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Over Reaction and the Cross-Section of Returns: Evidence from Pakistan

by

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To Almighty Allah who has created us as crown of creation and enable us to learn. This thesis is dedicated to my respective teachers, parents, brothers, and friends who always appreciate me in every step. I thank all of you for the interest in my studies and the motivation you gave me during those trying times when I had doubts about my abilities. This journey would not have been possible without their loving support and encouragement.

CERTIFICATE OF APPROVAL

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Abstract

A number of theories have discussed price momentum and price reversals. There is significant empirical evidence about the presence of momentum in global equity returns, however, there is less work on the subsequent long-term price reversal. This study explores the short-run momentum and long-run price reversal in the Pakistani equity market by using a sample of a hundred companies for a period of 2002-2015.

First, the returns of momentum sorted portfolios are compared. The findings of the study provided that the arbitrage portfolio created by taking a long position in and a short position in portfolios can earn higher returns in comparison to all momentum sorted portfolios. Secondly, the returns of reversal sorted portfolios are compared. The results indicate that the arbitrage portfolio created by taking a long position in and a short position in portfolios earns higher returns in comparison to all reversal sorted portfolios. The presence of short-run momentum indicates the overreaction of investors on the good news that is subsequently corrected through long-run reversal.

Finally, the link between momentum, reversal and cross-sectional returns are investigated and the results indicate that Momentum and Reversal are, in general, priced by the market. However, when all variables are considered, the effect disappears indicating that Fama and French factors capture all information. However, two pass regression provides that only beta of the market and size of hose significant impact on returns. The study the presence of overreaction and possibility of arbitrage profits in Pakistani market due to its inefficient behavior.

Keywords: Book to market, Momentum, Reversal, Value preimium, Stock returns.

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Abbreviations

APT	Arbitrage Pricing Theory
B	Big
BH	Big High
BL	Big Low
BLH	Big Low High
BHL	Big High Low
BHH	Big High High
BLL	Big Low Low
BE	Book to Equity
BTM	Book to Market
CAPM	Capital Asset Pricing Model
FF	Fama and French
HML	High Minus Low
KSE	Karachi Stock Exchange
ME	Market to Equity
MKT	Market
MTB	Market to Book
RF	Risk Free Rate of Interest
S	Small
SH	Small High
SL	Small Low

Chapter 1

Introduction

1.1 Theoretical Framework

The pricing of the financial assets has always attracted the attention of academicians and analysts. Various investment strategies based on size, market to book ratio, liquidity, growth, etc. has always been a matter of interest for all concerned. Two important investment strategies, commonly known as Momentum and Reversal are especially important as these are based on conflicting arguments. The momentum strategy provides that winner will remain winner and loser will remain loser so higher risk-adjusted returns can be earned by taking a long position in winners and a short position in losers. The second and equally important price pattern recognized is a reversal. Reversal strategy provides that higher return can be earned by buying losers and selling winners. DeBondt and Thaler (1985) studies US portfolio and finds that losers who perform worst in starting 3 periods perform better in the subsequent 3-year period which is test period and the overreaction results in the extreme high or low prices.The study by Jagadeesh and Titman (1993) argue that higher returns can be earned by selling a loser and buying winner stocks in U.S equity markets. Even though prices are symbolized through momentum in a short times of three to twelve months, prices overturn in long run of three to five years.

Price momentum and following reversal have been subsequently examined by many studies. Daniel (1998) covering various markets across the globe supports the presence of price momentum. The studies conducted by Barberis (1998) and Hong and Stein (1999) provide evidence on the existences of price momentum. The study by Asness et al. (2013) discusses the theoretical link between momentum and reversals. It reports the presence of a large volume of the empirical work supporting the prevalent momentum in international equity markets, but at the same time, the study highlights that there is a lack of comprehensive worldwide studies in the domain of price reversals. The empirical evidence regarding global price momentum is profound and consistent, but empirical evidence on long-run price reversal is scarce and inconsistent. This fill this gap in the literature by investigating price momentum and then the price reversal pattern in an emerging market.

Blackburn and Cakici (2017) state that strategy buys a stock that has performed well in the past and sell stock that has performed badly in the past make an insignificant positive return over three to twelve months holding time. This study finds that part of anomalous return generated in the first year before portfolio formation dissipate in two years. A similar model of return about the earnings announcement of the earlier period's winner and loser has also documented similar results.

The studies conducted on reversal are generally inclined and focused toward U.S equity market and only a few are focused on the single market. DA Costa (1994) investigates price momentum and subsequent reversal Brazil. Alonso and Rubio (1990) examine the same behavior in the Spanish market. Baytas and Cakici (1999) report overreaction during 1982 to 1991in equity markets of seven countries of the G7 group. Kaul (1998) discusses that momentum policy exclusively due to cross-section variation in expected return and some predictable time-series variation in stock return in European markets. The study by Blackburn and Cakici (2017) considers all stock active and inactive covering various size group from twenty-three major markets based on their addition in world index.

The increasing institutional interest in raising capital markets makes it important to recognize the way a market behaves. In recent year much attention has focused on the evident tendency of the market a overreact good and bad news. Howe (1986) and Chopra (1991) argue that the overreaction is a demonstration of essential market ineffectiveness. Others suggest that the noticeable overreactions are due in the direction of risk measurement or just another version of the size effect. Overreaction is present when individual revise their idea and inclined to round recent information. A conservative may cause an investor to under-react to new insignificant as already embedded belief in that investor can be explained momentum effect this occur post-formation again by assuming that overreaction occurs before portfolio information. If a momentum effect is to occur post-formation and overreaction are assumed to occur pre-formation in addition to assume that over-valued winner stock experience. Some negative news adjusts its bias in prices. It made sense that investor clings to their prior belief, by slowing diffusing the new set of information.

The assumptions of finance are generally consistent with the analysis. The prime contribution of Sharpe (1964) and Lintner (1965) in the form of CAPM should be accredited here It provides expected return on assets is linearly related to the market return. However, the risk premium in depends on beta. However, the domain of behavioral finance criticizes the rationality assumption of the humans and argues the presence of over and under reaction. The overreaction is not generally present in well-informed markets with lower information asymmetry. When it comes to overconfident investors with low portfolio values and investors in short income and low education, region, they typically exhibit overconfident behavior.

On the other hand, when come from anchoring bias, quickly attainable biases should necessarily be good news for winning stocks and bad news for losing stock. If overreaction has occurred on the arrival of some good news then winning stock will become overvalued and losing stocks will become undervalued. Winning stock should on average; exhibit more negative news then its price would call for and vice versa for losing stock. A conservative may cause investors to under-react to

new information if interesting is to be explained by conservatism. New information would not be important as already embedded beliefs in those investors and this could explain to momentum effect were to occur before portfolio formation. If a momentum effect is to occur post-formation and overreaction are assumed to occur and pre-formation in addition to assuming that overvalued winner stock experienced some negative news to hold adjusted its bias prices makes sense that investors cling to their prior beliefs, by slowing diffusion the new set of information.

1.2 Problem Statement

The pattern of the market in short term and long term always attracted the attention of academicians and practitioners. Existing research reveals that cross-section of returns remarkably explained by the multi-model factor. CAPM is the most powerful for the calculation of risk and returns on a measurable basis. A portfolio that gains a lot of attention from investor to know about the integration between different equity markets around the globe. This motivates investors to explore different equity markets. Knowledge of market conditions helps the investors to prevent from market imperfections. There is a lot of work on overreaction and stylized returns in the advanced market, but no or little evidence in the emerging market, especially in Pakistan. The goal of this study is to establish the relationship between the asset pricing factors and overreaction and the stylized return of various investment strategies. The behavior of the Pakistan market in this regard is inconsistent that require explanation in the short term as well as long term.

1.3 Research Questions

1. Do momentum-based investment strategy offers arbitrage profit?

2. Do reversal based investment strategies offer abnormal returns in the Pakistani equity market?

3. Which strategy offers higher returns, momentum or reversal?

4. Does evidence of overreaction exist in the Pakistani Market?

5. Do size premium explains Stylized returns?

6. Do value premium explains the Stylized returns?

7. Do momentum is priced by the market?

8. Do reversal is priced by the market?

1.4 Objectives of the Study

1. To explore the possibility of arbitrage profits by using a momentum-based investment strategies.

2. To investigate the presence of arbitrage profits by using reversal based investment strategies.

3. To provide insight into the presence of overreaction in the Pakistani market.

4. To provide insight into the role of the size premium in explaining stylized returns.

5. To explore the role of a value premium in explaining stylized returns.

6. To investigate the role of momentum in explaining stylized returns.

7. To examine the role of reversal in explaining stylized returns.

1.5 Significance of the Study

The literature related to the Pakistani equity market generally examines the role of momentum in explaining equity returns in the short run, but ignore the price reversal in the long run. This study bridges this gap and provides extant evidence of price momentum and subsequent price reversal. Secondly, the work on overreaction in momentum and reversal framework is very limited. This study covers

the gap and provides evidence regarding the presence of overreaction through a larger data set. It also provides us insight about how the strategy of overreaction portfolio contributes towards a higher expected return in the period of recession.

Thirdly, this study explains factors individually to check the relationship between factor premia and the return of portfolios formed on a different attribute. The extended analysis is performed through multifactor model by considering five factors, i.e. the factors of Fama French (i.e., market, value, size), reversal and momentum.

Pakistan is an emerging market that has attracted the global interest in the recent past. International and local investors may also be interested in new information. Therefore, this study opens a new door for information regarding momentum-reversal nexus.

This study holds great significance and helps the academicians and researchers in drawing a framework for their future research by testing these variables along with some factors in different market situations and locations. This study has equally been beneficial to the policymakers in devising their policies in a productive manner.

1.6 Organization of the Study

The study is organized in five chapters. The study provides the introduction, background of the study, objective and significance of the research study. The following section discusses the extensive review of the previous studies and re-balancing strategies applied in this study in detail. After a description of the data, results are presented. The subsequent sections provide discussions of findings respectively.

The final section summarizes conclusions and recommendations.

Chapter 2

Literature Review

For several year Scholars, and investment professional has been discussing price approaches outperform market Graham and Dodd (1934) and Dreman (1977). The value approaches demand for traders buy stock has short price relation to earning dividend past price, volume asset or an extra measure of rate. Basu (1977), Keim and Westerfield (1989), Chan Hamao and Lakonishok (1991) and the Fama French (1992) that stock through higher price ratio earn superior returns. Rosenberg Reid and Lanstein (1984) show that stock with a high book to market values outperforms the market. Finally, Chan Hamao and Lakonishok (1991) show that the high ratio of cash flow results in higher return. Literature investigates that magnitude by which those biases have enough to concurrently bring both short and long horizons.

In NYSE illiquidity have a positive and significant impact on expected return. It is more affected in time of market illiquidity. The stock excess return conventionally called risk premium that considered reimbursement for risk. This paper proposed that expected stock surplus return reflects recompense by the expected liquidity of the market. It is found as an increasing function of expected market illiquidity.

Amihud (1980) and Milgrom (1985) intended for typical dimension transaction value impact on bid-ask spread where larger surplus demand persuades greater impact on price. Kraus and Stoll (1972) Keiman and Madhavan (1996) reflect a

premium of informed traders. Kyle (1985) offers that market maker cannot make difference between order flows that are generated.

According to Sharp (1964), CAPM is based on efficient market hypothesis these hypotheses are based on a certain assumption such as the presence of transparency, no business cost, no important constraint by investment, investor normal behavior and prospects. There are assumptions imply that the market is not pretentious by imperfection. Some current evidence has highlighted requires to consider additional risk variables. Various studies test of model and model of portfolio assessment because of its dependence on a market portfolio of risky assets. Experimental studies repeat work on overreaction and under reaction by using active investment policies based on variables like size Banz (1981), a book to market Stattman (1980), momentum and reversal.

The study explains the link between the identified variables and portfolio management. Size premium is positive and significant for each portfolio.The value has clearly suggested that the market premium and size premium factor contribute towards the stock returns. The recognition of size effect leads the researcher to investigate its possible cause, as its presence implies either the CAPM is misspecified or that market is inefficient. The first point of view is that little firm is intrinsically risky than large firms due to the difference in operation and liquidity risk characteristics. The price value of little firms, stock tends to be more sensitive to change in the financial system that is less likely to survive the unfavorable economic situation. A number of outward inexplicable patterns in asset return that has led researchers to attribute multi-factors model. The cross-section relationship between market premium anomalies and stock return has attracted research in the US and Pakistan. In this particular study, relates cross section difference returns on Pakistan equity to the fundamental behavior of variable than market premium.

Jegadeesh and Titman (1993) report that meaningful return to buying winners and selling looser in the US equity market. This paper defines that short term return has a tendency to endure stock with a higher return in prior three to twelve months tends to have a higher long run of three to a five-year future return. These experimental finding price momentum and price reversal lead number of theories

instantaneously explain both effects. Others show that firm average stock return is associated with its size book to market earning value cash flow price and past sales development.

Merton (1973) develops the ICAPM and draws a number of implications for the cross section by return. An investor may hedge in contradiction of shift in investment prospect position. Campbell (1993, 1996) develops an inter temporal asset price model dependent on the linear estimate. Campbell's frameworks are mainly helpful to understand the fundamental instinct of ICAPM and predict the factor that influences equilibrium premium.

Campbell (1996) uses the VAR method in a multifactor model, setting by using 12 industries, 10 sizes, and 3 bond portfolio. Campbell finds CAPM provides an estimation by using a cross-section of the expected return. This innovation in labor income and estimated market return are extremely negatively correlated with the realized market return. The market factor picks up a huge portion of the other two sources of risk. VAR method that is implemented by Hodrick Sengmueller (1999) and Chen (2003) has merits and demerits. These methods permit investigators to make sure that variable at a price level predicts investment prospects.

Wang and Xia (2004) use regression basis method to check ICAPM that hypothesize a stochastic discount factor that is linear in market returns innovation on maximum sharp ratio and interest rate. This paper evaluates ICAPM factor exposure to size and book to market portfolio and other industry portfolio. Finally, test estimate exposure is priced in cross section. Fama and French (1996) argue that opportunity of SMB and HML factors are substituted by ICAPM state variable. Liew and vassal (2000) show that SMB and HML contain some information about GDP growth. Lettau and Ludvigson (2001) and vassalou (2003) show price ability of SMB and HML at minimum partly shared with the macroeconomic variable. Petkova (2006) point out that studies do not directly observe the Fama French model in the ICAPM background to predict investment prospects. Although, this methodology do not fully satisfied that component of the macroeconomic variable are orthogonal by investment prospects might be accounted for none zero price of risk.

Fama and French (1996) argue that the CAPM average return portfolio is connected to each other and captured by the three-factor model. FF (1993) show that three-factor models have a good explanation of return based on size and book to market. FF (1996) show that the three-factor model capture return based on earnings per price cash flow per price sales growth. Three-factor model capture reversal of return recognized by DeBondt and Thaler (1985). The stock has less long term past return tendency. Positive SMB and HML slope have smaller and moderate concerned advanced potential average return is predicted by the three-factor model. On the other hand, long term winner inclines to be strong stock, but has negative HML. Indifference to all support for the three-factor model, FF (1996) cannot explain the persistence of short term return documented by Jegadeesh and Titman (1993).

Jegadeesh and Titman (1993) show that the looser long term stock has lower short term past return with positive HML and long term winner short past winner has negative HML. Consequently, three-factor model is predicted by long term return. This model predicts reversal to certain range extension for future returns and continuance of short term returns unsolved by FF three-factor model.

Daniel and Titman (1997) argue that the Fama and French Three-factor model indicates that the expected return of an asset is a direct link to a characteristic of the asset.Furthermore grouping within each portfolio that is based on a factor loading of stock resolute by Fama and French three-factor models. Daniel and Titman find a relationship between factor loading and return, but it is weaker than predicted by the three-factor model.

2.1 Overreaction Hypothesis

Gaunt (2000) found that using a rebalancing technique to calculate market adjusted test portfolio returns, evidence of performance reversal for rank period loser and winner and positive irregular returns were found. But the results failed when buy and hold strategy was used. Data set for the period of 1974 to 1997 was used and Brails ford rebalancing technique was employed to test the winner, loser

performance, but the results were no doubt consistent with the Brails rod study but no significant difference was observed between two portfolios. In contrast, the multiplicative rebalancing technique was employed and found consistent with the results of other markets. Multiplicative buy and hold method was also adapted to make a comparison and the role of the size was also observed. However, for risk adjustment, performance reversal examined by loser portfolio was reduced using the rebalancing technique, but the remarkable abnormal return of arbitrage portfolio was still there. In this study, found that looser portfolio is subject to small firms and the positive returns of the portfolio are derived from the effect of small firms.

Even with the presence of these abnormalities, the equity market in Australia is not being exploited because of liquidity which was associated with small firms' stocks. This study also reveals the difference between US and Australian studies as if DeBondt and Thaler (1985) methodologies are used where the risk or other factors like size are not adjusted, US researches clearly demonstrate winner, loser portfolios through price reversal but this was not observed in Australian studies. The study indicated that the data sets should be divided into parts to find strong evidence of remarkable price reversals.

DeBondt and Thaler (1985) studied US portfolio stocks which ultimately tends to the overreaction of stock market investors. He found that loser who perform worst in starting 3 periods perform better in the subsequent 3-year period, which is test period and the overreaction results in the extreme high or low prices. This fault could be controlled in the subsequent time period. The overreaction hypothesis of the study assess the extent to which non- zero return in the time period after portfolio formation is related to a systematic residual return in the performance months. The empirical analysis in the study was based on three types of residuals; market model returns, market-adjusted returns and excess returns, and the empirical study made no different conclusions about the three so, market-adjusted returns were further used.

Finally, the study revealed that on the basis of market adjusted excess returns, loser, winner does not show systematic differences towards equity value in the

market. The study focused on the firms that experienced extreme gain or loss of up to 5 years. The data used were taken from January 1926 to December 1982. 16 3-year subsequent periods were used to observe the overreaction hypothesis. The results were consistent with the hypothesis of overreaction. Thirty-six months after the formation of the portfolio, 35 stocks of losers outperform the market by the average of 19.6%. On the contrary, winner portfolio was 5% less than that of the market. The findings of the hypothesis revealed that the overreaction effect is not symmetric i.e., it's larger for losers and smaller for winners and is consistent with earlier work and seasonality and most of the excess returns were observed in January. It observed that the overreaction often occurs during 2nd and 3rd year of the test time period. The study confirmed the prediction of the overreaction hypothesis that when focus on stocks or firms that went through less or more extreme returns, the price reversals will be less or more. The study demonstrated an interesting fact that losers earn large returns in January while winners do not earn as much.

Bernstein (1985) argued that investors have to eliminate the abnormal returns in a short time. He also observes that the market could perform inefficiently to incorporate information in the long term, but short-term inefficiency is due to incorporating the new information. The study also pointed out the solution of inefficiency as the long-term inefficiency behaviors could disappear if all investors develop the appropriate psychological aptitudes and realized the true investment prospects.

Costa Jr (1994) studied the impact of the overreaction hypothesis on Brazilian data set of the stock market for the period of 1970 to 1989. Price reversals for 2-year return were detected using market adjusted and Sharpe Lintner adjusted returns and the results were compared with U.S results. The results were found more sounding than the U.S. it was also observed that they differed in results which were measured by CAPM techniques could not account for overreaction. The absence of symmetry was also investigated using Dissanaike criteria.

Zarowin (1990) examined the performance of losers and found that losers' super city of winners is not due to the overreaction of investors, but due to size differences

of losers and winners as losers are smaller in numbers than winners. Without controlling the size, losers perform better than winners and are not subject to risks and nor January returns could account for this. Size is defined by the market value of a firm's equity at the end of the three-year ranking period. If the size of both losers and winners is the same, then there could be the difference in performance of January. If three-year losers are less than winners, losers will beat in performance to winners. If 3-year winners are less in numbers, winners will perform better than losers. This study also pointed out that this 3-year strategy could make problems in the long term. It also examined that this 3-year time period of performing better in January of losers might be due to tax loss selling, so, it is important to note that whether misspecification of the model or size phenomena is the problem of risk.

Baytas and Cakici (1999) tested the hypothesis of overreaction in seven industrial countries using Conard and Kaul methodology of the data obtained from a World scope disclosure database consisting of 5 year annual and average returns to a sample stock available for each country from the period of 1982 to 1991.Conard and Kaul's methodology use HPR tools i.e., holding period returns rather than cumulating returns that are abnormal as the measurement of holding periods. The performance of arbitrage portfolios depended upon size and prices and the results were compared with the performance of loser, winner portfolios. He concluded that the previous supporting evidence regarding US overreactions was not found and the low-price portfolios beat the market while the returns of high portfolios were found below the sum of the market. These findings matched with Conard and Kaul's studies, but the overreaction evidence was relatively weak in Canada through this tool. He also concluded that strategies regarding long terms based on price and size gave higher returns compared to those based on past performance. The two important points of the study were when portfolios were designed with a single variable like price, size and returns, the effect of the variables would be inflated and the returns to portfolios i.e., losers might be accounted by high risk.

Chordia (2005) raised the important issue of convergence of speed to market efficiency. Serial dependence is related to the weak form of efficiency. Strong evidence

of price momentum in worldwide markets and despite their link with empirical and theoretical studies, there is no brief global research for long term reversal of price. Selling long term winners and buying long term losers, the results were found statistically and economically significant by studying 23 stocks of developed markets. These results hold true for all the stocks in the horizons of Asia, Japan, and North America for the period from 1993 to 2014. To characterize both long term reversal and momentum simultaneously, Fama Macbeth and double sorts techniques were used.

Darden (2009), Revealed the results that large momentum of profits continues to prevail in the commodity market. The study was conducted on the data set consisting of 20 U.S commodity futures contracts chosen from a bulk of trading exchanges and belong to sectors related to energy, light, metals, cocoa, sugar, live cattle, aluminum etc. data was selected for the period of 1st January to 31st December 2008. He also pointed out that this range had a specific reason as selecting this range express potential profits of their trading could be eroded by industrialization through investors and also allow the analysis to expose either industrialization worn potential profits. He used the standard deviation to represent a risk in terms of volatility.

The PMRM technique (partitioned multi objective risk methodology) was used to calculate the risk of loss as standard deviation could not measure this risk. Different exceedance likelihood was used for PMRM to partitions the results. Another technique named low-exceedance high severity measurement of risk was applied that measures the expected loss that has to bear in one out of 20 days. The results of these techniques showed that large momentum profits exist in the goods upcoming markets. The use of these momentum-based strategies, increased with the rapid increase of industrialization and articles published which results in the violation of EMH (Efficient Market Hypothesis). As the profitability related to these policies increased, the risk associated with all these policies is also increased. If investors go on investing in these momentum oriented strategies in the goods market, it would result in the spread of their portfolios and acquire high return

rates. Ultimately, as the volatility of those returns and markets, enhanced, it causes future commodity market to be a highly risky state.

Easter wood and Nutt (1999) reexamined the behavior and predictions of the financial analysts as they are assumed to be rational financial experts in the information market as they predict future earnings and make recommendations for trading. Those financial experts immediately provide a piece of unbiased new information, but some recent researches and studies provide sufficient evidence regarding those experts that they systematically underreact to information of the market and some are of the view that they overreact regarding these information's which ultimately resulted in inconsistent not only with each other but with rational future predictions. These findings might be due to inefficiency occurred in 1795 named as Analysts' Earnings Forecasts with witch analysts made misconceptions in some specific directions. Two approaches were used to reexamine this. The first method focused on either analysts efficiently accommodate information present in the previous or proper year performance decomposition of expert's forecast error into predicted or forecasted change in the earnings and the original change was done and the model for those two errors were fitted. Regression was fitted by taking the forecasted change in earnings, original or actual change and the predicted error as the independent variable on the prior performance taking as the dependent variable. But two main and critical changing was adopted during standard regression modeling. First, a formula for abnormal prior or previous performance was constructed to control the changes in earnings.

The comparison was made in prior year's earnings and recent year earnings and experience and unexpected observations of this variable were identified. The result of all these models was statistically significant at the 0.001% level of significance. The significance of the two models indicated that expert's do utilize the prior year's earnings to predict current year's earnings .However, the significance of the third model that was forecasted error model indicated that experts did not fully incorporate market information which may lead to misconceptions. Second modifications were actually more critical as firms were grouped into low, average and high values of their corresponding abnormal performance. The reason for this

grouping was that we could easily identify situations where prior or previous year's information had a positive impact on current earning or it had a negative impact on current earnings.

The study revealed that experts underreact to negative and overreact to positive information's and also the results are systematic with the view that experts react systematically to information in an optimistic way. But the results of the study were not consistent with the behavioral aptitude of finance. The second approach of the study focused on financial expert's revision in the results of the prior year's prediction error. The change in approach was important because it pointed out less restraining definitions of information. Just like the first approach, they found that towards abnormal negative prediction errors, analysts underreact and overreact towards positive errors. Conclusively, these findings were in accordance with the optimistic behavior of analyst's but not consistent with the view that the experts overweight or underweight the new information systematically.

Mazouz and Li (2007) illustrated the presence of overreaction in the UK stock market. Data used in the study was extracted from DataStream. The sample data consisted of month wise prices and the yearly market values from the period of December 1972 to December 2002.CAR (cumulative abnormal return) and BHR (buy and hold return) methodologies predicted that overreaction phenomena are true for the UK. Using CAR methodology, loser portfolio beats the winner portfolio by 16.4% and 18.3% using BHR method. No seasonal pattern like January effect and April effect were supported by any evidence. Effect size was investigated by running the size portfolios on the basis of market value and in the present study size effect was larger than overreaction effect. As the loser portfolio was larger than that of the small portfolio, overreaction effect could not be fully explained by the size effect. The study documented that the loser portfolio risk decline and abnormal returns increase.

Alonso and Rubio (1990) studied the predictions regarding the overreaction hypothesis in the Spanish stock market and the result of the study was consistent with the literature. Losers outperform the winners over the years when five winners and loser safeties were selected. Average 24.5%, losing stocks were earning

more than the winners. The size effect appeared as independent phenomena in the whole study.

2.2 Under Reaction Hypothesis

Li and Yu (2009) proposed two measures to study underreaction and overreaction of investors in price returns. The first measure was closest to the fifty-two weeks up and closeness to the historical high that is the proxy of the degree of investors' behavior toward good or bad news for under and overreaction. The data used in the study was taken from CRSP on daily and monthly value weighted basis from the period of 1926 to 2008. Macroeconomic variables were taken as control variables in the whole study. In the aggregate market, the first measure was sued to predict future price returns while the second one was used to predict the returns of the market. As compared to other traditional methods, the power of these measures was found stronger. The effect of momentum was two to three times stronger for the stocks that were more probably experiencing underreaction in the past and these results were observed in cross-sectional data and the premium value was much stronger for those stocks which experienced overreaction.

Krishna Kumar proved by the review of various situations prevailed in the world; both in developed and developing countries at different time domains. He also observed that most studies followed the rules of DeBondt and Thaler, which aggregates the returns and the results are likely to be sensitive to the rules. Some other things are causing overreaction and underreaction in the developing and developed countries like the experience of investors, complexity, geographical and other demographic factors and behavioral problems. The other thing involves globalization that leads to enormous changes in the behavior of investment and pattern in the whole world. Liberalization also does the same behavioral impacts on investment behaviors.

The study focused on the solutions of over and under reaction that in various investment zones, changes in the pattern of investment should be dealt with briefly in both underdeveloped and developed states. Moreover, the tools used for the

testing of overreaction and under reaction hypothesis should be observed and cross verified in India as well as worldwide. He also reviewed the problem in Indian stock market that the presence of significant non- symmetrical overreaction is present in a long term scenario. The pessimistic investors in India show immense overreaction towards bad information's but sow no overreaction over good information's and efficiency regarding the stock market in India also challenges informational efficiency due to the contrarian strategy of investment. The study also includes the review of Gishan Dissanaike (1994) who argued that the method used by DeBondt and Thaler studies involve arithmetic that calculates the multi-period return from the return of single period or year, which is not appropriate in situations and the findings of calculations and effects cause the sensitivity of portfolio performance being estimated. Rather the cumulative arithmetic, multiplicative methods for cumulating were found superior.

Jegadeesh and Titman (1993) observed the phenomena of under reaction. They found that when in the same period, investors sell stocks with low returns and buy stocks with high returns in the 3 to 12 months, they yielded significant enormous returns. This momentum found in returns reflect under reaction and would stem from conservatism.

Fengge and Meng (2009) stated that the phenomena of underreaction and overreaction are quite obvious in the real estate business which is increasing gradually. Financial behavioral modeling was done using three mental models which were BSV, DHS and the HS model. They made these studies with questionnaire method and a simulation study. Decision features, analysis was done on questions using one sample t-test for mean and the results were found as i) decision of the investors depend upon their own preferences and priorities ii) and the investors have a strong belief on the throaty that human behavior exists in real estate market. Attitude analysis was performed to explain the hypothesis of BSV modes and the results of the analysis stated that firstly under the reaction tendency of investors do not depend on single profit impact but this tendency exists for some overreaction. The second assumption of the BSV model was supported by attitude analysis results, that means the investors have a continuous impact profit

tendency towards overreaction.

To explain the price behavior of China's real estate, decision confidence analysis was performed to support DHS model which assume three assumptions i) decision confidence level of investors would be affected by overconfidence if public knowledge or information meets the initial opinion of investors ii) decision confidence level of investors would be affected by overconfidence if public knowledge or information does not meet the initial opinion of investors iii)biased self-acknowledgment and overconfidence could affect an investor's decision. Again, one sample t-test was performed to test the above three assumptions and the first hypothesis was accepted that when public opinion meets the starting point of views of investors, they would be overconfident. The second hypothesis was unacceptable and the third assumption was also acceptable after one sample t-test, but the study could not find the reason for biased self-acknowledgment. Decision mode analysis was done with the assumption that in China, a person in this horizon could be regarded as momentum trader and this depended upon the movement of the market price for prediction purpose and this analysis was done using t-tests and factor analysis and all the assumptions of this analysis were found statistically significant.

The difference among estate investors in the attitude of performance and the behavior factors with DHS model and BSV models exist, but a uniform behavior was observed with the result of the HS model. At this point of the study, they merge the results of the investigation and empirical research results that reveal the link between the construction in real estate and the behavior of investors. So, they concluded that the HS model was more suitable to analyses the scenario of under and overreactions in the real estate department or market of China.

2.3 Market Efficiency

Fama (1998) discussed different reasons for anomalies in market efficiency. He pointed out that if a minor change in the estimation method results in the disappearance of that anomaly then it is just a deception. These are the result of replications of publication of original studies. Included in this category are IPOs,

SEOs, self-tenders, share repurchases, and dividend initiations. The study emphasized on the fact that efficiency should be jointly tested with the expected returns model, but the problem is that all models for returns are not complete that describe the systematic patterns in any period being sampled that result in the bad model problem. Two types of bad models were written in the study.

First one is that any pricing model related to the asset has been only just models, so could not describe expected returns. So, small stocks and adjustment of risk could produce abnormalities in the model. The second problem occurs when if the model is true, sampled period produces a pattern in deviations from the predictions made by the model. This also results in enormous abnormalities. Firm-specific models for returns are the one solution of bad models. Long term anomalies are basically marginal. When value weights are observed the anomalies almost disappear and become statistically insignificant. In result, it showed that these anomalies are subject to small stocks. In tests of pricing modeling, small stocks always raise problems, so it is reasonable to think of considering them as a bad candidate in the modeling process for long term market efficiency tests.

Pontiff (2006) observed market inefficiencies through mispricing concepts. He pointed out that price pressure on a trader can be controlled by two costs that completely remove mispricing; holding and transaction costs. Idiosyncratic risk studied in the research was basically the holding cost discussed above, but total risk is not the holding cost. Both costs have likely links with mispricing i.e., the greater either cost, greater is the potential of mispricing. Holding costs have their own appealing importance in the long run perspective of abnormal returns. Holding costs become more important to transaction costs when the holding period is longer for arbitrage position.

He argued that arbitrageurs were forced to take fewer positions in mispriced sanctuaries by holding costs. This thing continued the process of mispricing. Due to this fact, arbitragers take an adjustment between the expected profit and personal risk. The opinion that personal risk is an arbitrage cost is misunderstood by most of the investors and because of this few studies were carried out to study the impact of personal risk of mispricing. The empirical study was done with the paper

highlight the result that personal risk appears as the single and common biggest impairment to the efficiency of the market.

Sadka and Scherbina (2007) investigated empirically the relation between balanced mispricing and liquidity. It was studied that liquidity would be linked with arbitrage cost when mispricing is assured with short-lived. in this situation, cross-sectional and time-related variables coincide with cross-sectional and time series changes present in the mispricing equilibrium. The study made four hypotheses; the first one is that in case of financial experts' predictions or forecasts, trading costs increase in depression. The second hypothesis is that the plan of purchasing low dispersion and selling high dispersion stocks decays significantly after controlling trading costs. Thirdly, if we control the analyst's level of disagreement, then the highest price stock will be the most overpriced.

Fourthly, the high dispersion stocks return should be negatively associated with changes in liquidity in the market. The data for the testing of this hypothesis was taken from the Institutional Brokers Estimate System and consisted of summary statistics including arithmetic mean, standard deviation, median. These variables were calculated on the third Tuesday of every month. The price impact of trade was used as a liquidity measure throughout the study. Evidence were provided in the study that the magnitude of mispricing greatly affected by the liquidity and enormous liquid high dispersal stocks is highly mispriced. Moreover, a negative association was observed in returns of high dispersion with sums liquidity.

Amihud (2002) proposed new tests of the assumption that asset returns are increasing in illiquidity. The paper presented a new test which showed that illiquidity affects over the period. ILLIQ was the new proposed measure of liquidity, which is the ratio of a stock daily return to its daily dollar volume. The ease of this measure is that it can be calculated easily from the databases which contain daily data on volume and stock returns. This thing facilitated the markets that do not have microstructure data on dealings and quotes. New York stock exchange data from the period of 1964-1997 was used to illustrate the effects of new measures. Time series and cross-sectional stock returns showed a positive effect when illiquidity was used. In cross-sectional data, two variables were firmly priced i.e., a

positive effect was shown by ILLIQ and the negative effect was shown by turnover which was calculated as the ratio of trading volume to share and both were found statistically significant.

Gibbons (1989) proposed a test of a portfolio of assets for the ex-ante efficiency. Small sample distribution was used in developing statistic. To study the sensitivity of the test to the choice of the portfolio and the number of assets, a power function was derived. The data set uses the period from 1926 to 1982. A univariate test approach was derived that was equivalent to a multivariate test and some diagnostic tools were explained to reject the null hypothesis. Empirical studies were performed to show that the multivariate test performs better than traditional univariate approaches.

Usual univariate mythologies suggest that high values of beta portfolios earn very little and low portfolios earn too much when the equal weight of the index were used while multivariate tests remain unsuccessful in rejecting the efficiency of value-weighted index. The multivariate test statistics assumed that the number of assets in the study would always be greater than the number of observations in a time series data. This restriction was imposed due to the fact that the variance-covariance matrix should remain non-singular which is a foremost necessary condition of every multivariate data set or problem.

Shamshir (2018) studied the impact of random walk assumption on the stock markets of Pakistan to report the empirical indications on the existence of a weak form of efficiency. The study was conducted on a Pakistan stock exchange from first January 2009 to 31$^{\text{st}}$ of August, 2014 after examining two sorts of indices. Free float methodology and market capitalization criteria were used. Parametric and non-parametric statistical methods were applied named as Kolmogorov Smirnov test, runs test, serial correlation tests and unit root tests which are the basic tests of time series were performed on daily stock returns of KSE-100 index, KSE-30 index, KSE-all share, and KMI-30 index. Random walk phenomena were observed in those firms where the selection was made on the free-floating technique.

Chakraborty (2006) investigated the weak from efficiency present in the Pakistan stock market. Daily closing prices in KSE-100 index were taken from the period

of the first January 1996 to 15 November 2005. 2400 observations were present in the data. The data were subdivided from the period of 1st January 1996 to 31 December 2000 and from 31 January 2000 to 15 November 2005 and variance ratio tests were applied with usual time series serial correlation test.

The variance ratio test assumes that the variance of the random walk increments is linear in the interval. The random walk hypothesis was rejected by both serial correlation test and runs test applied to the complete data set as well as for sub-periods. The variance ratio test also rejects the hypothesis of a random walk for the whole period and first sub-period from January 1, 1996, to 31 December 2000 but for the second sub-period data set, the homoscedasticity variance ratio test was significant. The results pointed out the presence of autocorrelation as well as the presence of heteroskedasticity in the second sub-period. So, an autoregressive moving average (ARMA) model was developed for forecasting purpose. ARMA (3,0) means with three lags of time with 0 moving average parameters in the model was found appropriate for KSE-100 index returns of daily data.

Hameed and Ashraf (2009) tried to model the volatility of stock for the Pakistani stock market to test the weak form efficiency. Volatility clustering was observed from the results. Data consisting of 1764 observations from KSE-100 at the closing of each day was used for the said study from the period of December 1998 to March 2006. A collection of daily returns was computed as taking the logarithm of the ratio of today's price to yesterday's price. The hypothesis of weak form efficiency was rejected because it was observed that pas information was used to help out future predictions.

For the estimation purpose, GARCH model was specified for the returns. Based on Box and Jenkins methodology, ARMA (1,1) model was identified for the return series. The F test and LM statistics were significant, which indicated the presence of ARCH errors and the ARCH test indicated non-linear, so, the further process was carried out by a GARCH process. At the end ARMA (1,1-GARCH (1,1)-M) model was specified to check and test the weak efficiency and volatility of KSE-100 returns. These tests provided a good fit at the last because of the absence of serial correlation in the data. Other hypotheses regarding mean-variance were not held

for Pakistani market because no proof was found on the part of investors. SECP reforms were found to have a little positive impact on returns and volatility of returns.

Mobarek (2008) first time studied Dhaka stock exchange. The study provided enough evidence regarding the existence of a weak form of efficiency in the market. The results were consistent with situations prevailed in the market that return series did not follow the random walk model. The null hypothesis of weak form efficiency was rejected due to the significant presence of autocorrelation at different lags.

Lo and MacKinlay (1988) developed a variance ratio test to find the momentary and lasting components of stock returns. Enough evidence was presented against the traditional random walk model. The proposed test statistic was robust in both situations; homoscedastic and heteroskedasticity random walk models. In case of finite samples, Monte Carlo study was conducted to observe the size and power of the test. The study revealed that the variance ratio test performs better than traditional Dicky-Fuller and Box Pierce methodologies in case of heteroskedasticity random walk null hypothesis.

Daniel (1998) proposed a theory for under and overreactions based on two popular psychological issues, one is investors' confidence level about the precision of the individual's own interest and the other is biased self-attribution. These issues cause the absence of symmetry in the confidence level of the investor as the function of outcomes. The long lag of autocorrelation, immense volatility, predictions based on public events were implied by overconfidence. The second psychological issue adds short lags in autocorrelation i.e., momentum and drift.

Asness (2013) studied the return momentum phenomena in eight different markets, asset classes. More association was observed among value returns and momentum with the asset class. A negative correlation was observed within and across the asset class. A three-factor model was characterized by the presence of global risks. Global liquidity risk is a side source of the patterns, which is examined only when momentum and values were observed jointly across different markets. Focusing on

the U.S, the study exposed a challenge to the prevailed behavioral, rational and institutional assets.

Blocher and Molyboga (2017) asserted the different impacts of the CAPM model that dominates all other multi-factor models. The Fung and Hsieh seven, eight-factor models were unable to capture the flow and performance relationship. The data used were taken from Barclay hedge, which is the briefest hedge dataset. The findings of the study provide enough pieces of evidence toward calling the CAPM model as best fitted model as it fits the preferences of investors across all classes of assets. Using CAPM could be a rational choice because of two reasons. First and foremost reason is that this model associated with managerial skills, and secondly CAPM predicts upcoming positive performances. Robust corrections were made for auto correlation return. It was found from the present and previous studies that Fung models were developed for only characterizing fund strategies and the only purpose of their implementation was to develop fund's risk profiles.

Heaney and Lan (2016) conducted the study to test the power of characteristics over expected returns for a large sample of firms in Australia from the time of 1993 to 2012. The number of main findings is available in the study. First, the presence of association among the market and asset returns is sensitive to estimation methodology and asset pricing method used in the adjustment of risk. No supporting evidence was gained for the firm characteristics using Brennan methodology and the five-factor pricing model. Secondly, the used of Australian data permitted us to find the impact of imputed tax systems on equities. A positive relationship was observed among DO and equities only when the DP value is taken as positive.

The hypothesis regarding as the relationship among stocks returns and stocks liquidity of returns are prepared by Amihud and Mendelson(1986). The optimistic illiquidity returns relations have been examined crosswise in the numeral study. This study examines the relationship in excess of the time period. It proposes that in excess of time that stock have returned by increases in expected liquidity in the stock market. The illiquidity is quantified by ILLIQ. It proved that daily price and related by means of single dollar trading amount served as an irregular

measure of price impact. It is a superior measure that bid arise, spread leads to a market crash. The effects of illiquidity are higher in small firm stock. It has been suggested that variation in size impact the returned excess of small firm stock linked to changes in market liquidity above time.

This study shows that close linkage between mispricing and liquidity. Previous research has found these stocks have in the direction of overpriced, but price correct downward as earnings are resolvable. This study suggests that the reason of mispricing has persisted through the year that analyst variance coincides with high trading cost. It shows that in cross-section has liquid stock tend to some cruelly overpriced. Additionally, the increase in cumulative market liquidity accelerates price due to fundamental. Return of overpriced stock has a negative correlation with time series of innovation in comprehensive market liquidity.

The relation between mispriced and liquidity has voluntarily appeared in short-lived misprice of high divergence stock. It shows that to stock mistake idea be inclined to coincide with the high transaction cost. Selling high deviation stock has therefore considered less profitable after accounting for transaction cost. This study examines a large number of firm rank characteristic that gives a detail cross-section and time sequence changes in worldwide stock return. This study evaluates size dividend and earning cash flow of price, a book to market equity, reversal,and momentum monthly return.

This paper compares that reaction of individual stocks in the event of an extreme movement in the broader market through the situation of low-level versus high level of investor outlook. The event of extreme market movement has assumed to happen when the return of the long or short position. This study finds that individual stock overreact and the overreaction is statistically and economically more important when investor outlook is low. This study examines the relationship between size and momentum on international fact. Size effect exists across a large series of the international market both developed and rising relative momentum provides small improvement in risk-adjusted performance as compared Finally, the combined trend following with relative momentum leads to higher levels of return although there has been little enhancement in risk-adjusted performance.

Black Bum and Cakici (2017) observed that many theories were developed to link price momentum and reversal. Presence of pricing momentum in worldwide equity was proved by significant empirical studies, but no large-scale studies were employed to study subsequent long-term reversal of price. The study investigated the returns from 23 developed countries. These countries were classified in Europe, Asia, Japan, and North America over the period from January 1993 to December 2014. A total of 15,732 firms was considered and then categorized according to regions as 5,288 were from North America, 3,129 were Japanese firms, 2,186 Asian and5,129 were European firms.

Statistical significance due to positive returns was observed between loser over past three-year and winner over the past three years. Statistical methods used in the study were Fama-Macbeth regression and double sort. He constructed and used four variables throughout the study; size (market capitalization), BM (book-to-market returns), 36-month cumulative return (REV)and 12-month historic returns. Two sub-samples were constructed based on the size of capitalization. Top 90% of the total size of capitalizations stocks were considered big stocks and that remaining 10% were considered as small ones. Distribution of these stocks was highly skewed as they showed asymmetry behavior, according to size as 18% in North America were big stocks and 82% were small stocks. He compared the results of all the four variables discussed above in small stocks and big stocks. On average big firms comprised 15 to 23% of total stocks in the regions. From the analysis of big stocks, the results were found insignificant regarding the difference in returns among losers and winners. However, long term reversals were supported for small firms in all the categorized regions except Europe. In general, the presence of the overreaction was observed globally with significant market capitalization or size effect. Cifter (2015) investigated the relationship between inflation, stock returns, and activity with MS-DR (Markov-switching dynamic regression) approach to the regions of South Africa and Mexico. The very attractive market could be observed in both countries because they were underdeveloped and comparison could be made with foreign and local investors. Also, he observed that the bias of the locations could be reduced as the regions understudied were located in different

regions. The findings showed that in a recession period, a negative relationship was observed among inflation, returns,and real activity. The hypothesis of Fama's proxy technique were applied to these variables too. He developed a hypothesis of regime-dependent proxy effect to estimate the differences for returns, activity,and inflation. All these measures suggested the negative relationship between these variables.

Hong and Stein (1999) modeled a market populated by two categories of agents; one is news watchers and the other is momentum traders. He argued that any behavioral theory of pricing should be based on three standards. First is that the theory rests upon the behavior of investor. The second was based on explaining the present indications in a parsimonious way and the third is that it could make future predictions and validate and testing could be done on that theory. Some private information's observed by every news watcher, but he could not extract the information's farm prices. Under reaction in prices was observed in the short run when the information disperses progressively. Distinguishing implications were generated by the models.

Wahlroos and Berglund(1986) studied the Finnish economy on the hypothesis that stock returns were independent of expectations of inflation. The objective of his study was to study the magnitude of the relationship between the prices of stocks and unexpected and expected inflations. Significant results were observed when the returns of stocks were taken as dependent and inflation rate was taken as independent variables and the results were negatively related. It explained that higher rate of inflation might drop the demand of money persuade by low activity in progress and the results ultimately implied a fall in predictable profits of the future with a fall in prices of stocks. The coefficients of expected inflation and unexpected were still negative and he concluded that these hypotheses are insensitive to expectations.

Canova and Nicolo (2000) analyzed the experimental interdependencies among asset returns, inflation, and activity from the international point of view. He found that no significant relationship exists in innovations in stock returns and inflation. A vector autoregressive model was used in the study because of being famous for

the involvement of long lags and application to DGP. Findings suggested that interesting regularities but asymmetries in the data were present.

Chapter 3

Data Descriptive and Methodology

3.1 Data Description

The study examines reversal and momentum based investment strategies by employing the data of hundred non-financial companies that are listed at stock exchange for the period 2002 to 2015. The reason for choosing a hundred companies is that few companies are traded and large sample leads to the selection of inactive companies.

The sample consists of non-financial sectors. The reason for choosing the non-financial sector is accounting period and capital structure Accounting year of financial sector closes on December 31st while in case of the non-financial sector it generally closes on 30th June.

The data used in this study are collected from Pakistan stock exchange Monthly closing prices of the stock market index are used. Moreover, risk-free rate has been obtained from the state bank of Pakistan.

Monthly closing prices of companies listed on a Pakistan stock exchange are used to estimate MKT, SMB, HML, REV, and MOM. The market, size, and value are Fama French (1996) three factors, whereas MOM represents the momentum factor proposed by Carhart (1997). It provides that winner will always remain winner

and looser always remain looser. REV represents that winners become looser for subsequent periods and looser becomes winners and law of average holds.

3.2 Momentum and Reversal Based Investment Strategies and Arbitrage Profit

For momentum based strategies 12 month historical data is used to form 5 portfolios. The portfolio comprising of lower returns is loser and whereas a portfolio with highest returns is a winner. The arbitrage portfolio is formed by taking a long position in Winners and Short position in loser.

For reversal based strategies 36 month historical data is used to form 5 portfolios. The portfolio comprising of lowest returns is loser and whereas portfolio with highest returns is winner. The arbitrage portfolio is formed by taking a long position in loser and short position in winner.

If the arbitrage portfolio formed on the basis of momentum earns higher returns in comparison other momentum sorted portfolios, it indicates the presence of short run abnormal returns. If the arbitrage portfolio based on reversal strategy earns higher returns in comparison other reversal sorted portfolios, it indicates the presence of long run abnormal return. If both exist simultaneously, it reports the presence of overreaction.

3.3 Model Specification

This study uses two-pass regressions explain the impact of Size Book to Market, Momentum, and Reversal on return. Factor premium is estimated by constructing Size, Book to Market, Momentum, and Reversal of return sorted portfolio respectively. The first pass regression is used to estimate the β of the stylized portfolio, then estimated β are used in cross-sectional two-pass regression.

The first pass regression and two pass regression are reported below:

$$R_{pt} = \alpha + \beta_1 \text{MKT}_t + \beta_2 \text{SMB}_t + \beta_3 \text{HML}_t + \beta_4 \text{MOM}_t + \beta_5 \text{REV}_t + \mu_{ti} \quad (3.1)$$

$$R_{pi} = \gamma_0 + \gamma_1 \beta_{\text{MKTi}} + \gamma_2 \beta_{\text{SMBi}} + \gamma_3 \beta_{\text{BTMi}} + \gamma_4 \beta_{\text{MOMi}} + \gamma_5 \beta_{\text{REVi}} + \mu_{ti} \quad (3.2)$$

Whereas;

R_{pt} = Return of the portfolio for month 't'

R_{pi} = Average return of stylized portfolio 'i'

α = The management's impact (alpha)

μ_t = Error term

MKT = Market premium = $R_m - R_f$

SMB = Size premium = Return portfolio of small stock - Return portfolio of big stocks

HML = Value premium = Return of the portfolio of high BM ratio stock - Return of portfolio of low BM ratio stock

MOM = Return of a portfolio of winners stock - Return of portfolio of loser stocks

REV = Return of the portfolio of looser stock - Return of portfolio of winner stocks

3.4 Measurement of Variables

The variable market premium, value premium, size premium, momentum premium and reversal premium are measured to sort 100 companies for the construction of various factor premiums.

Market premium = MKT = $R_m - R_f$

Size premium = SMB = Return of small stocks - Return of big stocks

Value premium = HML = Return of high BTM stocks minus Return of low BTM stocks

Momentum premium = WML = Return of winner stocks - Return of loser stocks

Reversal premium = LMW = Return of loser stocks - Return of winner stocks

BTM = Book to Market = Book value of equity / Market value of equity

3.4.1 Market

The market premium is the difference between the expected return on the market portfolio and risk-free rate. Beta is equal to the slope of the security market line (SML), a graphical representation of the capital asset pricing model (CAPM).

Market premium is calculated as market return minus the risk-free rate.

$\text{MKT} = R_{mt} - R_{ft}$

3.4.2 Size

Size is the market capitalization of the firm and indicates the market value of the firm. It has been introduced by Banz in 1981. Market capitalization is used as the proxy of size. The size is used by Fama and French (1992, 1993 and 1996) as an important factor explaining return. Size is measured using market prices from month t-1.

It is measured by using the following formula:

Size = No. of share $\times$ MPS

Size premium is estimated on SMB = Return of small stock - Return of big stock

3.4.3 Book to Market

Value premium has been introduced by Rosenberg in 1985. For value premium book to market, ratio is used as the proxy. Book to market is used to find value premium. BM is measured from month t-6 and market prices from month t-1.

The following formula is used for estimation of the book to market ratio is;

BTM = Book to Market = Book value of equity / Market value of equity

The value premium is calculated by its following formula.

Value premium = Return of high BTM ratio stock - Return of low BTM ratio stock

3.4.4 Momentum

Carhart, (1997) discusses the momentum factor and link it with returns. It provides that winner will remain winner and loser will remain looser. Momentum is very useful indicators in asset prices that measure the price differences over a period of time. It measures the rate of rising or fall in stock prices. For calculating momentum, the stock is categorized in the portfolio on the basis of past returns. The portfolio with high portfolio return is defined as winner portfolios. While the portfolio with the lowest past return is defined as a loser portfolio. Momentum pay off the differences between winner portfolios return and looser portfolio return. MOM is the cumulative return over months t-12 to t-2.

The formula of momentum is under as

MOM = Return of the winner - Return of the loser

3.4.5 Reversal

It measures the rate of rising or fall in stock prices. For calculating reversal, the stock is categorized in the portfolio on the basis of past returns. The portfolio with high portfolio return is defined as winner portfolios. While the portfolio with the lowest past return is defined as a looser portfolio. Reversal pay off the differences between looser portfolio return and winner portfolio return. REV is the three-year cumulative return measured over t-36 to t-1.

The formula of momentum is under as

REV = Return of looser - Return of winner

Chapter 4

Results and Discussion

4.1 Average Size, Book To Market Ratio and Return of All Firms

Table 4.1 reports the Average size of firm, Book to market ratio and return of sample firm for the period 2002 to 2015 on year on year basis. The Results indicate that average size of firm has various from Rs. 1314.22029 millions in 2002 to Rs. 18977.43304 millions in 2015.

TABLE 4.1: Average Size, Book To Market Ratio And Return of All Firms.

Year	Average Size	Average BMR	Average Return
2002	1314.22029	1.701519854	0.539540786
2003	2355.77681	1.175659662	0.369053607
2004	3246.675085	0.91490419	0.021123633
2005	3536.65486	0.878775606	0.034238514
2006	4601.803175	1.063471599	0.119133819
2007	6276.00192	0.865593572	-0.082655972

Year	Average Size	Average BMR	Average Return
2008	6184.389564	1.099163085	-0.717524187
2009	3642.665058	2.689402977	-0.035642414
2010	4179.935058	3.334761878	0.096124595
2011	5415.818321	2.877315045	0.058093975
2012	5235.087234	3.113674092	0.520594941
2013	8781.607217	1.918205671	0.370916002
2014	16221.11828	1.209625582	0.074628708
2015	18977.43304	0.683008548	0.031827561
Average	6426.370423	1.680362954	0.099960969

The Book to market ratio indicates inconsistent behavior. It is observed higher in 2010 followed by the year 2012 and it is minimum in 2004, other bad performing year includes 2005, 2007 and 2008.Average returns are found the maximum in 2002 followed by a 52% return in 2012 and 36.9% in 2003.The worst year in 2008 when a loss of 71% is observed. It is the year of the worst stock market crash in the history of Pakistan when people lost billions of Rupees.

4.2 Average Size, BM and Return of Momentum Sorted Portfolio

The data is sorted on the basis of historical return for '12' months and portfolio are constructed and termed as momentum sorted portfolio. The Portfolio with the maximum return is termed as winner portfolio with the minimum return or maximum loss is defined as looser. The details of that portfolio are reported in Table 4.2.

TABLE 4.2: Average Size, BM And Return Of Momentum Sorted Portfolio.

Quintile	Size	BMR	Return	N
portfolio 1 (looser)	3555.6	1.40507	-0.039	280
portfolio 2	5770.64	2.8725	-0.0134	280
portfolio 3	6046.16	1.2719	0.00811	280
portfolio 4	8491.45	1.4457	0.02375	280
portfolio 5 (winner)	8665.45	1.40664	0.05912	280
5-1			0.09814	280

The Average size of the looser portfolio is Rs. 3555.604346 million whereas Average size of winner portfolio is Rs. 8665.447383 million. It appears that big firm performs well as compared to a small firm. The average return of looser is -3.9% and an average return of winner is 5.9%. However, worth mentioning that BMR of winner and loser is not significantly different. So for as Arbitrage portfolio is concerned, it reports that higher return i.e. 9.8%. This portfolio is created by taking a long position in a winner and a short position in looser.

Thus results support the momentum based strategy.

4.3 Average Size Book to Market Ratio and Return of Reversal Sorted Portfolio

Table 4.3 report that the Average size of REV looser portfolio is Rs. 1310.02 million whereas Average size of REV winner portfolio is Rs. 13668.4 million. It appears that big firm performs well as compared to a small firm.

TABLE 4.3: Average Size Book to Market Ratio and Return of Reversal Sorted Portfolio.

Quintile	Size	BMR	Returns	N
portfolio 1 (looser)	1310.02	1.40507	-0.019	280
portfolio 2	2723.13	2.8725	-0.0008	280
portfolio 3	5782.97	1.2719	0.01229	280
portfolio 4	8647.3	1.4457	0.01591	280
portfolio 5 (winner)	13668.4	1.40664	0.03657	280
5-1			0.0556	280

The Average BMR of REV looser portfolio is Rs. 1.40507 whereas Average BMR of REV winner portfolio is Rs. 1.40664. The average return of looser is -1.9% and an average return of winner is 3.6%. However, it is indicating and worth mentioning that BMR of REV winner and REV looser is not significantly different.

So for as Arbitrage portfolio is concerned, it reports that higher return i.e. 5.5%. This portfolio is created by taking a long position in a winner and a short position in looser.

4.4 Average Return of Rev vs. Double Sort Size

The Reversal sorted portfolios are divided into five different sizes. The return and average size is reported become below in column 1 and 2.

Table 4.4 reports that the Average size of the looser portfolio is Rs. 3837.517 million whereas Average size of winner portfolio is Rs. 4254.374 million. It appears that big firm performs well as compared to a small firm. The average return of size looser is -7.2% and an average return of size winner is 1.1%.

TABLE 4.4: Average Return of Rev vs. Double Sort Size.

Quintile	Size	Return	N
portfolio 1 (looser)	3837.52	-0.7296	280
portfolio 2	4617.13	-0.1333	280
portfolio 3	4844.29	0.21059	280
portfolio 4	5601.68	0.5713	280
portfolio 5 (winner)	4254.37	1.17115	280
5-1	416.857	1.90078	280

4.5 Average Return of Rev vs. Double BMR

The reversal sorted portfolio is further divided on the basis of book to market ratio and average book to market ratio and return is reported below in column 1 and 2.

TABLE 4.5: Average Return of Rev vs. Book Market Ratio.

Quintile	BMR	Return	N
portfolio 1 (looser)	1.3685	0.14181	280
portfolio 2	2.14195	0.11545	280
portfolio 3	1.77644	0.09777	280
portfolio 4	2.03457	0.10368	280
portfolio 5 (winner)	2.39991	0.07978	280
5-1	1.03141	-0.062	280

Table 4.5 report that Average BMR of the loser portfolio is Rs. 1.368502 million whereas Average BMR of winner portfolio is Rs. 2.399911 million. It appears that big firm performs well as compared to a small firm. The average return of BMR looser is 1.4% and an average return of BMR winner is 7.9%.

4.6 Descriptive Statistic on Portfolio Returns

The portfolio comprises of small stocks has incurred a loss of 2.18% at the average risk of 7.01%. The maximum value is 19.6% which is the highest return in the month, whereas minimum return or loss incurred for the portfolio is 25.17%. However, the big stocks portfolio has shown a profit of 3.7% at the average risk of 7.8% with the maximum value of 25.3% as higher monthly return and a minimum value of 15.8% as lower minimum return or loss for the portfolio. Thus it shows that a big stock portfolio indicates better results with the high return at the given level of risk. Small stocks are negatively skewed whereas big stocks are positively skewed.

TABLE 4.6: Descriptive Statistic.

	Mean	Median	Std. Dev.	Kurtosis	Skewness	Min.	Max.
P	0.00808	0.00442	0.06859	0.03242	0.01813	-0.1907	0.18995
Small	-0.0218	-0.0198	0.07012	1.20422	-0.1221	-0.2517	0.19644
Big	0.038	0.03612	0.07899	-0.3484	0.17475	-0.1586	0.25304
SMB	-0.0598	-0.0565	0.05911	-0.305	-0.3733	-0.2265	0.05526
BTM-H	0.01071	0.00151	0.07028	0.30849	0.28666	-0.1629	0.23226
BTM-L	0.00595	0.00359	0.06258	0.21784	-0.4086	-0.1887	0.15543
HML	0.00476	0.0014	0.03884	0.78606	0.2118	-0.1219	0.11926
MOM W	-0.0242	-0.0216	0.06311	0.17424	-0.3097	-0.1952	0.13484
MOM L	0.04143	0.04288	0.07476	0.02404	0.02561	-0.1421	0.24281
MOM W-L	-0.0656	-0.066	0.04564	1.08373	-0.5935	-0.2559	0.02879

	Mean	Median	Std. Dev.	Kurtosis	Skewness	Min.	Max.
REV W	-0.0115	-0.0141	0.06563	0.89074	0.0935	-0.2108	0.2049
REV L	0.02741	0.02734	0.06933	-0.215	-0.1254	-0.1545	0.19217
REV L-W	0.03889	0.0361	0.03983	-0.1412	0.30886	-0.0645	0.15192

The Size based Arbitrage portfolio SMB reports an average loss of 5.98% at average risk of 5.9%. The minimum loss incurred is 22.6% and maximum profit earned is 5.5%.

The portfolio comprises of BTMH stocks has been showing a mean of 1.07% at the average risk of 7.02%. The maximum value is 23.2% which is the highest return in the month, whereas minimum return or loss incurred for the portfolio is 21.8%. However, the portfolio BTML stock portfolio has shown a profit of 5.95% at the average risk of 6.2% with the maximum value of 15.5% as higher monthly return and a minimum value of 18.8% as lower minimum return or loss for the portfolio. Thus it shows that BTMH stock portfolio indicates better results with the high return at the given level of risk.BTML stocks are negatively skewed whereas BTMH is positively skewed. The value-based Arbitrage portfolio HML reports an average earn of 4.7% at average risk of 3.8%. The minimum loss incurred is 12.1% and maximum profit earned is 11.2%.

The MOM stocks Winner portfolio stocks have incurred a loss of 2.41% at the average risk of 6.31%. The maximum value is 13.4% which is the highest return in the month, whereas minimum return or loss incurred for the portfolio is 19.5%. However, the MOM looser stock portfolio has shown a profit of 4.14% at the average risk of 7.4% with the maximum value of 24.2% as higher monthly return and a minimum value of 14.2% as lower minimum return or loss for the portfolio. Thus it shows that MOML stock portfolio indicates better result with the high return at the given level of risk. MOML is positively skewed and MOMH is negatively skewed.

The MOM based Arbitrage portfolio MOMW-L reports an average loss of 6.5% at average risk of 4.5%. The minimum loss incurred is 25.5% and maximum profit earned is 2.87%.

The portfolio comprises of REV winner stocks has a loss mean of 1.14% at the average risk of 6.56%. The maximum value is 20.48% which is the highest return in the month, whereas the minimum return or loss incurred for the portfolio is 21.8%. However, the portfolio REV looser stock portfolio has shown a profit of 2.74% at the average risk of 6.9% with the maximum value of 19.2% as higher monthly return and a minimum value of 15.4% as lower minimum return or loss for the portfolio. Thus it shows that the REVL stock portfolio indicates better results with the high return at the given level of risk. REVL is positively skewed and REVH is negatively skewed.

The REV based Arbitrage portfolio REVL-W reports an average loss of 3.8% at average risk of 3.9%. The minimum loss incurred is 6.4% and maximum profit earned is 15.1%.

4.7 Correlation Matrix

Table 4.7 provides the average cross-sectional correlations across all month from 2002 through 2016 between market capitalization (size), a book to market equity (BM), momentum (MOM), and reversal (REV).

TABLE 4.7: Correlation Matrix.

	MKT	SMB	HML	MOM	REV
MKT	1				
SMB	-0.2691	1			
HML	-0.0588	-0.0069	1		
MOM	-0.2923	0.484	-0.0666	1	
REV	0.2595	-0.7936	-0.0984	-0.4102	1

The correlation matrix indicates that significant negative relationship is present in Size premium, MOM and REV premium. Similarly, MOM and REV are negatively correlated which is typical.

4.8 Impact of MKT, SMB, HML, REV, and MOM on Return

Table 4.8 reports the impact of factor premium on a portfolio of all stocks. The results indicate that market premium has a significant positive impact on portfolio return which is in line with the Capital Asset Pricing Model that requires a significant positive relationship between the market premium and portfolio returns.

TABLE 4.8: Impact Factor of Premiaon Return of Portfolio of All Stocks.

	1	2	3	4	5	6
Constant	0.0019	-0.0032	0.0066	-0.0135	0.0005	-0.0007
t-stat	0.4469	-0.4354	1.2523	-1.4852	0.0616	-0.0997
MKT	0.5718					0.5829
t-stat	10.2543					10.1204
SMB		-0.1893				-0.0311
t-stat		-2.1301				-0.2624
HML			0.3126			0.3629
t-stat			2.3174			3.4113
MOM W-L			-0.3289	-0.0505		
t-stat				-2.8892		-0.4866
REV L-W				0.196	-0.1132	

	1	2	3	4	5	6
t-stat					1.4761	-0.6651
Significance F	0	0.0346	0.0217	0.0044	0.1418	0
Adjusted R^2	0.3841	0.0207	0.0255	0.0421	0.007	0.4185

The Size premium has a significant and negative influence on the return which is also consistent with earlier studies. The results are in line with earlier studies Hassan and Javed (2009) and Mirza (2008). The value premium is significant and positive with, which is consistent with above stocks that HBM stocks earn a higher return in comparison to LBM stocks.

MOM premium is significant and negative, whereas REV is positive but insignificant. However, when all the values are jointly explored, it is observed that MKT premium has a significant impact while the influence of size premium is disappeared. The significant influence of HLM indicates that the influence of SBM is captured by HML, MOM and REV are found insignificant.

4.9 Impact of MKT, SMB, HML, REV, and MOM on the Return of a Portfolio of Big Stocks

The results indicate that market premium has a positive and significant impact on the return of big stocks portfolios. The findings are also supported by Capital Asset Pricing Model which also indicates significant positive relationship between market premium and portfolio returns.

TABLE 4.9: Impact Factor of Premia on a portfolio of Big Stocks.

	1	**2**	**3**	**4**	**5**	**6**
Constant	0.0306	-0.0032	0.0365	-0.0041	0.0075	-0.0007
t-stat	6.466	-0.4354	5.9984	-0.4153	0.9514	-0.0997
MKT	0.6782					0.5829
t-stat	10.7718					10.1204
SMB		-0.6893				-0.5311
t-stat		-7.7567				-4.4863
HML			0.3179			0.3629
t-stat			2.0389			3.4113
MOM W-L				-0.6423		-0.0505
t-stat				-5.1487		-0.4866
REV L-W					0.7849	-0.1132
t-stat					5.5522	-0.6651
Significance F	0	0	0.043	0	0	0
Adjusted R^2	0.4079	0.2616	0.0186	0.1325	0.1515	0.5616

Table 4.9 reports that impact of factor premium on a portfolio comprising of big stocks. The results of Size premium with big stock portfolio is found consistent to all stock portfolios, showing significant and negative influence on return. Similarly, these results are also supported by the studies of Hassan and Javed (2009) and Mirza (2008).

The value premium is also showing a significant and positive impact .However, MOM premium is found to be negative and significant when regressed with big stock portfolios. Whereas REV is significant and positive, but insignificant in other cases However, when all the values are jointly explored, it is observed that MKT premium has a significant impact and influence of size premium also observed. The significant influence of HML indicates that the value premium exists. However, MOM and REV are also found to be insignificant. It means that do not explain the return of a portfolio of big stocks.

4.10 Impact of MKT, SMB, HML, REV, and MOM on the Return of a Portfolio of Small Stock

Table 4.10 shows the influence of factor premium on a portfolio of small stocks. The results indicate that market premium has a significant positive impact on portfolio return when regressed with small stock portfolios, which is supported by the positive relationship represented by the Capital Asset Pricing Model .With small stock portfolio, the Size premium shows a significant and positive impact on return.

TABLE 4.10: Impact Factor of Premia on the return of the portfolio of Small Stocks.

	1	2	3	4	5	6
Constant	-0.0269	-0.0032	-0.0233	-0.0229	-0.0066	-0.0007
t-stat	-5.6469	-0.4354	-4.3261	-2.4009	-0.8869	-0.0997
MKT	0.4653					0.5829
t-stat	7.3548					10.1204
SMB		0.3107				0.4689

	1	2	3	4	5	6
t-stat		3.4965				3.9615
HML			0.3074			0.3629
t-stat			2.2259			3.4113
MOM				-0.0155		-0.0505
t-stat				-0.1296		-0.4866
REV					-0.3928	-0.1132
t-stat					-2.9492	-0.6651
Significance F	0	0.0006	0.0274	0.897	0.0036	0
Adjusted R^2	0.2412	0.063	0.0231	-0.0059	0.0441	0.4436

The value premium is also significantly influencing the return of a portfolio of small stocks and is consistent with the theory by emphasizing that HBM stocks earna higher return in comparison to LBM stocks. Both MOM and REV premium indicate a negative relationship with return However, this relationship is insignificant for REV and significant for MOM. when all the values are jointly explored, it is observed that MKT, SMB and HML stocks havea significant impact. While MOM and REV are found insignificant.

4.11 Impact of MKT, SMB, HML, REV on Return Portfolio of MOM Winner

Table 4.11 reports that MKT and HML premium has a significant and positive relationship with the return when each premium is regressed with MOM winners portfolios. Here the market premium has a significant and positive impact on portfolio return which is in line with the Capital Asset Pricing Model that represents

the significant positive relationship between the market premium and portfolio returns.

TABLE 4.11: Impact Factor of Premia on the return of MOM winner Stocks.

	1	2	3	4	5	6
Constant	-0.0297	-0.0234	-0.0257	-0.0167	-0.0212	-0.002
t-stat	-7.5949	-3.3668	-5.3261	-1.9507	-3.1073	-0.3133
MKT	0.514					0.6152
t-stat	9.8795					12.5782
SMB		0.0123				-0.0072
t-stat		0.1484				-0.072
HML			0.3204			0.4023
t-stat			2.5915			4.4538
MOM W-L				0.1145		0.3758
t-stat				1.0702		4.2632
REV L-W					-0.0759	-0.1686
t-stat					-0.6179	-1.1671
Significance F	0	0.8822	0.0104	0.2861	0.5375	0
Adjusted R^2	0.3665	-0.0059	0.0331	0.0009	-0.0037	0.5046

Here MOM premium is also found to have a positive but an insignificant impact on return portfolio of winners stock. REV is negative, but insignificant. However, when all the values are jointly explored, it is observed that market premium, value premium, and MOM are significant and positive which is constructed with theory. However, Size and REV are found to be insignificant.

4.12 Impact of MKT, SMB, HML, REV, and MOM on the Return of Portfolio MOM Looser

Table 4.12 indicates that market premium has a significant positive impact on portfolio return which is in line with the Capital Asset Pricing Model that represents the significant positive relationship between the market premium and portfolio returns. The Size premium has a significant and negative influence on the return which is also consistent with earlier studies by Hassan and Javed (2009) and Mirza (2008). The value premium is significant and positive with, which is consistent with the theory that HBM stocks earns a higher return in comparison to LBM stocks.

TABLE 4.12: Impact Factor of Premia on a portfolio of Big Stocks.

	1	2	3	4	5	6
Constant	0.0339	0.0198	0.0395	-0.0167	0.0261	-0.002
t-stat	8.0389	2.507	6.9341	-1.9507	3.2976	-0.3133
MKT	0.6926					0.6152
t-stat	12.3538					12.5782
SMB		-0.3614				-0.0072
t-stat		-3.8415				-0.072
HML			0.3987			0.4023
t-stat			2.7276			4.4538
MOM W-L				-0.8855		-0.6242
t-stat				-8.2789		-7.0824

	1	2	3	4	5	6
REV W-L					0.3941	-0.1686
t-stat					2.7672	-1.1671
Significance F	0	0.0002	0.0071	0	0.0063	0
Adjusted R^2	0.4759	0.0761	0.0371	0.288	0.0383	0.647

MOM premium is significant and negative whereas REV is significant and positive. However, when all the values are jointly explored, it is observed that MKT premium has a significant impact but the influence of size premium disappeared. The significant influence of confirms the presence of value premium and REV are found insignificant. However, the significant negative effect of MOM is found. It indicates that winner does not outperform looser in long run.

4.13 Impact of MKT, SMB, HML, REV, and MOM on Return Portfolio of REV Winner Stock

Table 4.13 exhibit that MKT, SMB, HML has a significant positive impact on portfolio return. Here the positive relationship between market and return portfolio is in line with Capital Asset Pricing Model that represents the significant positive relationship between market premium and portfolio returns. Here also HBM stocks earn a higher return in comparison to LBM stocks.

TABLE 4.13: Impact of Factor Premium on Return of REV Winner Stocks.

	1	**2**	**3**	**4**	**5**	**6**
Constant	-0.0171	-0.0052	-0.0133	-0.0224	0.0018	-0.0005
t-stat	-4.1427	-0.7172	-2.6675	-2.5282	0.264	-0.0709
MKT	0.5204					0.6057
t-stat	9.4725					12.2556
SMB		0.1056				0.0065
t-stat		1.2305				0.0639
HML			0.3811			0.379
t-stat			2.9827			4.1528
MOM W-L				-0.1661		-0.0857
t-stat				-1.4977		-0.9622
REV L-W					-0.3425	-0.6335
t-stat					-2.7379	-4.3401
Significance F	0	0.2202	0.0033	0.1361	0.0069	0
Adjusted R^2	0.347	0.0031	0.0451	0.0074	0.0374	0.5323

MOM premium is insignificant and negative whereas REV is significant and negative. However, when all the values are jointly explored, it is observed that MKT, HML premium has a significant impact but SMB and MOM is found insignificant.

4.14 Impact of MKT, SMB, HML, REV Winner and MOM on the Return of a Portfolio of REV Looser Stock

Table 4.14 report that market premium has a significant positive impact on portfolio return which is in line with the Capital Asset Pricing Model that represent the significant positive relationship between market premium and portfolio returns. The Size premium has a significant and negative influence on the return which is also consistent with earlier studies Hassan and Javed (2009) and Mirza (2008).

TABLE 4.14: Impact Factor of Premia on the Return of REV Looser Stock.

	1	2	3	4	5	6
Constant	0.0203	0.0017	0.0261	-0.007	0.0018	-0.0005
t-stat	5.3047	0.2419	4.884	-0.7893	0.264	-0.0709
MKT	0.6587					0.6057
t-stat	12.9818					12.2556
SMB		-0.4292				0.0065
t-stat		-5.0656				0.0639
HML			0.2802			0.379
t-stat			2.0477			4.1528
MOM W-L				-0.5241		-0.0857
t-stat				-4.7352		-0.9622
Rev L-W					0.6575	0.3665
t-stat					5.2558	2.5104
Significance F	0	0	0.0422	0	0	0
Adjusted R^2	0.5008	0.1287	0.0188	0.1137	0.1375	0.581

The value premium is significant and positive with which it is consistent with the theory that HBM stocks earna higher return in comparison to LBM stocks. MOM premium is significant and negative whereas REV is significant and positive. However, when all the values are jointly explored, it is observed that MKT premium has a significant impact but the influence of size premium disappeared. The significant influence of HLM is observed. MOM is found insignificant whereas REV is significant and positive. Indicating looser can move than the winner.

4.15 Impact of MKT, SMB, HML, REV Winner and REV and MOM on the Return of a Portfolio of High BTM Stocks

Table 4.15 report that market premium significant positive impact on portfolio return which is in line with the Capital Asset Pricing Model that require a significant positive relationship between market premium and portfolio returns. The Size premium has a significant and negative influence on return. The value premium is significant and positive with which is consistent with the theory that HBM stocks earna higher return in comparison to LBM stocks.

TABLE 4.15: Impact Factor of Premia on the Return of High BTM Stocks.

	1	2	3	4	5	6
Constant	0.0044	-0.0004	0.0067	-0.0152	0.006	-0.0015
t-stat	1.0191	-0.0497	1.3836	-1.6442	0.7888	-0.2513
MKT	0.581					0.6081
t-stat	10.1173					12.8744
SMB		-0.1853				-0.0293
t-stat		-2.0325				-0.3018

	1	2	3	4	5	6
HML			0.8392			0.883
t-stat			6.7433			10.1222
MOM W-L				-0.3944		-0.0958
t-stat				-3.4136		-1.1249
Rev L-W					0.1213	-0.1694
t-stat					0.8878	-1.2144
Significance F	0	0.0437	0	0.0008	0.376	0
Adjusted R^2	0.3777	0.0184	0.2103	0.06	-0.0013	0.6275

MOM premium is significant and negative whereas REV is positive but insignificant. Here looser stocks outperform the winners stock in case of reversal. However, when the entire premium is jointly explored, it is observed that MKT premium has a significant impact but the influence of size premium disappeared.The significant influence of HLM is captured MOM winner and looser and REV winners are found insignificant.

4.16 Impact of MKT, SMB, HML, REV, and MOM on Return Portfolio of Low BTM Stocks

Table 4.16 indicates that market premium has a significant and positive impact on portfolio return which is in line with Capital Asset Pricing Model that requires a significant positive relationship between market premium and portfolio returns.

TABLE 4.16: Impact Factor of Premia on the Return of Low BTM Stocks.

	1	**2**	**3**	**4**	**5**	**6**
Constant	-0.0007	-0.0049	0.0067	-0.0162	-0.0025	-0.0015
t-stat	-0.2039	-0.7152	1.3836	-1.9677	-0.372	-0.2513
MKT	0.6116					0.6081
t-stat	13.7647					12.8744
SMB		-0.1807				-0.0293
t-stat		-2.2322				-0.3018
HML			-0.1608			-0.117
t-stat			-1.2925			-1.3408
W-L-1				-0.3378		-0.0958
t-stat				-3.2743		-1.1249
L-W-3					0.2173	-0.1694
t-stat					1.7988	-1.2144
Significance F	0	0.0269	0.198	0.0013	0.0739	0
Adjusted R^2	0.5302	0.0233	0.004	0.055	0.0132	0.5302

The Size and momentum premium has a significant and negative influence on return in case of the high book to market stocks. The results are in line with earlier studies by Hassan and Javed(2009) and Mirza (2008). Whereas REV is positive but insignificant. However, when all the values are jointly explored, it is observed that MKT premium has a significant impact but the influence of size, value, MOM and REV are found insignificant.

4.17 Two Pass Regression

Two pass regression analyses are done to analyse the relationship between Beta and portfolio return is cross-sectional setting.

TABLE 4.17: Two Pass Regression.

Constant	-0.0433
t-stat	-9.6636
MKT	-0.1078
t-stat	-2.5282
SMB	0.29275
t-stat	3.39078
HML	-0.0956
t-state	-1.1964
Rev L-W	-0.082
t-stat	-0.6393
F Statistics	15.06
Significance F	1.70E-10
Adjusted R^2	0.25193

Beta size show a significant and positive relationship with the return. Whereas HML, MOM, and REV have an insignificant and negative relationship with return portfolio. Explanatory power of the model is 25.2%. It is worth mentioning that β_{MKT} is insignificant and negative which is inconsistent with theory. This may due to observed fluctuation in the market over the period of time.

Chapter 5

Conclusion and Recommendations

5.1 Conclusion

This study investigates the overreaction by investors in Pakistani equity market by examining momentum and reversal based investment strategies. The study uses data of 100 companies listed at Pakistan Stock Exchange. The study is divided into two sections. The first section creates arbitrage portfolios based on momentum and reversal based strategies.

For momentum based strategies 12 month historical data is used to form 5 portfolios. The portfolio comprising of lowest returns is loser and whereas portfolio with highest returns is winner. The arbitrage portfolio is formed by taking long position in Winners and Short position in loser. The arbitrage portfolio earned higher returns in comparison other momentum sorted portfolios.

For reversal based strategies 36 month historical data is used to form 5 portfolios. The the portfolio comprising of lowest returns is loser and whereas portfolio with highst returns is winner. The arbitrage portfolio is formed by taking long position in loser and short position in winner. The arbitrage portfolio earned higher returns in comparison other reversal sorted portfolios. This study also find economically and statistically significant returns from buying long term loser and selling long

term winners. This result holds for the set of stocks over the sample period 2002 to 2015.

It may be concluded the momentum strategy leads to higher return in one year time horizon and in three years reversal is seen to secure higher return. This indicates the over reaction of investors in short run and reversal in long run.

In second section the study explored the impact of market premium, size premium, value premium, momentum and reversal on stylized returns. Market premium is found significantly affecting the return of all portfolios. It is interesting that size premium, value premium, momentum and reversal have significant impact on return of portfolio comprising of all stock. However, this effect disappears in case of momentum and reversal. Similar patterns are observed for return of portfolios comprising of big stocks and small stocks. The results are generally consistent with theory especially for small stocks. However, SMB is found significant and negative for Big stock which indicates that big stocks earn more returns in comparison to small stocks.

MKT and HML premium has also a significant and positive relationship with the return when each premium is regressed with MOM winner portfolio whereas REV is significant and positive when each premium is regressed with MOM loser portfolio. Moreover, when two pass regression is applied on between Beta and portfolio return. It also reports that Beta size and Beta market have significant and positive relationship with returns.

5.2 Recommendation and Policy Implications

Owing to the scope of this study, we encountered a number of areas that many benefit for to the decision makers.

1. Winners earn higher profit in comparison to losers in short run. So momentum based strategy of investment in winner works in short run.

2. Arbitrage portfolio may be formed on the bases of momentum

3. Loser earn higher profit in comparison to winners in long run. So reversal based strategy of investment in losers works in short run.

4. Over reaction is observed market in short run that is reversed in long rum.

5. Arbitrage portfolio may be formed on the bases of reversal.

6. Momentum and Reversal are priced in many cases but when these are added with Fama and French three factors, the impact is disappeared.

7. Market is in efficient as betas can be used for forecasting returns.

Thus the investors may benefit in their portfolios investment strategies and can get better returns.

Similarly, decision makers may use this information in implementing the policies regarding investment, financial decision, and valuation of assets.

5.3 Direction for Future Research

The study may be conducted in emerging markets to generalize the results. The under reaction may also be investigated in future studies.

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