Momentum Effect: Evidence from Emerging Capital Market of Pakistan

Waseem Abbas¹, Idrees Ali Shah², Masroor Shah³

¹MS (Finance) Scholar, Institute of Business and Management Sciences, AUP Peshawar
²Lecturer, Institute of Business and Management Sciences, the University of Agriculture, Peshawar
³MS (Finance) Scholar, Faculty of Management Sciences, International Islamic University Islamabad

ABSTRACT

The objective of this study is to investigate the existence of momentum effect in Pakistan stock exchange (PSX). CAPM and Carhart four factor model is applied for risk factor analysis with regard to momentum. This study has analyzed 25 momentum strategies with the help of decile partial rebalancing and equal weighted techniques. Six years monthly data of 83 firms from PSX-100 Index from 2009 to 2014 is used for analysis for CAPM. For Carhart 4 factor model and for the momentum we have taken 190 non-financial firms from PSX all listed firms. We have selected 6x6 strategies for our study to check whether there exists any momentum effect in it or not. For Carhart, we have taken additional 3 factors known as HML, SMB, and MOM. We have applied CAPM model for momentum on 6x6 strategies and the result found that the return is due to systematic risk not by manager performance. After running the tests, very mild momentum was seen which we have neglected. Only 3 strategies of 25 have shown momentum, which also confirms that by taking ranking period short and holding period long will give investors significant abnormal return, it also proves the absence of momentum effect in PSX.

KEYWORDS: Momentum, CAPM, Carhart, and Pakistan.

1. INTRODUCTION

Wealth maximization is one of the main motives of finance and modern finance theories mainly focus on the issue of wealth maximization of the shareholders. Researchers are trying their level best and inventing new ideas and strategies for investors so that they can achieve their goals efficiently. Momentum effect is one of important strategy in the market and discussed as an anomaly of the market through which investors earn an excess return in finance literature (like, Fama & French, 2012;
Asness, Mokowitz, & Pederson, 2013). The history of development in risky asset pricing mainly starts from the work of capital asset pricing model (CAPM) presented by (Sharp, 1964) which measure the relationship between systematic return and systematic risk. Ross (1997) criticized classic CAPM on the basis that the market portfolio that includes all assets whose expected returns are uncertain and practically unobservable.

Ross (1976) developed arbitrage pricing model (APT) and discusses N number of variables which determine the return on risky assets. A number of anomalies were discussed in finance literature after the formal development of APT theory. Moreover, Basu (1977) introduced the concept of price earnings ratio in the pricing of financial assets and shows that high price earnings ratio perform well compare to low price earnings ratio. Klein and Bawa (1977) portray the effect of small firms and big firms and show that small firms perform low as compare to big firms. Jagadeesh and Titman (1993) develop the concept of momentum and shows that if there is any stock which has performed relatively bad will continue to perform relatively bad in the near future vice versa. Momentum is a thorough and organized method of investing in stocks and different kinds of securities like bond, currencies, and commodities (Berger, Israel, & Moskowitz, 2009).

The concept of momentum effect came from efficient market hypothesis (EMH) proposed by Fama and French (1972), in addition, Momentum effect and EMH are contrary to one another. They further divided efficient market hypothesis into three classes, weak form of EMH semi-strong form of EMH, and strong form of EMH. The weak form describes that technical analysis of prior or historical prices does not give any advantage to the investors as the price reflects all the available information and the investors can take advantage by using the fundamental analysis and inside information. The semi-strong form of the efficient market hypothesis (EMH) discusses that neither the technical analysis nor the fundamental analysis can give any advantage to the investors but only the inside information can give them advantage. Similarly, Strong form of efficient market hypothesis (EMH) states that none of this three fundamental analysis, inside information, and technical analysis can give any advantage to investor because all the available information is reflected in the current price of the stock, but there are certain
anomalies in finance which challenge the validity of EMH like size effect, value effect and momentum effect.

As the concept of EMH started rising in finance, the non-followers of EMH started arguing that future prices can be forecasted by using past prices information. Many of the researchers have put forward different phenomena’s against EMH which are known as anomalies in finance, it includes short term momentum effect, long-term reversals and after earning statement drifts.

1.1 Problem Statement of the study:

The effect of momentum in some markets is very strong in some developed markets and weak in some emerging markets. Several researchers have done researches on momentum effect but these studies were mainly done on developed stock exchanges in USA Europe and London and some western countries. Rouwenhort (1998); Kual and Conard (1998); Jegadeesh and Titman (1993) worked on momentum and found the existence of momentum in different markets, later on (Chui, Wei., & Titman, 2000; Dijk and Huibers and Hu., 2002 and Martin et al., 2003) worked on momentum and showed the existence of momentum effect, mild and strong results were reported by those researchers. Most of the researchers have studied developed stock markets and very few has given due importance to developing markets like Pakistan stock exchange. In the international equity market, emerging market got attention (Guo and Wei, 2017).

1.2 Objectives of the study:

The objectives of this study are following

1. To check the risk factors based on CAPM model
2. To investigate the momentum effect in emerging stocks of Pakistan

1.3 Research Hypothesis of the study:

Ho: Zero Cost Portfolios will not give positive return
H1: Zero Cost Portfolios will give positive return
Ho: Momentum Results in Ranking Period statistically same with Testing Period
H1: Momentum Results in Ranking Period statistically different from Testing Period
Ho: Return of zero cost portfolio is not due to manager performance by going long in winner portfolio
H1: Return of zero cost portfolio is due to manager performance by going long in winner portfolio
Ho: Four factor model is not able to describe variation in stock return for various factor.
H1: Four factor model is able to describe variation in stock return for various factors

2. Literature Review

Numerous studies have been conducted to analyze the momentum effect in developed and emerging stock exchange around the worlds of capitals markets. To find out the momentum effect various strategies have been used in various literature by the different researcher but the most commonly used are 16 strategies.

2.1 Theoretical Literature:

There are few theories that are based on momentum effects such as Efficient Markets Theories, Random Walk theories, and prospect theories etc.

2.1.1 Efficient Market Theories:

Fama and French (1970) explained efficient market hypothesis in term of information incorporation in the prices of assets. He gave three form of market efficiency i-e is weak, semi strong and strong form of market efficiency. He explained that investor could not predict future prices on the basis of past information. On the basis of this argument, momentum effect does not prevail in the market and unable to determine the future prices.

2.1.2 Random Walk Hypothesis:

This theory was put forward by a French broker Jules Regnault (1863) in his book that he published at the time. He was of the view that the prices of stocks in the market do not follow any pattern they move up and down randomly, and their future prices cannot be forecasted from the past prices information, it means that any investor who has the past knowledge of prices of stocks with the help of these prices he is unable to predict the future price for any stock and the prices of stocks the prices follow a random path

2.2 Empirical Literature:

Zoghlami (2013) worked on Tunisian stock exchange market to check the
existence of momentum effect in this market. For this purpose, he took 100 listed firms from Tunisian stock exchange market. He made 16 relative strength strategies. After analyzing the data, he found a positive return in zero cost momentum portfolios. He showed a very strong influence of momentum effect in the capital markets of Tunisia.

Martin, Rachel., & Siboulet (2003) worked on momentum effect at very large scale by taking the data from different regions of the globe which includes Asia US Africa and Europe. They took most of the countries data from all those mention regions and checked momentum effect whether there exists any momentum effect, and if it exists up to how much extent. When they analyzed the data they reported that Europe, United States of America and African stock markets have very strong momentum effect in the capital markets while that in Asian capital market the momentum effect was reported very low. These results showed resemblance with the results of Titman and Jegadeesh (1993). Dijk and Huibers (2002) conducted a study on momentum effect, for this purpose they took a sample of 15 European countries from the year 1987-1999. They transformed the ranking period and testing period, ranking period was 12 months and it was fixed, while the testing period was 1, 3, 6 and 12 months consecutively. After analyzing the data, he stated that zero cost momentum portfolios are statistically significant and bear a positive result. He also concluded that risk adjusted returns are also positive.

Chui et al (2000) they were the first researchers who worked on Asian capital markets for the first time in the history of finance to check whether there exists any momentum effect or not from 1976-2000. They made 6/6-month strategy for their study, in which winner stock was ranked on the top and losers were ranked at bottom. After analyzing the capital market, they find out a very low efficiency of momentum presence at these capital markets of Asia, except two countries in all Asian countries Korea and Indonesia.

Rouwenhurt (1998) conducted a study on European markets so he took 2190 firms and took data from the year 1980 to 1995. He made 32 strategies instead of 16 strategies. They were divided in to two parts on the bases of one-month gap and without gap one month gap was taken between ranking period and testing period in 16 strategies while on the other hand no such gap was taken in other 16 strategies. After analyzing the
data, he found that the momentum portfolio bears positive return which is also significant it was the result of 16 strategies without one month gap. it was interesting to know that the portfolio marked by (Jegadeesh and titman, 1993) as bad and good were testified same. The result of other 16 strategies with a one-month gap between ranking period and testing period also got the same result as given by Jagadeesh and titman (1993) on capital markets in the US.

Rouwenhort (1999) on the basis of his study conducted later on individual countries reported that Denmark Holland and Spanish capital markets have very strong momentum effect in them.

Jegadeesh and Titman (1993) were the first two persons to analyze the momentum effect for the first time in the history of finance, they studied NYSE and AMEX from the beginning of 1965 to 1989. At that time, they made approximately 32 strategies withholding period and formation/ testing period from 3 to 12 months. Their result showed that positive return in all zero cost momentum portfolios has occurred. All the returns were checked statistically and it was found them all of them were statistically significant except 3x3 months strategy.

Jegadeesh (1990); Lehmann (1990) filed the evidence of short term reversal. Both of the authors worked individually. They said that those stocks in capital market which have given a positive return in the past will yield more and above than Average positive return in their near future.

Lakonishok et al (1994) also worked on American capital markets, NYSE, NASDAQ, and AMEX. They took data of 16 years from 1977 to 1993. they arranged the data according to earning news basis and their past returns. After analyzing the data, they came up with the result that the profit in price momentum strategies is much higher than that of earning momentum strategies. They also observed that in the first year, the stocks give higher momentum return and in 2nd and 3rd year the return becomes average. They also find that the reaction of investors to information is not fast rather they respond slowly to new information. Nawosah and Bulkley (2005) conducted a study on three American stock exchanges which includes the most popular NYSE, NASDAQ, and AMEX. They used the data for their study form 1962-2001. In this long tenure, some
firms were de-listed, they also included those firms in their study. They adopted the same methodology as used by Titman and Jegadeesh in 2001. Their findings were the same as reported in the previous literature. Testing period 3x12 months bears abnormal returns. They also reported that if there is no control on returns, momentum effect will give you the same result as reported by Titman and Jegadeesh.

Rahman and Mohsin (2008) used momentum strategies (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, and 12/12) to identify the existence of momentum effect in Karachi stock exchange using monthly data. Their result suggested that momentum effect exists in Karachi stock exchange.

3. RESEARCH METHODOLOGY

3.1 Population, sample and sampling of the study:

For this study, the population was comprised of all listed companies in Pakistan stock exchange, while our sample was PSX 100 index. The PSX 100 index consists of 100 companies, whereas 83 companies which are included in PSX 100 index will be selected for a period of 01-01-2009 to 30-12-2014, purposively on the basis of non-probability sampling. The reason for the selection of 83 companies is due to non-availability of data as well as delisted stock. We will also take closing price of the 83 companies for analysis purpose of the momentum.

3.2 Strategies Formulation for Momentum Effect:

To check the momentum effect in Pakistani capital market, 25 momentum strategies that are based on ranking and testing period such (1/1, 3/3, 6/6, 9/9, 12/12) and each momentum strategies further divided into 5 strategies

3.2.1 Decile versus Weighted Relative Strength Strategy:

For ranking the Three portfolios such winner, looser and momentum portfolio, we have two well know mentioned procedures. They are WRSS and Decile strategies. To rank the stock and then compare its performance with average sample performance in WRSS method. While in Decile strategy, stocks were ranked on the basis of their historical performance such as Long position in the best portfolio, in upward order of all portfolios while the Short position in the worst portfolio in downward order of all portfolios.
3.2.2 Equally-Weighted versus Value-Weighted Portfolio:

The next important consideration is regarding the weights assigned to each portfolio. In the equally-weighted method, portfolios are constructed irrespective of the market capitalization. On the other hand, portfolios are weighted on the basis of market capitalization in the value-weighted portfolio. By using the value-weighted portfolio method, it becomes very difficult to conclude that either effect is an entire sample or only in stock having large capitalization. So, we selected equally-weighted portfolio for our study.

3.3 Momentum Strategies, Ranking and Testing Period:

Here we defined both the size of a ranking period (formation) and testing period (holding period). We have read and observed in the literature that vastly used ranking (formation) strategies are 1x1, 3x3, 6x6, 9x9, 12x12. Jegadeesh and Titman (1993)

In addition, it’s also important to note that each and every strategy give rise to 5 further strategies. When we add them up 25 strategies were made from these 5 strategies. 1x1, 1x3, 1x6, 1x9, 1x12 and 3x1,3x3, 3x6, 3x9, 3x12 and 6x1,6x3, 6x6, 6x9, 6x12 and 9x1,9x3, 9x6, 9x9, 9x12 and 12x1,12x3, 12x6, 12x9, 12x12.

We applied 6x6 strategies for the analysis of the risk factor; with six months testing period and six months ranking period, at the end of six months ranking period winner and loser portfolios was shaped. Winner portfolio and looser portfolio could be obtained by taking a long position in best performing stock, and looser by taking a short position in the worst performing stock. These portfolios hold for 6 months. Strategies making process is given below.

<table>
<thead>
<tr>
<th>Table 3.1: Overview of 25 Momentum Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>6</td>
</tr>
<tr>
<td>9</td>
</tr>
<tr>
<td>12</td>
</tr>
</tbody>
</table>
3.4 **Equations and variables of the study:**

3.5.1 **Variables for the study:**

Several variables were going to be highlighted in our study. This helped us find the results. They are described as PSX 100 index monthly return, selected firms/companies monthly stock return. Looser portfolio and winner portfolio, zero cost portfolio (winner – looser portfolio), and for capital asset pricing model we used portfolio monthly return denoted by (Rp-Rf), and risk premium denoted by (Rm-Rf). For four factors model, three extra variables were included such as value and size premium and momentum factor. The equations models for these variables are as follows.

3.6 **Risk Factors and Models:**

3.6.1 **CAPM Model:**

CAPM model was used to price an individual security or portfolio. This model helped the investors to calculate risk, and what type of expected return they can get on their investment. We said that momentum effect will give us abnormal returns. But we also knew that these abnormal returns are due to some factors, to identify those factors we used CAPM model, to find out that return of winner minus looser momentum portfolio, and whether these returns are because of looser or winner. Or it is due to the position taken by the manager, long in a winner and short in the looser portfolio. Mathematically it can be written as

\[ \text{Rp} = \alpha + \beta (Rm-Rf) + \epsilon \]

Data for analysis were taken from different sources in this regards we took help from the data given by state bank of Pakistan www.SBP.org.pk, Karachi stock exchange and yahoo finance as well. We used Stata for the value of portfolios Alpha and Beta.

3.6.2 **Carhart 4-Factor Model:**

Carhart 4-Factor Model is the expansion of Fama and French three factor model; he added momentum effect in Fama and French 3 factor model on the findings of Jagadeesh and titman (1993). Mathematically this model can be written as

\[ r_{it} = \alpha + \beta_1 r_{mt} + \beta_2 m_{it} + \beta_3 h_{it} + \epsilon_{it} \]

In the above mentioned formula, \( r_{it} \) represents a return of portfolio i in month t,
\( r_{(ft)} \) represents the risk-free rate for month \( t \) and \( \text{MKT}_t \) represents excess market portfolio return, \( (r_{(ft)} - r_{(ft)}) \), in month \( t \) and \( \text{MOM}_t \) represents momentum risk factor. More specifically, \( \beta_{\text{HML}} \) (High minus Low) represents book-to-market factor and also represents the difference between the return on a portfolio of high (the upper 30%) and return on a portfolio of low (the lower 30%) book-to-market stocks. \( \beta_{\text{SMB}} \) (Small Minus Big) is the size factor which shows the difference between return on a portfolio of small (lower 50%) stocks and the return on a portfolio of large (upper 50%) stocks. \( \text{Mkt} \) represents a return on the market portfolio. \( \text{SMB} \) shows the difference between the return of a portfolio of stocks with low (the lower 50%) prior year returns, and the return of a portfolio of stocks with high (the upper 50%) prior year returns, \( (H - L) \) high minus low prior year returns, we will skip the return in the Ranking month or period.

4. RESULTS AND DISCUSSION

4.1 Descriptive Statistics

In the given table 4.1, the means and standard deviation of six portfolios and four risk factors are given as follow. We have also found out the mean return (monthly return) and its risk which is measured by standard deviation in the given table below.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>BL</td>
<td>2.745414</td>
<td>4.947176</td>
</tr>
<tr>
<td>BM</td>
<td>1.582632</td>
<td>6.279262</td>
</tr>
<tr>
<td>BH</td>
<td>-0.4119041</td>
<td>8.369265</td>
</tr>
<tr>
<td>SL</td>
<td>2.823707</td>
<td>8.335509</td>
</tr>
<tr>
<td>SM</td>
<td>1.720534</td>
<td>7.408791</td>
</tr>
<tr>
<td>SH</td>
<td>-0.4108522</td>
<td>9.518832</td>
</tr>
<tr>
<td>ri_rf</td>
<td>0.3580565</td>
<td>19.80302</td>
</tr>
<tr>
<td>Rm-Rf</td>
<td>1.487349</td>
<td>4.962674</td>
</tr>
<tr>
<td>SMB</td>
<td>0.0720823</td>
<td>4.702376</td>
</tr>
<tr>
<td>HML</td>
<td>-3.95439</td>
<td>4.864435</td>
</tr>
<tr>
<td>MOM</td>
<td>-1.315665</td>
<td>5.034101</td>
</tr>
</tbody>
</table>

The 2nd column in the table 4.1 shows mean returns of all portfolios, the maximum monthly return was of SL portfolio 2.82, and the lowest monthly return was 1.58 of the BM portfolio. The return of BL portfolio was 2.75, the monthly return of SH
was - .410, SM has the monthly return of 1.72 and BH was also found - 0.411, the maximum return was 2.28 \% of SL portfolio and minimum return was produced by BH - 0.411. The return of SMB (small- big) .0720823 with standard deviation of 4.702376

4.3 Correlations

| Table 4.2: Correlation between Six Portfolio Returns and four risk factors |
|-----------------------------|------------------|------------------|------------------|----------------------|------------------|------------------|
| B/L | B/M | B/H | S/L | S/M | S/H | Ri-Rf | Rm-Rf | SMB | HML | MOM |
| 1.0000 | 0.0085 | 0.0731 | 0.0634 | 0.0070 | 0.0643 | 0.0300 | 0.0735 | 0.1445 | 0.2940 |
| | 1.0000 | 0.0883 | 0.0759 | 0.0077 | 0.0082 | 0.0350 | 0.0775 | 0.4356 | 0.2402 |
| | | 1.0000 | 0.0654 | 0.0071 | 0.0795 | 0.0289 | 0.0470 | 0.0660 | 0.0815 |
| | | | 1.0000 | 0.0074 | 0.0772 | 0.0325 | 0.0434 | 0.1121 | 0.1065 |
| | | | | 1.0000 | 0.33 | 0.033 | 0.0486 | 0.0641 | 0.0335 |
| | | | | | 1.0000 | 0.2332 | 0.0660 | 0.0175 | 0.0911 |
| | | | | | | 1.0000 | 0.0615 | 0.2697 | 0.0615 |
| | | | | | | | 1.0000 | 0.0113 | 0.0045 |
| | | | | | | | | 1.0000 |

The above correlation table shows the relationship among different portfolios, the smallest correlation was found to be -0.206 between SMB and market risk premium, while on the other hand the highest correlation coefficient was found 0.33 between SH and SM portfolios, showing a positive and strong correlation between these two portfolios. The maximum correlation between momentum and SH is 0.091 and low correlation has been observed between MOM and HML is 0.0045.

| Table # 4.3: Correlation between 4 independent Factor |
|-----------------------------|----------|----------|----------|----------|
| Market Factor (Rm-Rf) | 1.00     |          |          |          |
| Size Factor (SMB)      | -0.206   | 1.00     |          |          |
| Value Factor (HML)    | 0.2697   | 0.1113   | 1.00     |          |
| Momentum (MOM)        | 0.0615   | 0.1151   | 0.0045   | 1.00     |

We can conclude correlation between different factors, the highest correlation was calculated in between value factor and a market factor which was 0.206 and the
lowest correlation was found in between momentum and value factor which was 0.0045. Generally, we can conclude there is a positive correlation between all the factors except one factor, which shows a positive but a very mild correlation in between the factors. In addition coefficient values were concluded high for HML and SMB, but with positive direction. The value of momentum coefficient is low but found in a positive direction in few cases.

We can also conclude from the above mentioned table that correlation between momentum and value factor is also very low, and hence it can be concluded that there is no correlation between them. Moreover, low correlation between 4 risk factors represents that SMB offered a good foundation for HML that is somewhat free from market risk factor (Rm-Rf)

4.4 Explanation of a CAPM for Risk factor and 6/6 strategies

<table>
<thead>
<tr>
<th>Table # 4.4: CAPM Model for Risk factors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ri-Rf</strong></td>
</tr>
<tr>
<td>Constant</td>
</tr>
<tr>
<td>Rm – RF</td>
</tr>
</tbody>
</table>

Alpha shows us the regression intercept, and it also measures the manager performance, same results were also produced by Petr and Abdullah (2012); Ellis and Thomas (2004). In addition to this, Alpha value shows us the return of momentum portfolio which can be explained by the market risk factors. Whereas Beta shows systematic risk or undiversified risk, and it also portrays the risk associated with portfolio comparative to the market collection i-e PSX 100 index. The value of beta in the momentum portfolio only measures systematic risk in the momentum portfolio but does not measure total risk. (Jegadeesh and Titman., 1993; Rouwenhort, 1999)

4.4.1 CAPM model on 6/6 Momentum strategy

Momentum portfolio is obtained by subtracting looser portfolio from winner portfolio while beta shows systematic risk. The return which we get from the portfolio is due to systematic undiversified risk or looser portfolio, CAPM will be used because most of the researchers have excessively used this model for risk factor in their researches studies Petr and Abdullah (2012). CAPM will be applied on stock prices of PSX with the
help of STATA in order to get the desired results. This method was also used by researchers like Ellis and Thomas (2004).

### Table # 4.5: CAPM Model; Momentum Strategy R6T6.

<table>
<thead>
<tr>
<th>Dep. Variables</th>
<th>Ind. Variable</th>
<th>Coefficients</th>
<th>Constant</th>
<th>Standard Error</th>
<th>t-value</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>*WT6 Winner Testing</td>
<td>Rm – RF</td>
<td>1.21777</td>
<td>.6357273</td>
<td>1.92</td>
<td>0.060</td>
<td></td>
</tr>
<tr>
<td>**LT6 Looser testing</td>
<td>Rm – RF</td>
<td>-.0397708</td>
<td>.0891865</td>
<td>-.45</td>
<td>0.657</td>
<td></td>
</tr>
<tr>
<td>***WLT6 Winner minus loser</td>
<td>Rm – RF</td>
<td>.075778</td>
<td>.5978061</td>
<td>0.13</td>
<td>0.900</td>
<td></td>
</tr>
</tbody>
</table>

***R-squared: 0.001, F-value: 933.74, P-value: 0.0834

Alpha is the regression intercept and it also shows manager performance Petr and Abdullah (2012). In addition, alpha value also shows us the return from zero cost portfolios (momentum portfolio) which is explained by MRF, whereas beta measures systematic risk of momentum portfolio but not the total risk. (Berger et al, 2009)

Momentum strategies R6T6 ranking period 6 months and testing period also 6 months, the return of zero cost portfolio or momentum portfolio is 0.2121147, and .075778, while Alpha is .075778, t-stat is 0.13, and insignificant, while t-stat, P-value, again confirms insignificance. While Beta of the zero cost portfolio is 0.2121147, and significant at ten percent level it is due to t-stat p-value 0.089, and R2 is 0.0010 and it is very low. This Winner minus Looser shows alpha or y-intercept value is low. This indicates that return of the momentum portfolio or zero cost portfolios are because of systematic risk. Due to high and significant beta, it is confirmed that returns are increased by taking the high systematic risk and it also represents stock fluctuate with the market portfolio. In addition, the value of R2 is 0.0010 which again shows that the return of this portfolio is confirmed by somewhat the PSX-100 index.

Role of the manager becomes significant in the performance portfolio when the ranking period in increased and the value of alphas decrease at a minor rate. The regularity in the entire portfolio shows that return cannot be earned without taking the high risk but we cannot neglect the importance of beta related to the stocks. The importance of beta is also there because it helps the manager in making a decision.
4.5 Carhart four Factor Model

Carhart 4-Factor Model is the expansion of Fama and French three factor model. He added momentum effect in Fama and French 3 factor model on the findings of Jagadeesh and titman (1993). The following are the results of the said models.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. error</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>.9216681</td>
<td>1798217</td>
<td>5.13</td>
<td>0.000</td>
</tr>
<tr>
<td>MOM</td>
<td>.2019505</td>
<td>.0275018</td>
<td>7.34</td>
<td>0.000</td>
</tr>
<tr>
<td>HML</td>
<td>.348374</td>
<td>.0305156</td>
<td>11.42</td>
<td>0.000</td>
</tr>
<tr>
<td>SMB</td>
<td>.6771112</td>
<td>.0332898</td>
<td>20.34</td>
<td>0.000</td>
</tr>
<tr>
<td>rm_rf</td>
<td>.9438329</td>
<td>.0327548</td>
<td>28.82</td>
<td>0.000</td>
</tr>
</tbody>
</table>

***R-squared: 0.1141, F-value: 872.56, P-value: 0.0000

The coefficient value momentum is 0.20169505 and p-value are 0.000 which is highly significant and show a positive relationship. The coefficient value of value factor (HML) is 0.348374 with respect to p-value is 0.000 which is highly significant at 1% level which shows that there is a positive relationship between HML and portfolio return. The coefficient of size factor (SMB) is 0.6771 and their p-value is 0.0000, which is highly significant and also show a positive relationship. In the same cases, the value of the market factor is positive and highly significant Petr and Abdullah (2012). It indicates that due to market factors, it describes the variation in stock returns and has a positive contribution and same cases for all other risk factors. If we see all the four factors it has positive and strongly significant which accept our alternative hypothesis that four factor model is able to express variation in stock return for different factor and this model is best applicable on Pakistan stock.

<table>
<thead>
<tr>
<th>Ranking period(R)</th>
<th>Testing Period(T)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Winner</td>
<td>1</td>
</tr>
<tr>
<td>Looser</td>
<td>1.7013</td>
</tr>
<tr>
<td>Winner-Looser</td>
<td>-.32929</td>
</tr>
<tr>
<td>t-stat</td>
<td>-0.506</td>
</tr>
</tbody>
</table>
4.6 Returns of Momentum

The above table shows us that we have used overlapping holding period in order to get a monthly return of total 25 different momentum strategies that we have obtained from different testing and ranking periods. After the ranking period portfolios are formed but those portfolios are formed at the start or beginning of every month. In addition, we will further discuss these results to our base study. It’s also very important to note that Overlapping has been given preference rather than non-overlapping in our study with the aim to increase the number of observations and get accurate results from our tests to show the existence of momentum.

Looking at the winner portfolio, we got 24 out of 25 momentum strategies produce a positive return. The same result was found by Berger et al (2009); Mohsin. (2012). we also predict that the winner portfolio will give positive returns and here we got 24 positive strategies. There is only one strategy that yields negative return having both ranking and testing period of 3 months (3/3) Which indicates that a strategy with the low formation and holding period produce a negative return, and all the reaming strategies are producing a positive return.
In line with Berger et al. (2009) only one strategy provides a negative return, while the remaining produce positive return, in addition, the winner portfolio that is performing worst is having 3 months ranking & testing periods, with monthly return -0.54204. We can have concluded on the basis of winner portfolios that all portfolios are producing a positive return and only one strategy provides a negative return which indicates that winner portfolio is right direction and proves the existing of momentum (Petr & Abdullah, 2012; Rouwenhort, 1999).

The values of winner minus looser portfolio return from 10 strategies out of 25 is positive, but insignificant at 1, 5 and 10percent level, there are only 3 strategies that have produced positive return they are 1x9 which gave the return of 0.3562 and 9x6 and 6x6 produce high returns (0.52214) and (0.3214) respectively. For zero cost portfolio it does not seem profitable up to some extent because 10 portfolios have generated a positive return, but if we see on the other side, 15 out of 25 strategies has produced negative returns, which does not confirm our hypothesis that Zero cost portfolio generate will give a positive return. While the worst performing zero cost portfolios has 6x12 months, with return -1.03772, same results were found by, (Berger et al, 2009). On the other side, the best portfolio was 1x9 months, which indicates that low ranking period and high testing period generate an abnormal return with a good result. It is also interesting to know that we have found a high return with a formation period of 1 month and holding period nine months, which is a new contribution to the current finding  

5. CONCLUSION

Momentum strategies are gaining too much importance nowadays in both emerging and developed stocks exchanges of the world for investors as well as for firms. Momentum has been vastly used as an increasing return technique. Momentum strategies are generally accepted for measuring the momentum effect in international capitals markets as well as local capital markets in Pakistan. Our Aim of the research was to check the existence of momentum in Pakistan stock exchange. CAPM and Carhart four factor model is applied for risk factor analysis with regard to momentum. In this study we have analyzed 25 momentum strategies (1 x 1, 1 x 3, 1 x 6, 1 x 9, 1 x 12, 3 x 1, 3
x 3, 3 x 6, 3 x 9, 3 x 12, 6 x 1, 6 x 3, 6 x 6, 6 x 9, 6 x 12, 9 x 1, 9 x 3, 9 x 6, 9 x 9, 9 x 12, 12 x 1, 12 x 3, 12 x 6, 12 x 9, and 12 x 12) with the help of Decile, partial rebalancing and equal weighted techniques. Six years’ monthly data for CAPM of 83 firms from PSX-100 Index from the year 2009 to the year 2014 is used to obtain our results, and for Carhart 4 factor model as well as for momentum we have taken 190 non-financial firms from PSX all listed firms.

6x6 strategies were used for our study to check whether there exist any momentum effects in it or not. For CAPM, Ri-Rf was dependent variable and market portfolios as an independent variable, for Carhart, 3 additional factors known as HML, SMB, and MOM. All the data were analyzed in STATA with ASM coding. CAPM was applied for momentum on 6x6 strategies, and the result found that the return is due to systematic risk not by manager performance. Carhart 4 factor model was applied to different risk factors and were found significant positive return and the relationship is found positive which examine the relationship among different risk factors on Pakistan Stock Exchange

We accepted the hypothesis that 4-factor model is able to show fluctuations in stock return. Only 3 strategies out of 25 strategies have shown momentum effect but such momentum was very mild and hence we have neglected that momentum effect exists in Pakistan stock exchange. Those strategies were (1x9, 9x1 and 9x9), there were new finding, that by taking ranking period short and holding period long will give us the significant result.

It is concluded from the study that winner minus looser’s portfolio does not generate a positive significant return and it proves the inexistence of momentum effect in PSX. the firms of PSX do not follow the momentum effect because we accept the hypothesis that Momentum Results in Ranking Period statistically same with Testing Period and it confirm a very low but insignificant momentum effect in Pakistan stock exchange. Future study should conduct to test the momentum and CAPM effect on cross-country analysis. Further, nowadays Islamic stocks got attention from both academicians and practitioners. So, future study should conduct to check momentum effect on Islamic stocks and conventional stocks.
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