Momentum Effect in Stock Market: Empirical Evidence from Pakistan Stock Exchange

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Abstract

This study aims to examine the momentum effect presence in selected stocks of Pakistan stock market using data from Jan 2007 to Dec 2016. This study constructed the strategies includes docile, equal weighted and full rebalancing techniques. Data was extracted from the PSX – 100 index ranging from 2007 to 2016. STATA coding ASM software was used for calculating momentum portfolios, finally top 25 stocks were considered as a winner stocks and bottom 25 stocks were taken as a loser stocks. In conclusion, the results of the study found a strong momentum effect in Pakistan stock exchange PSX 100- index. As by results it has been observed that a substantial profit can earn by the investors or brokers in constructing a portfolio with a short formation period of three months and hold for 3, 6 and 12 months. There is hardly a study is present on the same topic on Pakistan Stock Exchange as preceding studies were only conducted on individual stock markets before merger of stock markets in Pakistan while this study leads the explanation of momentum phenomenon in new dimension i.e. Pakistan Stock Exchange.
Keywords: Momentum, Portfolio, Winner Stocks, Loser Stocks

Savings are very necessary for economic development of a country. Every state encourages savings in different forms like for instance savings in a form of deposits in banks etc. These savings further can be utilized as a source of investment in legal activities and as well as a source of investment in stock markets (Jagadeesh, 2015). Every investor wants to get a high return for which he can predict a future return on the basis of historical returns, technical analysis, earning base model, relative base model, and price to earnings ratio and so on (Haque, & Nasir, 2016, Fama & French, 1992). In the investment arena, momentum denotes the potency of price movement of an asset or stock; known as a rate. Therefore, the momentum effect refers to the degree of change in term of price for a particular asset i.e. the speed at which the price is changing. The momentum phenomenon has been discussed across the international equity markets in both developed as well as numerous other classes (Asness, Moskowitz, & Pedersen, 2013).

This study is about the reflection of investment strategies in stock markets. Investment strategy may be Contrarian Strategy and Momentum Strategy (Chen, Jiang, & Li, 2012). Contrarian investment strategies refer to those strategies that emphasize on to invest in those stocks that are performing worst. Contrarian investors believe that past loser will be the winner of the future and past winners will be the future losers. Few of researchers also argued to buy past losers and sell past winners (Chen, Jiang, & Li, 2012). On the other hand, Momentum strategy implies that to invest in those stocks that are performing well. This strategy is for those investors who believe in that past winner will be a future winner and past losers will be the future loser. Similarly, studies also argued that to buy past winners and sell past losers (Rahman & Mohsin, 2012).

As the future is uncertain, modern financial theories suggested that stock prices are unpredictable (Samuelson & Paul, 1965). While the efficient market theory argued that stock prices reflect all available information (Fama & Malkiel, 1970) subsequently many theories are documented regarding stock prices that it can be affected by many factors (Hussian, & Saeed, 2017). Since 2007 financial crisis investors became reluctant to invest their money in financial markets because of anomaly in businesses returns (Ali & Afzal, 2012). Though the concept of momentum effect in stock market is not new but the limitations of the preceding studies like say for instance date for recent years, increase the sample of the population, increase the number of the strategies as referred by (Khan, Siddiqui, Ali & Khan, 2016) and (Mohsin & Rehman, 2012) enables the author to cover these gaps. On the other hand the present study will be one of the pioneer study that will investigate/explore the momentum effect in Pakistan Stock Exchange (PSX

100 index) because after the merger of 3 stocks market in Pakistan i.e. Karachi Stock Exchange, Lahore Stock Exchange and Islamabad Stock Exchange it is the need of the hour to examine the presence of momentum effect in PSX as new changes 100 index listed companies in stock market alter the pattern of the return in the stock market. Based on the above argument and references there is a clear research gap that provokes the researcher to conduct the study in Pakistan Stock Markets i.e. PSX. Therefore, this study is an attempt to examine that whether stock prices are predictable in the light of momentum effect in new dimension followed by the methodology of J*K formation and holding period strategy documented by (Jagadeesh, 1993).

The proposed study would be of worth for both to scholars and practitioners in the Management Sciences field, particularly for those who are engaged in the stock market. Studies on practicing investment strategies, techniques with the aim of obtaining an optimal return are one of the emerging areas of research in the business management arena, to which this study would be important. This study examines the performance of the stocks (specifically momentum) over a decade, which is very important in terms of investor's aspect as well as researcher's aspect to get know about the prevailing indications of the Pakistan stock market. The findings of the study also beneficial for better decision making and can be used for future research in academia. In order to simplify the research problem researcher has proposed the following research question and objective;

Research Question 1: Whether Momentum effect exposes in the different strategies of selected stocks of PSX –100 index?
Research Objective 1:To examine the strategy level where the past winner is the future winner and past loser is the future loser in selected stocks of the Pakistan stock market, PSX – 100 index.

The remaining paper is structured as follows; theoretical and empirical background, with an emphasis on different investment techniques in different stock markets, followed by methodology used in formation of portfolio and research model, later on includes data analysis, and the last section discussed results, and implications.

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Literature Review and Hypothesis Development

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Theoretical Evidence
Jagadeesh and Titman (1993) had worked on anomalies in stock returns and finally argued that winner stocks outperformed then a loser stocks in short term. Study constructed winner and loser portfolio and calculate stock returns and results represent that momentum effect is present in short run not in long run. Modern financial theory documented stock returns perform randomly and unpredictable (Samuelson & Paul, 1965). However other studies also test the hypothesis against the random walk theory (Jensen, and Bennington, 1970). A smart investor can earn by greater risk-adjusted return while the efficient market hypothesis also suggests that stock prices are an effect to the all available information (Fama & Malkiel, 1970).

Evidence from Developed Countries
Some of the empirical evidence opposed the efficient market hypothesis that stock prices are predictable in many ways including like momentum (Mackinlay, 1999) (Mortal, & Schill, 2018). Research study on investor overreaction and stock market seasonality conducted by (Bondt & Thaler, 1987) found the loser-winner effect due to the market seasonality, risk, size and earnings. By taking a data from (1926-1982) study formed portfolio of 50 winners and 50 losers of formation period (J*K formation), results of the study argued that loser and winner get excess return in January and loser gets more return then winners as late is five years. Further researcher argued that the beta of loser is greater than winners and when market goes up beta was positive and vice versa (Khan, Waqas, & Hassan, 2016).

Study held on profitability of contrarian vs momentum evidence from Istanbul stock exchange extracted data from Istanbul Stock Exchange 1990-2000, researcher investigated a weak form efficiency performance of contrarian on the basis of past prices, size, book to market, earning to price ratio of stocks and argued that contrarian performed better then momentum predictions with overreaction. Results indicated that there is a downward trend in momentum stocks average return and upward trend in contrarian stocks profit of contrarian higher in January month as compared to other rest of months. Researcher also further found that losers are riskier because they are more sensitive to Fama French factor (Montgomery, Raza, & Ülkü, 2018), (Bildik & Gulay, 2002). Rouwenhorst (1998) empirically test the momentum patterns in the context of European markets, whereas Griffin, Ji and Martin (2005) advocated momentum profitability to other stock

market avenues includes America, and Asian markets, Australia (Hurn & Pavlov, 2003), Span (Forner & Marhuenda, 2003), Italy (Mengoli,2004), Honk Kong (Cheng & Wu, 2010).

Study of (Kang, Liu & Ni, 2002) suggested on contrarian and momentum strategy in China by using sample from 1993-2000. Researcher documented single most important source of the short-term contrarian profit are the information overreaction and negatively to momentum profit. Researcher follows a method of J*k for return reversal and return continuation and ranked 5 equal size portfolios highest for winner lowest of loser, result shows that both the strategies generate statistically significant profit. Empirically study has been conducted to explain momentum effect in China stock market by using two test portfolio analyses and cross-sectional regression analysis on weekly data study argued reason leading to the momentum effect is one of the information ambiguities (Xu, 2016). Study of Zaremba (2018) stated that by examining the stock market returns of 78 countries provide the convincing evidence of momentum effect; however the other variables like "value spread" may influence the future possible return of the stocks. Though the inclusive tenacity of momentum is well established, however the cause of such effect (profit) still remain stood a debatable subject among the various academic community which made it impossible to reach a consensus about what causes momentum profitability at a specific strategy level using J* K formation.

Evidence from Developing Countries

Study evidenced on momentum effect from Karachi stock exchange i.e. study was constructed 16 momentums by following equal weighted, full rebalance and docile techniques and used data of stock prices from 1999-2007 of 300 listed companies, study ranked a stock in each portfolio (winner portfolio, loser portfolio, and momentum portfolio) by using the data study found zero cost portfolios in 15 out 16 strategies, for further investigation study divides a sample into two groups 1999-2003 and July 2003-2007 but the result was again near to zero, researchers took another sample of 50 listed companies of KSE by taking eight representative strategies constructed on the basis of same techniques J*K method. The study concluded a low but significant momentum effect in KSE (Rahman & Mohsin, 2012). Study conducted on profitability of momentum and contrarian strategy having a sample of 108 listed companies of Tehran stock exchange from 2005-2010. Stocks were categorized into three parts (low, medium and high) also test the Ordinary least square and analysis of variance (ANOVA) for finding relationship of momentum profit with different variables used procedure of Titman (J*K) weighted relative strength strategy. Scheme for formation of momentum portfolio by observed for 3 month period found excess return momentum strategy is significantly positive in average and high trading volume whereas momentum return is negative in low trading volume. Researcher found profit of contrarian or momentum are positively related to increases in trading volume and no significant relationship of momentum or contrarian strategy with cross-sectional and lead-lag effect (Yahyazadehfar & Lorestani, 2011). Ansari and Khan (2012), explore that momentum effect is present in India stock market from 1994 to Dec 2006, had a sample of 500 stocks across 20 sectors by using the methodology of J*K a high profit observed was in 3*3 and 6*6 portfolio strategy, subsequently concluded that idiosyncratic risk has a positive relationship with momentum effect and behavioral factors.

Evidence from national Stock Market of India to test the momentum effect from a 4 sectors (banking 40, pharmaceutical 31, automobile 20 and information technology 20) because of these 4 sectors are highly contributing to the GDP of India by using the methodology of J*K study constructed 144 winners and 144 loser portfolios with the help 36 trading strategies study found that high momentum profit was seen in pharmaceutical while low in information technology sector. The study pinned that out of 36 trading strategy 12 months formation and 12 months holding months profit were as high as compared to the other strategy and winner portfolio outperformed. Future research was also directed to investigate different trading frequencies such as daily and weekly (Garg & Varshney, 2015), (Maheshwari, & Dhankar, 2017).

According to Shah and Shah (2015) zero investment strategy investors earn a positive return by taking 509 stocks as a sample from Karachi stock exchange from Jun 2004 to March 2014 with the help of J*K strategy to calculate momentum returns in the light of theory of efficient market hypothesis. According to Ejaz and Polak (2014), the study suggested momentum effect are significant in middle east stock markets but not explained major stock markets by CAPM adequately data for this study has been collected from six countries and using the methodology of j6*k6 and CAPM by constructing winner and loser portfolio. The study held on momentum suggested by taking 83 top stocks as a sample in Karachi stock market using the same methodology of J*K momentum effect is present very low as well given direction for future research to increase a sample size might be shown a greater momentum effect (Khan *et.al.*, 2016). In past studies also does not found any momentum effect (Durand, Limkriangkrai, & Smith, 2006).

Generally in financial crisis, stock markets participants suffer losses and same also influences the structure of participants. More frequently, winners interact with bullish market not with the bearish one. Hence, one can anticipate non-profitability using momentum approach while dealing in stock markets. Beside above mentioned studies a similar study in the Pakistan context is lacking in the field specifically after the merger of stock markets. In order to fill this gap, the present manuscript emphases on presence of momentum effect in the Pakistan Stock market post-merger period.

H_A: *There is a significant momentum effect at all strategy level present where the past winner is the future winner and past loser is the future loser in selected stocks of the Pakistan stock market, PSX – 100 index.*

Research Methodology

This study is based on quantitative in nature because the time series data from 2007 to 2016 was extracted from PSX – 100 index. Purpose of the study is to test the hypothesis developed from the existing literature that do stock market follow the momentum effect in Pakistan stock market of PSX-100 Index or not. This study considered the top 100 companies listed in Pakistan stock market i.e. PSX – 100. The study took top and bottom 25 consistent stocks as a sample for analysis. The basic indicator for the top and bottom stocks was share price return. Daily share prices of top 100 listed companies were considered for the formation of portfolios and analysis. There are many other tools or software's are available that may be used for the analysis but for this study researcher used a special ASM (A STATA PROGRAM FOR MOMENTUM) software for measuring momentum effect.

Research Model

This study used the methodology of Titman followed by many researchers to measure the momentum portfolios j*k (formation and holding period return). Before the constructing portfolio study is calculating daily compound returns for construction of portfolio then portfolio can be constructed on the highest and lowest stocks of 25% $R_t = 100 * \ln(P_t / P_t\text{-}1)$. ASM (state for momentum) have different features regarding calculate momentum returns (winners and losers) portfolios. 1st of all this study researcher find the daily returns by means of daily share prices and construct investment portfolio strategies for the top 25% stocks that considered as a winner portfolio, similarly bottom 25% stocks are considered a loser. The sole reason behind the construction of portfolios of top 25% and bottom 25% was that these 25 winner and 25 losers stocks were stable in PSX index. For measuring momentum effect portfolio of 16 strategies was developed. The portfolio constructed in 3 months formation and 3 months holding period strategy j*k (3-3,3-6,3-9,3-12,6-3,6-6,6-9,6-12,9-3,9-6,9-9,9-12,12-3,12-6,12-9,12-12). 3-3 represents 3 months formations period and 3 months holding period, 3-6 represent 3 months formation and 6 months holding period and so on. Table 1 represents the overview of momentum strategies;

Table 1. *Formation period (J)*

		3 Months	6 Months	9 Months	12 Months
Holding period (K)	3 Months	3*3	3*6	3*9	3*12
	6 Months	6*3	6*6	6*9	6*12
	9 Months	9*3	9*6	9*9	9*12
	12 Months	12*3	12*6	12*9	12*12

Further to this, in overlapping technique numbers of observations are increased than non-overlapping. So this study used overlapping because of increase observation which results were more significant and reliable then non-overlapping. Following table 2 represents an overlapping method for 3*3 months. We also use the equal-weighted method for constructing portfolios irrespective to the capitalization which are the opponents of the value-weighted portfolio because of easy to interpret that momentum effect is present in those stocks which have a higher capitalization.

Table 2. *Overlapping method*

Month	1	2	3	4	5	6	7	8	9	10	11	12
		Formation			Holding							
			Formation			Holding						

Formation   Holding

    Formation   Holding

       Formation   Holding

          Formation   Holding

Data Analysis and Results

This study aims to get an answer what impact reveals by the selected stocks of Pakistan stock exchange 100 index and to test hypotheses there is no momentum effect exist in Pakistan stock exchange of 100-index. Table 3 is about 16 momentum strategy with overlapping holding period. Table 3 is based on 16 momentum strategies with formation and holding period which show where momentum effects exist in PSX. Momentum effect is not present in all winners firm some of the strategies of winner stocks have a negative return but in overall basis study can say momentum effect is present on average in Pakistan stock exchange in PSX-100 index.

Overall Strategies Explanation

Look at the winner portfolio there are 10 portfolios which shows a positive return out of 16 strategies which are almost same results to (Khan *et.al.*, 2016) and (Mohsin & Rehman, 2012). Our prediction before the testing was all of the strategies will show positive returns. There are six strategies in the winner portfolio which show negative returns which are 3*6, 6*6, 9*3, 9*6, 12*3, and 12*6.

Table 3. *Mean Returns of Monthly Price Momentum Strategies*

		3 Months	6 Months	9 Months	12 Months
3	Winner	0.0910814	-0.0629683	0.3470423	0.5619858
	Losser	-1.063831	-0.6361248	0.436919	-0.055711
	Winner-Losser	0.3648424	0.464456	-0.0712446	0.2252026
	T-value	0.686	2.88**	-0.453	1.33
6	Winner	0.0036321	-0.210878	0.3921454	0.3668844
	Losser	-0.4325416	-0.4535385	0.4070361	0.3765568
	Winner-Losser	-0.1123288	0.2450551	-0.0440969	0.1050205
	T-value	-0.334	1.43	-0.421	0.923
9	Winner	-0.2335707	-0.13011	0.2496464	0.2173613
	Losser	0.0817934	-0.5656093	0.5516049	0.3742326
	Winner-Losser	-0.4744855	0.3984301	0.0315844	0.1739313
	T-value	-1.38	2.05**	0.312	0.854
12	Winner	-0.155226	-0.2458118	0.3520111	0.2187693
	Losser	-0.014134	-0.4572266	0.4087265	0.3806349
	Winner-Losser	-0.3040568	0.3959858	0.053206	0.1686123
	T-value	-0.899	2.05**	0.524	0.831

(Row label: Formation - J)

Winner portfolio in 3 and 6 testing period must hold for a short (3 months) or long period of time (9, 12 months) while in long formation period 9 and 12 months must hold for 9 and 12 months which give a positive returns 3*12 strategy returns are matching and confirm returns of 12 months holding period return of (Jagadeesh & titman 1993). In winner portfolio, the highest return given strategies are 3*12 shows 0.562 which indicate investor can earn with short formation period of 3 months with a long holding period 12 months in PSX-100 index.

By examining the loser portfolio in table 3 there are totally 16 strategies 8 strategies shows a positive return while 3*3, 3*6, 3*12, 6*3, 6*6, 9*6, 12*3 and 12*6 shows a negative return. Which indicate momentum effect is present 50% in losers portfolios and to suggest sale past losers. The most profitable strategy is 3*6 which shows a -0.636 returns in loser portfolios which indicate to sale on first priority. Before our prediction was there will be momentum effects in all strategies. One thing is more interesting in loser's portfolio a stocks 3, 6 and 12 months formation period withholding period 3 and 6 months is profitable. As momentum theory argued to sale past losers and loser is on the short position. Looking at zero cost portfolios (winner minus loser) at table 3 there are 11 strategies out of 16 strategies which shows a positive return. Zero cost portfolio which shows a positive return are 3*3, 3*6, 3*12, 6*6, 6*12, 9*6, 9*9, 9*12, 12*6, 12*9 and 12*9. Zero cost portfolio shows when the formation period is 9 and 12 holding period 6, 9 and

12 gives a positive return and it indicate a strong momentum effect are present in momentum strategy in PSX-100 index.

The most profitable strategies of zero cost portfolio are formation period 3*6, 9*6, 12*6 and 3*3 which shows return 0.46, 0.39, 0.39 and 0.36 respectively. A rational investor can earn an abnormal return by taking a long position in the winner portfolio and short sell position study suggested 10 winners and 8 loser portfolio can earn an abnormal return. In the given table 4, the overall results of 16 momentum strategies represent the testing of hypotheses of the study that either hypotheses (Null, Alternative) are supported in the context of Pakistan stock exchange i.e. PSX-100 index.

Table 4. *Strategy Wise Hypothesis Testing*

J*k	Results	Effect	Decision	
3-3 Months	0.3648424	YES	H_A Accepted	H_o Rejected
3-6 Months	0.464456	YES	H_A Accepted	H_o Rejected
3-9 Months	-0.0712446	NO	H_o Accepted	H_A Rejected
3-12 Months	0.2252026	YES	H_A Accepted	H_o Rejected
6-3 Months	-0.1123288	NO	H_o Accepted	H_A Rejected
6-6 Months	0.2450551	YES	H_A Accepted	H_o Rejected
6-9 Months	-0.0440969	NO	H_o Accepted	H_A Rejected
6-12 Months	0.1050205	YES	H_A Accepted	H_o Rejected
9-3 Months	-0.4744855	NO	H_o Accepted	H_A Rejected
9-6 Months	0.3984301	YES	H_A Accepted	H_o Rejected
9-9 Months	0.0315844	YES	H_A Accepted	H_o Rejected
9-12 Months	0.1739313	YES	H_A Accepted	H_o Rejected
12-3 Months	-0.3040568	NO	H_o Accepted	H_A Rejected
12-6 Months	0.3959858	YES	H_A Accepted	H_o Rejected
12-9 Months	0.053206	YES	H_A Accepted	H_o Rejected
12-12 Months	0.1686123	YES	H_A Accepted	H_o Rejected

Discussion and Implications

Momentum investment strategy is a fast and growing technique in the era of finance. In European countries, most of the researcher had worked on a momentum strategy to check whether it's existing or not. As momentum theory argued by past winner and sale past looser (Jagadeesh & Titman, 1993) because past winner will be always a winner and past losers will be losers in future which are proven from the various literature such as (Jagadeesh & Titman, 1993). Efficient market hypothesis theory suggests stock prices are movable due to the market information whether momentum theory is the opponent of the efficient market hypothesis and the theory suggest stock prices are predictable on the basis of past return. This study test stock prices are predictable on the basis of past return and the momentum theory suggest buy past well-performed stock and sell past worst performer stock. Study checks the presence of momentum effect in Pakistan stock exchange. This study also answered the question of the current study is what impact reveals by the selected stock of the PSX 100 index and to test alternative and null hypothesis there is momentum effect in PSX 100 index and there is no momentum effect in PSX-100 index. So for the purpose of checking the momentum effect in Pakistan stock exchange, this study evaluates. This study used last decade data from Jan 2007 to Dec 2016 using the method of j*k with the help of Stata coding. Study constructed 16 strategies for the winner, loser, and winner minus looser by applying the technique of docile, equal weighted technique and zero cost portfolio (winner minus loser) winner stocks as on long call position and losers stocks as on short call position.

This study found the returns of the stock prices and arrange the return in descending order the top 25 stocks consider as winner and the bottom 25 stocks consider as a loser so study get totally 16 momentum strategies for analyzing momentum effect which is 3*3, 3*6, 3*9, 3*12, 6*3, 6*6, 6*9, 6*12, 9*3, 9*6, 9*9, 9*12, 12*3, 12*6, 12*9, 12*12 by combining there are totally 16 strategies each and every strategy suggest to buy or not. 3 by 3 strategy means if the stock has given a positive or negative return with formation period of 3 if study holds the same stock for next three months what would be the result same as it as a researcher have a 12 by 12 strategy so at the end study get some average results which discussed are as under. look to table 3 winner minus loser stocks result are matching with (Jagadeesh & Titman, 1993) and the result of the current study strategy of 3*6, 3*9 and 3*12 are opponents to the (Khan. *et.al*., 2016). With 6 months formation, period withholding period of 3 and 9 months are opponent while with formation period

of 6 withholding period of 6 and 12 are same results with (Anjum, Ijaz, and Ahmad, 2016). 9 and 12 months formation strategy withholding period 3 months results are opponent while with 9 and 12 month formation period with 6, 9, and 12 holding months' results are matching with the results of (Peter and Abdullah, 2012). Current studies results are strongly matched with previous studies so it's concluded this study has found a strong momentum effect in PSX-100 index. Pakistan stock exchange is the stable stock market because in the last decade Pakistan economy faces a different kind of challenges terrorism, political instability, systematics risk earthquake 2005, flood 2010 and internal strikes after 2013 election but still up to 2016 Pakistan stock exchange shows a momentum effect which indicate in different time of challenges its perform better and its increase the confidence level of investor. Look in the table,3 T-value of formation period 3 and holding period 6 are 2.88, formation period 9 and 12 withholding period d 6 are 2.05 and statistically, the significant result is the opponent of (Khan. *et.al.*, 2016) and matching with (Anjum, Ijaz, and Ahmad, 2016).

Conclusion and Future Research Directions

This study intends to evaluate the presence of momentum effect in Pakistan stock market by taking daily share price data for a period from Jan 2007 to Dec 2016. The study applied the sixteen momentum strategies base on docile, full rebalancing and equal weighted techniques top 25% stocks selected as winner and bottom 25% stocks selected as a loser. In winner portfolio, 10 strategies show positive results out of 16 strategies while in losers stocks portfolio 8 strategies show a negative result which is favorable because of short call position. In winner stocks portfolio the highest return was given by 3*12 strategy which shows 0.562 returns while in losers stocks portfolio 3*6 strategy has the highest return which is -0.636. The return of zero cost portfolios indicates the strong momentum effect. The most profitable strategy was 3*6 which show 0.46 returns reveal momentum effect and statistically significant in Pakistan stock exchange. Hence, study concluded that the momentum effect exists in Pakistan stock exchange. Beside useful implications of the study this study was based on some limitations i.e. study took only last ten year's data as more data requires more payment. There are possibilities of more momentum effect is present if the data period is extended and added some non-financial firms in a selected sample period. In future, variables like a book to the market value, risk, size, trading volume and transaction cost can be considered to explain the momentum return more precisely in Pakistan stock exchange.

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