-L | –0.06 | –0.16 | 0.02 | –0.13 | 0.47 | 0.23 | 0.33 | 0.60 |
| | *t*-stat | (–8.29)*** | (–18.66)*** | (1.19) | (–7.10)*** | (13.75)*** | (16.03)*** | (11.50)*** | (12.04)*** |
| 6 | W-L | –0.13 | –0.22 | 0.02 | –0.24 | 0.001 | 0.21 | 0.58 | 0.54 |
| | *t*-stat | (–13.97)*** | (–12.87)*** | (0.83) | (–11.66)*** | (0.06) | (20.17)*** | (48.05)*** | (32.91)*** |
| 9 | W-L | –0.13 | –0.17 | –0.03 | –0.25 | 0.07 | 0.22 | 0.51 | 0.48 |
| | *t*-stat | (–16.58)*** | (–13.68)*** | (–2.15)** | (–16.43)*** | (10.77)*** | (26.68)*** | (46.05)*** | (30.93)*** |
| 12 | W-L | 0.23 | 0.17 | 0.26 | 0.03 | 0.08 | 0.27 | 0.43 | 0.58 |
| | t-stat | (33.68)*** | (14.44)*** | (18.75)*** | (2.16)** | (12.80)*** | (43.43)*** | (47.10)*** | (49.52)*** |
| **Panel B-Sub-Sample 2010–2014** | | | | | | | | | |
| 3 | W-L | 0.41 | 0.25 | 0.24 | –0.04 | 0.06 | 0.36 | 0.30 | 0.43 |
| | *t*-stat | (30.27)*** | (19.78)*** | (10.42)*** | (–1.54) | (3.27)*** | (17.40)*** | (8.13)*** | (6.79)*** |
| 6 | W-L | 0.12 | –0.07 | 0.13 | –0.20 | –0.05 | 0.01 | 0.16 | 0.46 |
| | *t*-stat | (7.15)*** | (–2.95)*** | (3.78)*** | (–6.51)*** | (–7.23)*** | (0.42) | (8.26)*** | (20.75)*** |
| 9 | W-L | 0.08 | 0.11 | 0.15 | 0.11 | 0.15 | 0.43 | 0.84 | 0.97 |
| | *t*-stat | (8.21)*** | (5.62)*** | (6.55)*** | (4.61)*** | (20.34)*** | (58.88)*** | (68.20)*** | (60.27)*** |
| 12 | W-L | 0.21 | 0.26 | 0.47 | 0.43 | 0.11 | 0.20 | 0.28 | 0.39 |
| | *t*-stat | (16.42)*** | (16.32)*** | (27.15)*** | (20.00)*** | (12.53)*** | (19.05)*** | (21.93)*** | (23.50)*** |
| **Panel C-Sub Sample 2015–2019** | | | | | | | | | |
| 3 | W-L | –0.25 | –0.37 | –0.23 | –0.32 | 0.69 | 0.12 | 0.40 | 1.27 |
| | *t*-stat | (–28.16)*** | (–31.87)*** | (–16.31)*** | (–15.24)*** | (14.46)*** | (4.91)*** | (9.21)*** | (21.59)*** |
| 6 | W-L | –0.37 | –0.52 | –0.55 | –0.73 | –0.05 | 0.04 | 0.72 | 0.43 |
| | *t*-stat | (–57.10)*** | (–38.97)*** | (–27.66)*** | (–35.57)*** | (–2.99)*** | (4.53)*** | (50.02)*** | (22.69)*** |
| 9 | W-L | –0.14 | –0.06 | –0.05 | –0.40 | 0.10 | 0.13 | 0.47 | 0.52 |
| | *t*-stat | (–14.34)*** | (–4.65)*** | (–3.42)*** | (–21.65)*** | (10.41)*** | (9.37)*** | (31.19)*** | (29.93)*** |
| 12 | W-L | –0.07 | –0.14 | –0.15 | –0.61 | 0.08 | 0.15 | 0.26 | 0.593 |
| | *t*-stat | (–7.32)*** | (–14.99)*** | (–11.39) | (–33.12)*** | (7.02)*** | (13.26)*** | (23.75)*** | (51.13)*** |

*** Is equivalent to a significance level of 1%, ** is equivalent to a significance level of 5%, and * is equivalent to a significance level of 10%.

The high-value traded stocks are less volatile and have low market risk in nature; therefore, get investors' attention who formulate long-run investment strategies for these stocks. The results also show that the winner portfolio of high value traded stocks remain a winner in the long run; therefore, the investors get the higher momentum profits who hold these high value traded stock for a longer period.

Further, the results show that all momentum profits of low-value traded stocks are positive and significant for all strategies except J6K3, which is positive but insignificant. Moreover, the low-value traded stocks also produce long-run momentum profits but with a lesser formation period. The JK3 family produces the highest momentum profits as compared to other investment strategies. For low-value traded stock, investors formulate portfolios of winner and

losers stock based on shorter period information but hold it for long as results suggest that J3K12 produces the highest momentum profit among all formulations.

In the case of the first sub-sample, all investment strategies show positive and significant momentum profits for high-value traded stocks portfolios except J3K12, which produces negative but insignificant momentum returns. Moreover, medium and long-term investment strategies take the lead on short-term strategies in terms of momentum profits. For low-value traded stock portfolios, long-term investment strategies produce more momentum profits as compared to short and medium-term. Further, the JK9 family outperforms the other investment strategies and generates the highest moment profit for J9K12. However, the second sub-sample shows negative and significant momentum profits for all investment strategies. The negative momentum profits depict that there are contrarian profits in the market instead of momentum returns. It does not make any difference in trading strategy to hold portfolios for a shorter period or a longer period. In this case, all combinations are generating profits. As all these portfolios are zero-cost and equally weighted, therefore any profit in this regard shows the inefficiency of the Saudi stock market. The results suggest that an active trader just sells the winner stocks based on the past 3 to 12 months performance and buy loser stocks and hold them for 3 to 12 months and register a riskless profit, a major blow to market efficiency. The low trading value stocks portfolios in the second sub-sample show similar results to the full sample and first sub-sample.

## 5. Conclusion

This paper aims to investigate the presence of momentum profits in the Saudi stock market during 2010–2019. Additionally, the sample period is divided into two equal sub-samples, and the same is investigated in both samples. The results show a very strong presence of momentum profits in the Saudi stock market for the full sample as well as for sub-samples. Moreover, these momentum profits are identified for a longer investment horizon. Interestingly, it seems that a formation period of three months allows investors to construct a zero-cost portfolio and hold it for a longer period to get the maximum momentum profits. The same results are observed for the first sub-sample; however, in the second sub-sample, the formation period of six or nine-month with a longer period holding yields maximum momentum profits. These results suggest that an investor should keep an eye on the past performance of desired stocks for at least three-nine months in which they are willing to invest. The paper also finds that the high-valued traded stocks portfolio produces momentum profit in the longer investment horizon. It is interesting findings for those investors who are looking for investment in high-valued traded stocks; they must consider at least the past one-year performance of these stocks to construct a portfolio and hold it longer to get the maximum momentum profits. The results confirm that the short or medium-term formation of portfolios produces negative momentum returns for high-value traded stocks. The low-value traded stocks portfolios give similar results to the full sample results in terms of momentum profits.

The presence of momentum or contrarian profits in the Saudi stock market indicates that the uninformed investors in the market may switch systematically between over-and under reaction to the available information. The findings are in line with the results of Chowdhury (2016) who reported that retail investors mainly produce momentum profits in the Saudi stock market. Both momentum and contrarian profits are related to the systematic behavior of investors, therefore a high possibility of momentum and contrarian profits in the Saudi market. The split sample results also provide an impact on the structural changes that occurred in the Saudi stock market. The Saudi government already opened the market to large institutional foreign investors in June 2015, and they are seriously considering further relaxation of rules and regulations to the global investors.

The findings of the paper posit important implications for portfolio managers, institutional investors, and individual investors. There is evidence of long-term momentum in the Saudi stock market. Therefore, investors need to form portfolios based on the past performance of the winners and losers stock for at least three to six months and hold it long for the period of at least six months to one year. Moreover, the presence of long-term momentum profits in the Saudi stock market indicates the inefficiency of the market as well. The regulators and the policymakers need to introduce policies to eliminate momentum profits from the markets. Since some of the initiatives have already been taken by the Saudi government to re-structure the market. The entry of foreign investors, integration of the Saudi stock market with global markets, and Vision 2030 can play an important role in the efficiency of the Saudi stock market.

There are some limitations to this study. First, it considers only sixteen investment strategies to find out the presence of momentum profits in the Saudi market. Secondly, it is based on a single country; a regional comparative analysis may give more interesting findings.

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