Returns-Based Trading Strategies and Equity Returns

Evidence from an Emerging Market "Pakistan"

By

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This thesis includes no material which has been already accepted for the award of any other degree or diploma in any university and confirms that to the best of my knowledge the thesis includes no material previously published or written by another person, except where due reference is made in the text of the thesis.

IMRAN SHAUQAT

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Dedication

I am dedicating this research work to my loving Mother and caring Sister to help me in every possible way for my successful future. Without your help, patience and confidence in me, i was not able to complete this whole journey. I love you.

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List of Abbreviations

EMH	Efficient Market Hypothesis
CAPM	Capital Asset Pricing Model
P/E ratio	Price to Earnings Ratio
M/B ratio	Market to Book Equity Ratio
NYSE	New York Stock Exchange
MSCI	Morgan Stanley Capital Index
PSX	Pakistan Stock Exchange
DJIA	Dow Jones Industrial Average
EPS	Earnings per Share
BV	Book Value of Equity
MPS	Market Price per Share
MV	Market Value of Equity
MKTP	Market Risk Premium
PERP	Price to Earnings Ratio Premium
MBPR	Market to Book Ratio Premium
VIF	Variance Inflation Factor
S.D	Standard Deviation
MOMP	Momentum Premium
CONP	Contrarian Premium

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First of all i would like to thanks and praise Almighty who gave me courage and strength to complete this Thesis. Without His blessings, i would not be able to accomplish this task on time.

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Abstract

This study examines the significant profitability of three most pronounced trading strategies including value, momentum and contrarian strategies in the Pakistani market. A sample of 100 non-financial companies listed on PSX for the period of 2002 to 2016 is used. Average returns of the arbitrage portfolios based on these strategies are calculated and the statistical differences between the average returns of all the strategies are tested by two-sample t-tests. It is found that the arbitrage portfolios based on P/E, M/B, momentum and contrarian strategies do not earn significant abnormal returns for the 1 year investment period after the formation of portfolios. While for 5 and 10 years holding periods, only momentum strategy is able to earn significant abnormal returns. It confirms the presence of momentum effect in the Pakistani market for the longer investment periods. It can provide opportunities to earn abnormal returns for local as well as foreign investors in the Pakistani stock market. Cross-sectional Multiple Regression is applied to examine the impact of value, momentum and contrarian premiums on the returns of size-sorted portfolios. It is found that among all the variables (premiums) used in the study, no one has significant relationship with all the portfolio returns. This confirms that it is not possible to predict the equity returns by using these variables in the Pakistani market.

Keywords: Trading Strategies, Value Strategy, Momentum Strategy, Contrarian Strategy, Equity Returns.

Chapter 01

Introduction

It is the nature of human beings to find such ways that can benefit them throughout the different aspects of their lives. Considering different alternatives, they usually choose those that can bring them with least losses and higher gains. Similar is the case of the stock market investors, active investors try to find different alternatives by which they can maximize their profits by limiting their losses. Such investors consistently seek out different opportunistic stocks that can earn higher returns in the future.

1.1 Theoretical Background

According to Efficient Market Hypothesis (Fama, 1970), only risk-adjusted returns can be earned by the investors. It means higher returns can only be booked by taking higher risk levels (investment in more risky stocks) and no other way exists to earn abnormal returns. After 1970's Efficient Market Theory, different trading strategies have been identified that contradict with the EMH and by adopting these strategies, one can book abnormal returns (that must not be in the case of market efficiency). These strategies tend to make profit from the arbitrage opportunities existed in the market based on different abnormalities usually known as "market anomalies". These abnormal patterns are big question mark on the market efficiency as well as on the capital asset pricing model CAPM proposed by Sharpe (1964) and Lintner (1965).

Malkiel (2003) concludes that stock markets are more efficient and less predictable and there is no other proposition in economics which has more solid empirical evidence supporting it than the Efficient Market Hypothesis. So if capital markets are efficient then how is it possible to earn abnormal profits form the markets? The answer lies in the mis-specification of the model used for the asset pricing and measuring expected returns. According to Fama and French (1992, 93), these abnormal profits are not the outcome of market in-efficiency but the arbitrage opportunities exist in the market are extra market risk-factors that are being priced by the market. These extra market risk-factors must be included in the asset-pricing model for better estimation of the stock returns. Roll (1977)

is a famous analysis of the validity of empirical tests of the Capital Asset Pricing Model CAPM. It suggests that asset pricing is the outcome of multiple factors and only one factor "market risk premium" does not capture all the risk characteristics that must be priced.

1.1.1 P/E Effect

After the publication of a critical paper by Roll (1977), academicians put more efforts to find out other factors (variables) that capture other risk characteristics that are not fully captured by the single-factor model. The very first attempt is by Basu (1977) who documents that stocks with lower P/E ratios tend to outperform stocks that have higher P/E ratios listed on NYSE for the sample period 1956 to 1971. These results are also confirmed by Jaffe, Keim and Westerfield (1989) in the US market by using sample period 1951-86. Ball (1978) documents that P/E ratio can be viewed as a direct proxy for the expected returns. P/E anomaly has been focused by different researchers and observed repeated significant results in its favour. Recently Pettersen (2011) has documented the positive returns by focusing on the P/E anomaly-based strategies in the Swedish market for the sample period 2000-2009. Concerned with the Pakistani market, Khan (2009) reports insignificant results of P/E effect on stock returns of companies listed on KSE-100 index for the sample period 2001-2006. But most recently Arslan and Zaman (2014) have reported significant positive impact of P/E on the stock returns for sample period 1998-2009. So, there are mixed results about this anomaly related to the Pakistani market and this area needs to be investigated further.

1.1.2 M/B Effect

Stattman (1980) reports another effect that market-to-book equity ratio can explain the average stock returns. Companies with low market-to-book ratios, referred to as "value stocks", have on average higher returns than the companies with high market-to-book ratios, referred to as "growth stocks". Value effect of M/B ratio is further investigated by Rosenberg, Reid and Lanstein (1985) by using the sample period of 1980 to 1984 for the U.S stock market and the study concludes that there exists statistically significant abnormal returns for the market-to-book strategy. Ball (1978), Berk (1995), Sharathchandra and

Thompson (1994) argue that M/B ratio captures information about expected future returns because book value proxies for expected cash flows.

1.1.3 Momentum Effect

Jagadeesh and Titman (1993) report another effect that is still considered to be the most prominent one. By using data for the companies listed on NYSE for the sample period 1965-89, the study reports that past winner stocks earn higher returns than the past loser stocks in the future for the period of 12-months. It is known as momentum strategy as the stocks have the ability to continue their price patterns. Fama and French (1996) propose that their three-factor model consisting of market risk premium, size-premium and value premium does not successfully incorporate the short-term past returns documented by Jagadeesh and Titman (1993). Later on Carhart (1997) proposes four-factor model in which momentum is the fourth factor. The study claims that it substantially improves the pricing errors of the CAPM and the three-factor model of Fama and French (1993). Ejaz and Polak (2015) examine the Middle East markets and find the presence of short term momentum effects there. Recently Ansari (2012) reports momentum effect in India during 1995-2006. Concerned with the Pakistani market, more recently Shah (2015) and Tauseef (2016) also report the same results.

1.1.4 Contrarian/Price-Reversal Effect

De Bondt and Thaler (1985, 87) propose contrarian strategy that loser stocks of the past (36-months) can earn higher profits in the future for the long-run (36-months) as compared to winner stocks of the past. So one can easily predict the future and can earn abnormal return that is contradiction to the EMH too. Later on Richards (1995,97) and Balvers (2000) document that losers outperform winners over the long-run in the National Stock Exchange for the sample periods 1970-95 and 1969-96 respectively. Most recently Jansen and Nikiforov (2016) examine NYSE listed stocks for the sample period 1971-2012 and report that contrarian strategy works well against buy-and-hold assumption around earnings announcement and earns 95% annualized abnormal return after transaction costs. Concerned with the Asian markets, recently Locke and Gupta (2009) report that contrarian strategy is highly profitable in the Bombay Stock Exchange for the sample period 1991-

2004 but McInish, Ding and Pyun (2008) document insignificant profitability of contrarian strategy in the Asian markets. So here is the area to work on it either Pakistani market also reports insignificant profitability for the contrarian strategy or there exists opportunities of abnormal profits for the investors?

1.2 Problem Statement

As we have seen above, a lot of research has been done; almost in all the developed and emerging markets of the world, in the area of portfolio management regarding different investment strategies and the mis-specification of models used for the asset-pricing. Unfortunately, there exists a very limited published work and findings about the performance of such different trading strategies in the Pakistani market. So it is hard to reach at a conclusion that either Pakistan Stock Exchange is efficient or there exists the above mentioned anomalies on the basis of which different profitable trading strategies can be adopted just like the other markets of the world. This study focuses the significance of the above discussed three most pronounced trading strategies (based on market anomalies) i.e. contrarian, momentum, value strategies in the Pakistani market.

1.3 Research Questions

This study is an effort to answer the following questions related to Pakistani market:

1. Do the winner stocks outperform loser stocks? (Momentum strategy)

2. Whether the loser stocks outperform winner stocks? (Contrarian strategy)

3. Whether the returns of winner and loser stocks are significantly different?

4. Do the stocks with low P/E ratio outperform stocks with high P/E ratio?

5. Whether the returns of low and high P/E stocks are significantly different?

6. Whether the stocks with low M/B ratio outperform stocks with high M/B ratio?

7. Whether the returns of low and high M/B stocks are significantly different?

8. Which strategy earns highest return per unit of risk?

9. Whether these strategies are helpful in explaining the equity returns?

1.4 Objectives of the Study

- To investigate the outcomes of three important investment strategies i.e. momentum strategy, contrarian strategy and value strategy in different time horizons in the Pakistani market.
- To investigate the role of premiums based on these strategies in explaining the equity returns as extra market risk-factors.

1.5 Significance of the Study

This study provides significant contribution in many directions. First of all, it tries to explore different trading strategies suitable for the Pakistani market. Trading strategies used in this study including value, momentum and contrarian strategies have never been empirically investigated collectively in Pakistan. Few studies including Khan (2009), Arslan and Zaman (2014) and Habib and Mohsin (2012) look at these strategies individually but none has attempted to explore them collectively. Moreover, all these previous studies have used the sample periods ranging from 1997 to 2009. This study uses possible current fourteen years from 2002 to 2016 in the sample period. This helps to explore the pervasiveness or attenuation of these trading strategies in Pakistan as compared to the previous studies.

Secondly, this study investigates the relationship between equity returns and the premiums used in the study as extra market risk-factors in Pakistani market. The effect of these factors (premiums) on equity returns has not been investigated collectively. This study helps the local as well as foreign investors to understand different profitable investment strategies for investment purposes in the Pakistani market. It also helps the companies to choose appropriate factors used in the study for the estimation of cost of equity in Pakistan.

1.6 Plan of the Study

The road map of this study is as follows. Chapter one comprises the introduction of trading strategies used in the study. It also consists of problem statement, research questions, research objective and significance of the study. Chapter two consists of literature review of the previous studies. Chapter three is related to the data description, measurement of variables, research methodology. Chapter four is based on empirical results, interpretations and discussions. Chapter five concludes the study by providing policy recommendations.

Chapter 02

Literature Review

Market efficiency and the CAPM are the two main pillars of the modern finance that attract the attention of academic researchers. Market efficiency debate is started in 1965 when Fama (1965) concludes in his famous article "Behavior of Stock Market Prices" that stock prices follows a random walk and successive stock price changes are statistically independent. It means no one can predict in which direction the stock prices will move in the future by using the past price's trends and patterns: which is a common practice in the technical analysis.

However, Levy (1967) criticize the Random Walk Hypothesis by studying the inter-correlation or co-movement of stock prices with the other stocks present in the market. The study concludes some important results. Stocks which historically have been relatively strong tend to remain relatively strong for some significant period of time (26-weeks). The study examines the relative strength and relative volatility of the stocks and reports that the selection of securities which historically have been strong and volatile produce profits superior to those attainable from random selection. Therefore it suggests that acceptance of Random Walk Hypothesis is purely in doubt after these results. Jensen and Bennington (1970) come forward in the favor of Random Walk Hypothesis and criticize on Levy (1967) that Levy's results have overstated the excess returns earned by the profitable trading rules than the buy-and-hold comparison. The study use the sample period 1931-1965 with each five year time interval and find that after allowance for transaction costs, the trading rules by Levy (1967) does not on average earn significantly more than the buy-and-hold policy.

Fama (1970) presents Efficient Market Hypothesis that talks about three main types of market efficiencies (i) Weak-form efficiency: stock prices follow a random walk and future trends cannot be predicted by analyzing the past trends, both are independent. (ii) Semi-strong form efficiency: prices reflect all the available public information and converges to the new position instantaneously after the release of any new public information. (iii)

Strong-form efficiency: all the information in a market, whether public or private, is accounted for in a stock's price. The theme of EMH is that no one can earn abnormal profits by beating the market unless and until investor takes the risk for the required return; means no lunch in free.

After the arbitrage model of capital asset pricing proposed by Ross (1972, 1976), there comes a criticism by Roll (1977) on the existing asset pricing model CAPM proposed by Sharpe (1964) and Lintner (1965). According to Roll (1977), only a single factor of market risk premium is unable to capture all the risk characteristics prevailing in the stock market. There must be some other factors that affect the stock returns and must be incorporated in the asset pricing model. The study suggests that CAPM is the outcome of "n" factors: but how many factors? Do not know yet.

2.1 P/E Effect and Stock Returns

Nicholson (1960) investigates the P/E effect for the very first time. The sample size use in the study consists of 100 industrial stocks for the sample period of 1939 to 1959. The study reports that by rebalancing of portfolios for every 5 years repeating period, the portfolio of lowest P/E stocks earns on average 14.7 times more than the original investment at the end of the twenty years. In 1968, by using sample size of 189 companies for the ample period of 1937 to 1962, Nicholson extends his earlier work. In this study, companies are divided into five groups on the basis of P/E ratios. The study reports that companies with low P/E ratios earn average returns of 12.71% per annum over 7 years' time horizon. Author concludes "The greater productivity can be seek logically by the investors by purchasing common stocks with low P/E ratios rather than stocks with high P/E ratios."

In 1977, Nicholson's results are confirmed by Basu. The study uses the NYSE stocks for the sample period of 1956 to 1971. Based on the previous financial years' results, stocks are ranked on the basis of P/E ratios for each 1st April over 14 years. The study reports that low P/E stocks earn average return of 16.3% per annum with beta of 0.99 while high P/E stocks earn only 9.3% with beta of 1.11. The study concludes that low P/E portfolio with low beta outperforms high P/E portfolio with high beta. Contrary to the capital market theory, results are not consistent with the higher levels of systematic risk.

Criticism on the P/E effect is made by Reinganum (1981) who reports that P/E effect is totally subsumed by the small firm effect (proposed by Banz, 1981) for the NYSE stocks for sample period 1975-1978, so it should not be considered as a separate factor for the asset pricing model. Basu (1983) defends his work by re-examining P/E anomaly and reports the same results as earlier. Further the study contributes that P/E effect is not entirely independent of the small firm size and the effect of both are at work. Later on Cook and Rozeff (1984) also confirm the results of Basu (1983) by examining NYSE stocks for sample period 1964-81 and reports that it does not appear either size effect subsumes earnings yield effect (as criticized by Reinganum,1981).

The confused picture of the size and P/E effects resulting from the studies of Cook and Rozeff (1984), Reinganum (1981) and Basu (1977, 83) is tried to be clarified by Jaffe et al. (1989). The study uses a long sample period of 1951 to 1986 and reports that the power of different effects being variable over time is the reason for the conflicting results of earlier studies. Ball (1992) extends the work on this anomaly and reports that future abnormal returns can be predicted by the current earnings or current information about future earnings. A complex multi-factor model is used by Fuller et al. (1993) for the explanation of the outperformance of low P/E stocks. A wide variety of possible explanatory factors including systematic risk beta, 55 industry classification factors and 13 other explanatory factors such as earnings variability, leverage and foreign income are used in the study. The study again reports that low P/E stocks earn higher returns than high P/E stocks for the sample period of 1973 to 1990.

The view about CAPM's position that only a single risk-factor 'market premium' can explain all the differences in securities' returns is now hard to accept for the Fama and French. They have already moved away from the simple CAPM. Fama and French (1992) report that company size and price-to-book values can explain the cross-sectional variations in the equity returns. They further extend their work in 1993 and 1996 and their studies propose a three-factor model consists of excess return, size and book-to-market values. The studies report that three-factor model can successfully explain the value stock

anomalies. The evidence of the existence of both size and P/E effects is also provided by Dreman (2008).

Anderson and Brooks (2006) report the P/E effect in the UK market by using sample period 1975-2003. Recently Pettersen (2011) has documented the positive returns by focusing on the P/E anomaly-based strategies in the Swedish market for the sample period 2000-2009. Concerned with the Pakistani market, Khan (2009) reports insignificant results of P/E effect on stock returns of companies listed on KSE-100 index for the sample period 2001-2006. But more recently Arslan and Zaman (2014) have reported significant positive impact of P/E on the stock returns for sample period 1998-2009. So, here we have mixed evidences about this anomaly related to the Pakistani market and it needs to be investigated further.

Hypothesis 1:

Stocks with low P/E ratio outperform stocks with high P/E ratio.

2.2 M/B Effect and Stock Returns

Variables like market-to-book equity, size, E/P and leverage are all scaled versions of a firm's stock price. They can be regarded as different ways of extracting information from stock prices about the cross-section of expected stock returns (Ball (1978), Keim (1988)). One of the most pronounced variable and the central point of attention for the academicians is market-to-book equity.

Graham and Dodd (1934) identify the value premium using market-to-book ratios for the very first time. 'Value stocks' i.e. companies with low market-to-book ratios earn higher returns than 'growth stocks' i.e. companies with high market-to-book ratios. Heated debate is started on the value effect in the late 1970's and 1980's. Stattman (1980) reports that average returns of U.S stocks are positively related to the market-to-book ratio of common stocks. Chan, Hamao and Lakonishok (1991) try to investigate the value effect of market-to-book ratio in Japanese market. The study reports that among four variables used in the study i.e. earnings yield, size, market-to-book ratio and cash flow yield, only two variables

market-to-book and cash flow yield have the most significant positive impact on expected returns for the sample period of 1971 to 1988.

To evaluate the joint role of market β, size, E/P, leverage and M/B equity in explaining the cross-sectional variations of the average returns in the U.S market, Fama and French (1992, 93) use the sample period of 1962 to 1990. The study reports that cross-sectional variations of the stock returns are fully explained by only two variables M/B equity and size. E/P and leverage effects are subsumed in both of them. Another attempt by Fama and French (1998) tries to investigate the value effect of market-to-book equity for a sample of thirteen countries including U.S.A for the sample period of 1975 to 1995. The study reports the significant results. Davis, Fama and French (2000) use the sample period of 1929-1963 and report that premium associated with the value stocks on the basis of M/B equity is similar and consistent in the pre-1963 data to the post-1963 data used in the previous study of Fama and French (1992, 93). The study further finds that the size effect is subsumed in the value effect in the earlier sample period of 1929-1963.

Fama and French three-factor model (1992, 93) is criticized by Daniel and Titman (1997). The study concludes that in an equilibrium pricing model of Fama and French (1992, 93), size and M/B are not the risk-factors. These are characteristics rather than factor loadings that determine expected returns. Later on Davis, Fama and French (2000) defend by reporting that David and Titman (1997) results do not hold outside their sample period.

Regarding the abnormal returns of value effect, another school of thought is based on individual psychology of the investors. Lakonishok et al. (1994) criticize by concluding that value strategies are not fundamentally riskier. They earn higher returns because these strategies exploit the non-rational behavior of the typical investors. La Porta, Lakonishok, Shleifer and Vishny (1997) criticize that the expectational errors made by the investors are the main causes of these superior returns earn by the so-called value stocks. The study concludes that a significant portion of the return difference between value and glamour stocks is attributable to earnings surprises that are systematically more positive for value stocks. The evidence of the study is inconsistent with a risk-based explanation for the return differential.

A lot of research has been done in the domain of value effect based on M/B equity despite of all the criticisms. Pontiff and Schall (1998) report that market returns can be predicted by M/B ratio during 1926 to 1994 for DJIA stocks. The study concludes that among all the variables used in the study including interest yield spreads, dividend yield and M/B ratio, only M/B ratio captures the information about future returns. Kothari and Shanken (1997) also report that market returns over the period 1926-1991 can be predicted by M/B ratio for DJIA stocks. More recently, Fama and French (2012) try to investigate the value, momentum and size effects across global equity markets. The study reports that among the four regions including Japan, Asia-Pacific, Europe and North-America, except Japan the value premium of M/B variable is significant and explains the average stock returns for all other regions.

Hypothesis 2:

Stocks with low M/B ratios outperform stocks with high M/B ratios.

2.3 Momentum Effect and Stock Returns

The most pronounced and famous market anomaly "momentum" is proposed by Jagadeesh and Titman (1993). The study uses data for the companies listed on NYSE for the sample period 1965-89 and finds that the past winner stocks earn higher returns than the past loser stocks in the future for 12-months. It is known as momentum strategy as the stocks have the ability to continue their price patterns.

Momentum effect has been found in different stock markets. Griffin et al. (2005) try to discover momentum effect in all the countries used in the sample. The study concludes that investors who have institutional capital can produce abnormal profits by taking long position in the portfolios formed based on the momentum investment strategy. Rouwenhorst (1998) use the sample of twelve developed countries of Europe and try to discover the momentum effect. The study reports the significant momentum effect in all twelve countries and the momentum investment strategy is profitable. The study finds that past winners earn 1% more than the past losers. The study further investigates that price continuation behavior is shown by the stock prices and it lasts for at least one year. McInish

et al. (2008) try to discover the momentum effect in seven stock markets of Asian countries. The study reports that momentum effect is significant and momentum investment strategy is profitable in five out of seven stock markets.

Fama and French (2008) again find out the pervasiveness of the momentum effect in the NYSE for the sample period of 1963-2005. Hong et al. (2003) compare the momentum effect in western and East-Asian countries and reports that it is more prominent in west as compared to the East-Asian markets. Schwert (2003) points out that many well-known anomalies such as firm effect have disappeared or attenuated but momentum anomaly has not vanished. More recently Jagadeesh and Titman (2011) consider both cross-sectional and time-series determinants of momentum profits and concludes that perhaps momentum effect is the strongest evidence against the EMH. Fama and French (2012) document strong momentum returns in North America, Europe and Pacific-Asia in the sample period of 1989-2011.

The applicability of momentum strategy is also investigated in the emerging markets. Vu (2012), Rouwenhorst (1999) and Chan et al. (2000) empirically investigate the profitability of momentum strategy by using a variety of indices of different countries. All the studies report the existence of momentum effect in the respective samples of the emerging countries used in the respective studies. While writing about the contribution of the study, Chan et al. (2000) write that the study uses the largest sample so far for the momentum effect. It includes forty eight stock market indices in which twenty eight are emerging stock markets form Latin America, Asia, Middle East, Africa and Europe.

Venter (2009) try to investigate the momentum and reversal effects in Johannesburg Stock Exchange. The study explains the intraday movements of stock prices and concludes that 1% abnormal return can be earned by using momentum strategy if the traders successfully predict the price movements appropriately. Kang (2005) also investigates the NYSE for the intraday momentum effect. The study uses a sample of 2000 stocks and reports that intraday momentum effect is significantly profitable.

The short-term momentum effect is examined in Vietnamese Stock Exchange by Alphonse and Nguyen (2013). The profitability of momentum investment strategies is the focal point of the study. Gutierrez and Kelley (2008) examine the momentum effect in weekly data of U.S stock market for the sample period of 1983 to 2003. The study reports that short-term momentum effect exists and results in significant returns. The momentum portfolio used in the study is able to earn highest profit of 0.83% per week.

Momentum effect is empirically found and the momentum investment strategies are found able to earn significant abnormal profits in many stock markets as discussed in the above mentioned studies. But there are many other studies that raise doubt about the existence of momentum effect. These studies claim that momentum effect does not exist and momentum investment strategies are not able to earn significant abnormal returns. Short-term momentum effect is investigated in eight Asian stock markets by Chui, Titman and Wei (2000). The study reports insignificant momentum effect in Japan. Similarly for South Korea and Indonesia, momentum investment strategies are not found profitable. Another study for the investigation of momentum effect is by Hameed and Kusnadi (2002). The study examine six emerging Asian stock markets and reports that momentum investment strategy does not earn significant abnormal profits. The study further argues that insignificant profits of the momentum strategies are due to high volatility in profits of emerging markets. Fernandes and Ornelas (2008) also try to investigate short-term momentum effect in eighteen emerging markets of Asia and Europe. The study reports that there is no evidence of short-term momentum effect in these markets. Avizinis and Pajuste (2007) also report insignificant momentum effect in Poland.

Academicians also try to explain momentum profits generally through risk-based models and particularly through CAPM. Several authors try to explain returns of momentum effect through CAPM but they reach at a conclusion that CAPM is unable to explain the momentum effect. Naranjo and Porter (2004), Grundy and Martin (2001), Griffin et al. (2003) and Jagadeesh and Titman (1993) use CAPM and other risk-based models for the explanation of momentum profits but they are unable to explain momentum effect.

A lot of behavioral explanations of momentum effect have been offered. Some of them include studies by Avramov and Chordia (2006), Daniel, Hirshleifer and Subrahmanyam (1998), Barberis et al. (1998), Hong, Lim and Stein (2000), Chordia and Shivakumar (2002) and Grinblatt and Han (2005). These studies present the reasons of over-reaction or under-reaction to the earnings announcement and data-mining for the presence of momentum effect but no real consensus is built among all these studies and this requires to explore this area extensively.

Concerned with the Pakistani market, recently three papers have been published that provide the evidence of existence of momentum anomaly. Habib and Mohsin (2012) report the strong evidence of presence of momentum effect in Pakistan Stock Exchange (formerly Karachi Stock Exchange) for the sample period 1997-2007. Similarly Shah (2015) and Tauseef (2016) also report the same results.

Hypothesis 3:

Past winner stocks earn higher returns than the past loser stocks in the future.

2.4 Contrarian Strategy (price-reversal effect) and Stock Returns

Negative serial correlation of stock returns i.e. return reversals for longer holding periods are investigated by many academicians with significant results. Fama and French (1988) report that negative correlation with past returns helps to predict 25 to 40 percent of the variation in returns for the longer holding periods. In the same way, for longer horizons there is an evidence of substantial mean-reversion in stock market returns (Poterba and Summers, 1988).

De Bondt and Thaler (1985, 87) propose contrarian strategy that loser stocks of the past (36-months) can earn higher profits in the future for the long-run (36-months) as compared to winner stocks of the past. Moreover the study adds that winner-loser effect is not primarily a size-effect, earnings of winner-loser firms show reversal patterns that are consistent with the over-reaction. It is criticized by Chan (1988) by using sample period 1932-1983 for the NYSE stocks and find that contrarian strategy earns a very small abnormal return which is insignificant. There exists no strong evidence of market over-

reaction hypothesis. Loser stocks' betas are increased after a period of abnormal loss and winner's betas is decreased due to which losers outperform winners for the reason of large betas and small sizes. Later on Ball and Kothari (1989) confirms the results of Chan (1988) that trading rule proposed by De Bondt and Thaler (1985, 87) yields insignificant abnormal returns by using sample period 1930-1981.

The long-term over-reaction hypothesis of De Bondt and Thaler is somehow supported by other researchers. Howe (1986), Schiereck et al. (1999) and Gunarantne and Yonesawa (1997) conclude that contrarian strategy can be profitable due to the existence of long-term over-reaction of investors for the information and earnings announcements. However, Lo and MacKinlay (1990) and Zarowin (1989) criticize that over-reaction effect is subsumed by size-effect and this is due to difference in sizes between the two groups that past losers outperform the past winners.

Later on Jagadeesh (1990) reports that the contrarian strategy yields statistically significant abnormal monthly returns for 1934-1987. Richards (1995,97) and Balvers (2000) document that losers outperform winners over the long-run in the National Stock Exchange for the sample periods 1970-95 and 1969-96 respectively. Fluck, Malkiel and Quandt (1997) use a strategy of buying stocks over a 13-year period during the 1980s and early 1990s that have particularly poor returns over the past three to five years. The study finds that stocks with very low returns over the past 3 to 5 years have higher returns in the next period and that stocks with very high returns over the past 3 to 5 years have lower returns in the next period. More recently Jansen and Nikiforov (2016) work on NYSE listed stocks for the sample period 1971-2012 and report that contrarian strategy works well against buy-and-hold assumption around earnings announcement and earned 95% annualized abnormal return after transaction costs.

Concerned with the Asian markets, recently Locke and Gupta (2009) report that contrarian strategy is highly profitable in the Bombay Stock Exchange for the sample period 1991-2004 but McInish, Ding and Pyun (2008) document insignificant profitability of contrarian strategy in the Asian markets.

Hypothesis 4:

Loser stocks of the past earn higher profits in the future as compared to winner stocks of the past.

These three strategies; especially momentum and contrarian strategies, have been studied simultaneously to test which one is more prevalent in any specific market. Most recently Doan et al. (2016) find out that contrarian strategies prevail in the short-run investment horizons while momentum strategies dominate in the intermediate and long-run horizons in the Australian equity market form 1992-2011. With respect to Asian markets, there have been remarkable findings about these anomalies for the last few years. Kang et al. (2002) report the abnormal profits for short-horizon contrarian strategy and intermediate-horizon momentum strategy in the Chinese market for the period 1993-2000. Similarly the presence of these profitable aspects has been investigated in the Indian market by Sehgal and Balakrishnan (2002). The study reports weak but significant reversal patterns (contrarian effect) in the long-term returns while strong momentum effect in short-term returns for the sample period 1989-1999. Foster and Kharazi (2008) work on contrarian and momentum effects in the Iran's Tehran Stock Exchange for the period 1997-2002 and report no evidence of contrarian behavior in the short-run. However evidence of momentum behavior is found.

Chapter 03

Data Description and Research Methodology

3.1 Data Description

This study uses the secondary data of monthly closing stock prices for the sample of 100 non-financial companies listed on Pakistan Stock Exchange Limited (PSX). The sample period of the study consists of 14 years from Jun-2002 to Jun-2016 with 1400 firm year observations. Companies included in the sample are selected on the basis of market capitalization. Mostly high market capitalization stocks are traded frequently on the PSX. The reason of selection on the basis of market capitalization is to avoid the inactive stocks for the sample.

Sample comprises the companies from non-financial sector. The reason for the exclusion of companies from financial sector is that the accounting period of financial companies closes at December while it closes at June for the non-financial companies. So it is not possible to compare the different variables used in this study at a specific point of time. Moreover, financial and non-financial sectors (companies) have different capital structures. Financial companies usually have higher percentage of debts in their capital structures while non-financial firms usually have higher percentage of equity.

Monthly closing stock prices of 100 companies are obtained from the official website of PSX and Business Recorder. Moreover, data used for the calculation of market capitalization, price-to-earnings ratios and market-to-book value ratios including EPS, BV of shareholder's equity and No. of ordinary shares is obtained from the annual financial reports of the companies. Monthly risk-free rates of the Pakistani market are obtained from the website of State Bank of Pakistan. These are considered as reliable sources of information.

3.2 Measurement of Variables

The variables of price-to-earnings ratio, market-to-book value ratio and size are calculated as follows:

3.2.1 Price-to-Earnings Ratio

Price-to-earnings ratio is needed to sort the stocks on the basis of low and high price-to-earnings. It is calculated as follows:

$$P/E = \frac{MPS}{EPS}$$

Whereas,

P/E = Price-to-Earnings Ratio

MPS = Market price per share

EPS = Earnings per share after tax (from annual report)

Basu (1977) uses this ratio in the same manner.

3.2.2 Market-to-Book Value Ratio

Market-to-Book ratio is needed to sort the stocks on the basis of low and high market-to-book values. It is calculated as follows:

$$M/B = \frac{MV}{BV}$$

Whereas,

M/B = Market-to-Book Ratio

MV = Market Value of Equity = MPS × No of shares

BV = Book Value of Equity (from annual report)

Stattman (1980) uses this ratio in the same manner.

3.2.3 Size

There are different proxies for the measurement of size of companies. It includes market capitalization, total assets, total sales. In this study, size is measured by the market capitalization.

Size = Market Capitalization = MPS × No of shares

Fama and French (1992, 1993) use the same proxy for the size measurement.

3.3 Research Methodology

According to CAPM proposed by Sharpe (1964), market risk is the only risk factor that can explain the cross-sectional variation in the equity returns. But according to Arbitrage Pricing Theory (Ross, 1976), 'k' many risk-factors affect the equity returns. Basu (1977) identifies P/E premium as one of the extra-risk factor. Moreover, Stattman (1980), De Bondt and Thaler (1985,87) and Jagadeesh and Titman (1993) identify B/M premium, contrarian strategy premium and momentum premium respectively as extra-risk factors that can explain the cross-sectional variations in the equity returns. Methodologies implemented by above mentioned authors are used in this study for the construction of portfolios.

3.4 Portfolios' Construction

Portfolios are constructed in the following manners based on different criteria.

3.4.1 Size Sorted Portfolios

To construct the size-sorted portfolios, market capitalization of hundred companies is calculated each year. Then companies are arranged in the descending order on the basis of market cap. Twenty five portfolios named S1 to S25 having four companies each are formed. Monthly return of each company in all portfolios (S1 to S25) is calculated separately for all twelve months in a given year by using the following formula.

$$R_{i,t}=\ln\frac{P_t}{P_{t-1}} \qquad i=1,2,3,4$$

Whereas,

$R_{i,t}$ = Return of each company 'i' for each month 't'

P_t = Market price of company's stock in current month

P_{t-1} = Market price of company's stock in previous month

Monthly average returns of each portfolio (S1 to S25) are calculated as follows:

$$R_{avg\ S_{n,t}} = \frac{\Sigma R_{i,t}}{4} \qquad n=1,2,.....,25$$

Whereas,

$R_{avg\ S_{n,t}}$ = Monthly average returns of each portfolio (S1 to S25) for month 't'

This process is repeated for each year from Jun-2002 to Jun-2016.

3.4.2 P/E based Portfolios

To construct portfolios on the basis of P/E ratios, each company's P/E ratio is calculated each year. Then companies are arranged in the descending order on the basis of P/E ratios. A portfolio of fifty companies with higher P/E ratios is formed while another portfolio of fifty companies with lower P/E ratios is also formed. Monthly return of each company in high P/E portfolio and low P/E portfolio is calculated separately for all twelve months in a given year by using the following formula.

$$R_{i,t} = \ln \frac{P_t}{P_{t-1}} \qquad i=1,2,\ldots\ldots,50$$

Whereas,

$R_{i,t}$ = Return of each company 'i' for each month 't'

P_t = Market price of company's stock in current month

P_{t-1} = Market price of company's stock in previous month

Monthly average returns of each portfolio (low P/E, high P/E) is calculated as follows:

$$R_{avg\frac{LP}{E},t} = \frac{\Sigma R_{i,t}}{50} \qquad \text{(50 low P/E stocks)}$$

$$R_{avg\frac{HP}{E},t} = \frac{\Sigma R_{i,t}}{50} \qquad \text{(50 high P/E stocks)}$$

Whereas,

$R_{avg\frac{LP}{E},t}$ = Monthly average return of low P/E portfolio at time 't'

$R_{avg\frac{HP}{E},t}$ = Monthly average return of high P/E portfolio at time 't'

This process is repeated for each year from Jun-2002 to Jun-2016.

3.4.3 M/B based Portfolios

Construction of portfolios on the basis of M/B ratios starts with calculating each company's M/B ratio each year. Then companies are arranged in the descending order on the basis of M/B ratios. A portfolio of fifty companies with higher M/B ratios is formed while another portfolio of fifty companies with lower M/B ratios is also formed. Monthly return of each company in high M/B portfolio and low M/B portfolio is calculated respectively for all twelve months in a given year by using the following formula.

$$R_{i,t} = \ln \frac{P_t}{P_{t-1}} \qquad i=1,2,\ldots\ldots,50$$

Whereas,

$R_{i,t}$ = Return of each company 'i' for each month 't'

P_t = Market price of company's stock in current month

P_{t-1} = Market price of company's stock in previous month

Monthly average returns of each portfolio (low M/B, high M/B) is calculated as follows:

$$R_{avg\,\frac{LM}{B},t} = \frac{\Sigma R_{i,t}}{50} \quad \text{(50 low M/B stocks)}$$

$$R_{avg\,\frac{HM}{B},t} = \frac{\Sigma R_{i,t}}{50} \quad \text{(50 high M/B stocks)}$$

Whereas,

$R_{avg\,\frac{LM}{B},t}$ = Monthly average return of low M/B portfolio at time 't'

$R_{avg\,\frac{HM}{B},t}$ = Monthly average return of high M/B portfolio at time 't'

This process is also repeated for each year from Jun-2002 to Jun-2016.

3.4.4 Momentum Portfolios

For the construction of portfolios based on momentum strategy, each company's average return for the six months' time period from Dec to May is calculated every year. Then all the companies are sorted in the descending order on the basis of these average returns. A portfolio of fifty companies with higher average returns is formed and named as winner stocks' portfolio. Another portfolio having companies with lower average returns is formed and named as loser stocks' portfolio. Monthly return of each company in winner stocks' portfolio and loser stocks' portfolio is calculated respectively for all twelve months in a given year by using the following formula.

$$R_{i,t} = \ln \frac{P_t}{P_{t-1}} \qquad i=1,2,\ldots\ldots,50$$

Whereas,

$R_{i,t}$ = Return of each company 'i' for each month 't'

P_t = Market price of company's stock in current month

P_{t-1} = Market price of company's stock in previous month

Monthly average returns of each portfolio (winner, loser) is calculated as follows:

$$R_{avg\ W,t} = \frac{\Sigma R_{i,t}}{50} \quad \text{(50 winner stocks)}$$

$$R_{avg\ L,t} = \frac{\Sigma R_{i,t}}{50} \quad \text{(50 loser stocks)}$$

Whereas,

$R_{avg\ W,t}$ = Monthly average return of winner portfolio at time 't'

$R_{avg\ L,t}$ = Monthly average return of loser portfolio at time 't'

This process is also repeated for each year from Jun-2002 to Jun-2016.

3.5 Arbitrage Portfolios' Construction

After the construction and calculation of monthly average returns of portfolios each year based on P/E ratio, M/B ratio and momentum strategy, their arbitrage portfolios are constructed in the following manner:

Monthly average returns of portfolios with high P/E ratios are subtracted from monthly average returns of portfolios with low P/E ratios for each year. The resulting portfolios are named as P/E based Arbitrage Portfolios for each year and their returns are calculated as follows:

$$R_{arb\frac{P}{E},t} = R_{avg\frac{LP}{E},t} - R_{avg\frac{HP}{E},t}$$

Whereas,

$R_{arb\frac{P}{E},t}$ = Monthly Return of P/E based Arbitrage Portfolio at time 't'

Monthly average returns of portfolios with high M/B ratios are subtracted from monthly average returns of portfolios with low M/B ratios for each year. The resulting portfolios are named as M/B based Arbitrage Portfolios for each year and their returns are calculated as follows:

$$R_{arb\frac{M}{B},t} = R_{avg\frac{LM}{B},t} - R_{avg\frac{HM}{B},t}$$

Whereas,

$R_{arb\,\frac{M}{B},\,t}$ = Monthly Return of M/B based Arbitrage Portfolio at time 't'

Monthly average returns of loser portfolios are subtracted from monthly average returns of winner portfolios each year. The resulting portfolios are named as Momentum Arbitrage Portfolios for each year and their returns are calculated as follows:

$$R_{arb\ mom,\,t} = R_{avg\ W,\,t} - R_{avg\ L,\,t}$$

Whereas,

$R_{arb\ mom,\,t}$ = Monthly Return of Momentum Arbitrage Portfolio at time 't'

Monthly average returns of winner portfolios are subtracted from monthly average returns of loser portfolios each year. The resulting portfolios are named as Contrarian Arbitrage Portfolios for each year and their returns are calculated as follows:

$$R_{arb\ con,\,t} = R_{avg\ L,\,t} - R_{avg\ W,\,t}$$

Whereas,

$R_{arb\ con,\,t}$ = Monthly Return of Contrarian Arbitrage Portfolio at time 't'

This process is repeated each year for all the strategies from Jun-2002 to Jun-2016.

3.6 Variables' Construction

After the formation and calculation of monthly returns of arbitrage portfolios each year for all the strategies, we have premiums of P/E, M/B, momentum and contrarian strategies.

$$R_{arb\frac{P}{E},\,t} = P/E\ \text{premium}$$

$$R_{arb\frac{M}{B},\,t} = M/B\ \text{premium}$$

$$R_{arb\ mom,\,t} = \text{momentum premium}$$

$$R_{arb\ con,\ t} = \text{contrarian premium}$$

Whereas, these are monthly premiums for each month 't'.

Market risk premium = $R_{mktp,t}$ = $R_{m,t}$- $R_{f,t}$

Whereas,

$R_{m,t}$ = Return of Market for month 't' and can be calculated as follows:

$$R_{m,t}=\ln \frac{Index_t}{Index_{t-1}}$$

$R_{f,t}$ = Risk-free rate for month 't'

3.7 Model Specification

According to Fama and French (1992, 93, 96), Carhart (1997) it is considered that equity returns can be explained by the extra-risk factors. Some of the extra-risk factors that they identified are size-premium, value premium, momentum premium respectively. So this aspect is also investigated in this study whether premiums of P/E, M/B, momentum and contrarian strategies have the risk-characteristics to explain the equity returns or not. This is tested by using cross-sectional multiple regression analysis on the following equations. The dependent variable is the monthly average returns of the size-sorted portfolios.

$$R_{p,t}= \beta_0 + \beta_1(MKTP_t) + \beta_2(PERP_t) + \beta_3(MOMP_t) + \mu_t \quad (1)$$

$$R_{p,t}= \beta_0 + \beta_1(MKTP_t) + \beta_2(MBRP_t) + \beta_3(MOMP_t) + \mu_t \quad (2)$$

$$R_{p,t}= \beta_0 + \beta_1(MKTP_t) + \beta_2(PERP_t) + \beta_3(CONP_t) + \mu_t \quad (3)$$

$$R_{p,t}= \beta_0 + \beta_1(MKTP_t) + \beta_2(MBRP_t) + \beta_3(CONP_t) + \mu_t \quad (4)$$

Whereas,

$R_{p,t}$ = Average returns of the size-sorted portfolios for month 't'

μ_t = Error Term

Chapter 04

Empirical Results and Discussion

4.1 Descriptive Statistics

Descriptive statistics are statistics that quantitatively describe or summarize features of a collection of information (sample). Some measures that are commonly used to describe a data set are measures of central tendency and measures of variability or dispersion. Mean and median are the measures of central tendency while measures of variability are standard deviation, minimum and maximum values, skewness and kurtosis. Table 4.1.1 reports the measures of central tendency and variability of size-sorted portfolios.

Table 4.1.1 *Descriptive Statistics of Size-sorted Portfolios*

	Mean	Median	St. Dev.	Kurtosis	Skewness	Minimum	Maximum
S1-H	0.0006	0.0085	0.0756	1.9039	-0.8173	-0.3099	0.1958
S2	0.0089	0.0088	0.0820	3.9861	-0.8229	-0.4141	0.2168
S3	0.0162	0.0220	0.0978	6.6347	-1.3655	-0.5517	0.2619
S4	0.0150	0.0178	0.0941	2.1262	-0.0312	-0.3352	0.3834
S5	0.0080	0.0036	0.0934	2.3882	-0.3288	-0.4239	0.2946
S6	0.0134	0.0158	0.0847	1.7911	-0.7868	-0.3592	0.1821
S7	0.0083	0.0082	0.0833	3.2157	-0.4243	-0.3914	0.2736
S8	0.0039	0.0001	0.0855	0.6264	0.0662	-0.3006	0.2624
S9	-0.0040	0.0033	0.0961	3.0407	-1.0178	-0.4399	0.2138
S10	0.0124	0.0154	0.0930	1.1606	-0.2295	-0.3315	0.3204
S11	0.0057	0.0026	0.1067	3.5385	-0.5129	-0.5052	0.3739
S12	0.0103	0.0134	0.1057	3.6783	-1.0713	-0.4708	0.2477
S13	0.0064	-0.0016	0.0854	2.0615	0.3937	-0.2946	0.3580
S14	0.0126	0.0093	0.0920	4.9744	-0.2805	-0.4591	0.3580
S15	0.0117	0.0074	0.0891	0.6870	0.2847	-0.2329	0.2916
S16	0.0094	0.0027	0.0888	0.5472	0.1041	-0.2676	0.2886

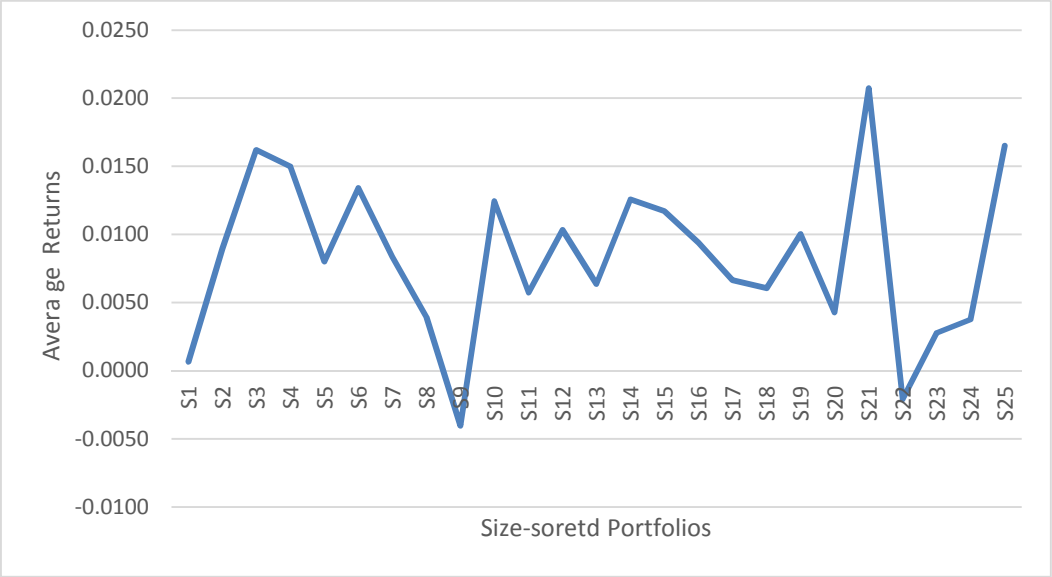
S17	0.0067	-0.0016	0.0802	-0.1346	0.3799	-0.2029	0.2000
S18	0.0061	0.0000	0.0929	2.1625	-0.1673	-0.4117	0.2730
S19	0.0100	0.0049	0.0887	2.4672	0.4147	-0.2401	0.4090
S20	0.0043	-0.0106	0.1046	2.9033	0.6820	-0.3049	0.4306
S21	0.0207	0.0191	0.1065	2.8973	0.2786	-0.4016	0.4705
S22	-0.0021	-0.0001	0.1098	2.0031	-0.2999	-0.4742	0.3394
S23	0.0028	0.0026	0.1174	1.2250	0.0543	-0.3855	0.3578
S24	0.0038	0.0000	0.1337	2.9068	-0.0375	-0.5844	0.4797
S25-L	0.0165	0.0180	0.1726	1.7524	0.2169	-0.4700	0.6212

Results clearly indicate that portfolio S25 with small size stocks (low market capitalization companies) earns on average more than the portfolio S1 with large size stocks (high market capitalization companies). It is consistent with the theory as risk of small size stocks' portfolio is higher than the risk of large size stock's portfolio. Portfolio S1 earns 0.06% in a month with standard deviation of 7.56% while portfolio S25 earns 1.65% in a month with standard deviation of 17.26%. Portfolio S1 has median of 0.85% while median of portfolio S25 is 1.80% which means in portfolio S1 50% of companies earn more than 0.85% in a month and for portfolio S25 50% companies earn more than 1.80% in a month. Among all the portfolios, the highest return is earned by the portfolio S21 (relatively small size stock's portfolio) which is 2.07% in a month with standard deviation of 10.65%. Moreover, the maximum gain in a month is incurred by the portfolio S25 which is 62.12% in a month while maximum loss is incurred by the portfolio S24 which is 58.44% in a month. The behavior of average returns of all portfolios is depicted graphically in Figure 4.1.1

Kurtosis is a measure of peakedness (flatness) of the data. If the kurtosis value is equal to 3, then the data has mesokurtic distribution which is most similar to the normal distribution with respect to peakedness. If kurtosis value is greater than 3, then the data has leptokurtic distribution having thin and tall peak. If kurtosis value is less than 3, then the data has platykurtic distribution having flatter peak. Results indicate that only five portfolios S7, S9, S20, S21 and S24 have mesokurtic distributions (similar to normal distribution). While

portfolios S2, S3, S11, S12 and S14 have leptokurtic distributions while rest of the portfolios have platykurtic distributions.

Figure 4.1.1 *Average Returns of Size-sorted Portfolios*



Skewness is measure of asymmetry of the data distribution from the normal distribution. For a normal distribution, value of skewness is zero. Results indicate that all the portfolios have insignificant skewness within an acceptable range of -0.5 and +0.5 except portfolios S1, S2, S3, S6, S9, S11, S12 with significant negative skewness and portfolio S20 with significant positive skewness.

Skewness and kurtosis strongly dependent on sample sizes. For the large sample sizes, both measures have relatively insignificant values. The presence of skweness and kurtosis in size-sorted portfolios may be due to the small sample size of each portfolio. Each portfolio consists of only four stocks. Secondly, the assumptions of zero skewness and kurtosis are difficult to fulfill in the economic data, so this data is used by keeping in view this limitation.

Table 4.1.2 reports the measures of central tendency and variability of market, P/E, M/B, momentum and contrarian premiums respectively. Results clearly indicate that all the

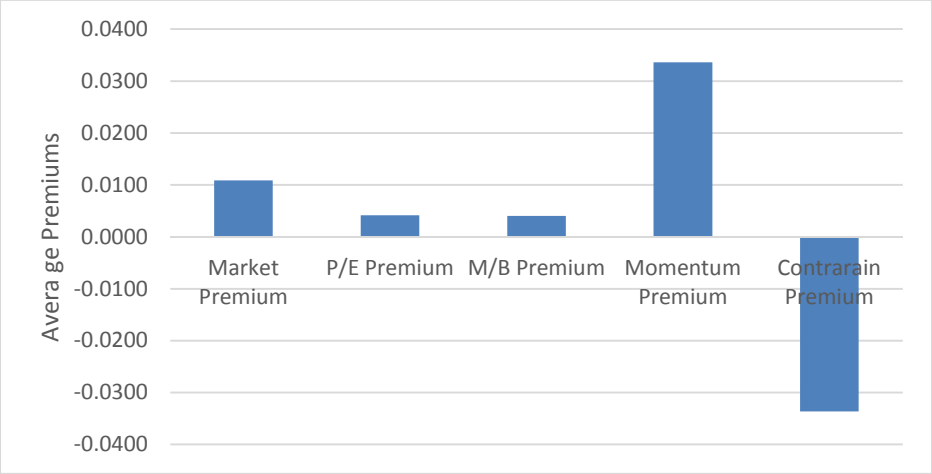
premiums associated with market, P/E, M/B and momentum strategies are positive except the contrarian premium. Momentum premium has highest value of 3.36% in a month followed by the market premium of 1.08% in a month. The standard deviation of the market premium is highest among all which is 7.47%. It may be due to the stock market volatile behavior during the period of the study. The maximum gain of 34.99% in a month is incurred by the momentum premium while maximum loss is incurred by the market premium of 46.07% in a month.

Table 4.1.2 Descriptive Statistics of Market, P/E, M/B, Momentum and Contrarian Premiums

	Market Premium	P/E Premium	M/B Premium	Momentum Premium	Contrarian Premium
Mean	0.0108	0.0042	0.0040	0.0336	-0.0336
Median	0.0139	-0.0010	0.0011	0.0269	-0.0269
Std. Deviation	0.0747	0.0404	0.0423	0.0693	0.0693
Kurtosis	9.1924	1.4775	1.2210	3.8872	3.8872
Skewness	-1.7327	0.6980	0.5306	0.1772	-0.1772
Minimum	-0.4607	-0.0906	-0.1246	-0.2740	-0.3499
Maximum	0.1977	0.1604	0.1626	0.3499	0.2740

Market, momentum and contrarian premiums have leptokurtic distributions while P/E and M/B premiums have platykurtic distributions. In case of skewness, momentum and contrarian premiums have insignificant positive and insignificant negative skewness respectively within an acceptable range of -0.5 and +0.5. Moreover, P/E and M/B premiums are significantly positively skewed while market premium is significantly negatively skewed. Figure 4.1.2 depicts the average premiums of all strategies graphically.

Figure 4.1.2 *Average Premiums of all Strategies*



4.2 Correlation Analysis

Table 4.2.1 reports the correlation matrix for the variables including market, P/E, M/B, momentum and contrarian premiums used in the study.

Table 4.2.1 *Correlation Matrix*

	$R_m - R_f$	P/E Premium	M/B Premium	Momentum Premium	Contrarian Premium
$R_m - R_f$	1				
P/E Premium	0.0819	1			
M/B Premium	-0.0363	0.6537	1		
Momentum Premium	0.2860	-0.1121	-0.1560	1	
Contrarian Premium	-0.2860	0.1121	0.1560	-1	1

Results indicate the insignificant positive relationship of market premium with P/E and momentum premiums while insignificant negative relationship with M/B and contrarian premiums. P/E premium has significant positive relationship with M/B premium. It is further checked by the VIF test and results indicate that the relationship is within tolerable limit. Moreover, P/E premium has insignificant positive and insignificant negative relationships with momentum and contrarian premiums respectively. M/B premium has

insignificant negative and insignificant positive relationships with momentum and contrarian premiums respectively. Momentum premium has perfect negative relationship with contrarian premium. It does not allow us to use both variables together. It is the reason both variables are used separately one-by-one for the regression analysis. Table 4.2.2 and Table 4.2.3 reports the results of VIF tests.

Table 4.2.2 VIF Test

Variable	Un-centered VIF
MBRP	1.798716
MKTP	1.137757
MOMP	1.383323
PERP	1.805664

Table 4.2.3 VIF Test

Variable	Un-centered VIF
MKTP	1.137757
PERP	1.805664
MBRP	1.798716
CONP	1.383323

Results confirm that all the variables have un-centered VIF values within a tolerable limit of 5.

4.3 Comparison between Returns of Portfolios

In this section, returns of different portfolios based on P/E, M/B, momentum and contrarian strategies are compared and reported. Table 4.3.1 reports the average risk and returns of P/E, M/B, momentum and contrarian strategies based portfolios for the period 6/2002 to 6/2016 using 1 year time-period holding window.

Results clearly indicate that portfolio with low P/E stocks earn more than portfolio with high P/E stocks. It is consistent with the theory because risk of low P/E portfolio is higher than high P/E portfolio. Figure 4.3.1 graphically represents the average returns of low P/E and high P/E portfolios.

Figure 4.3.1 Average Returns of Low and High P/E Portfolios (1 year holding period)

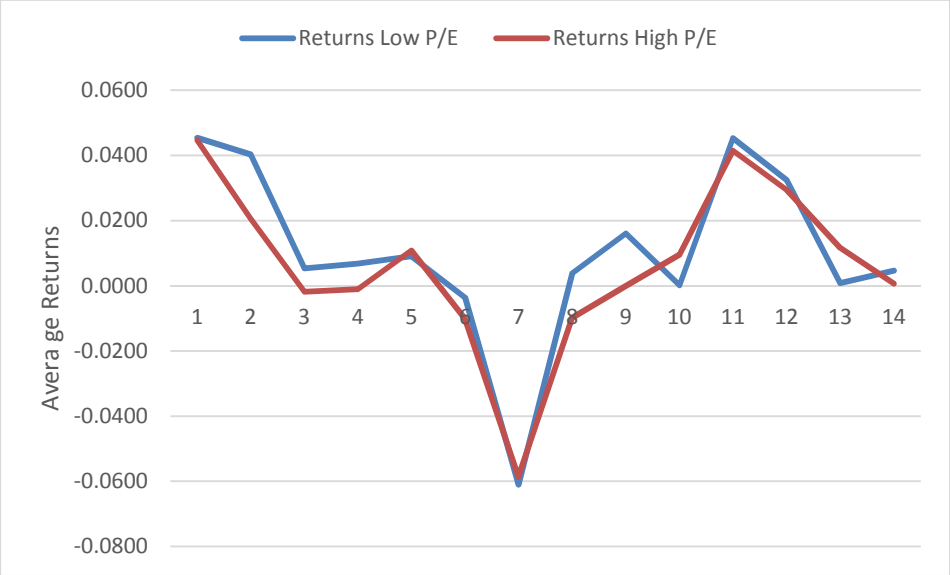


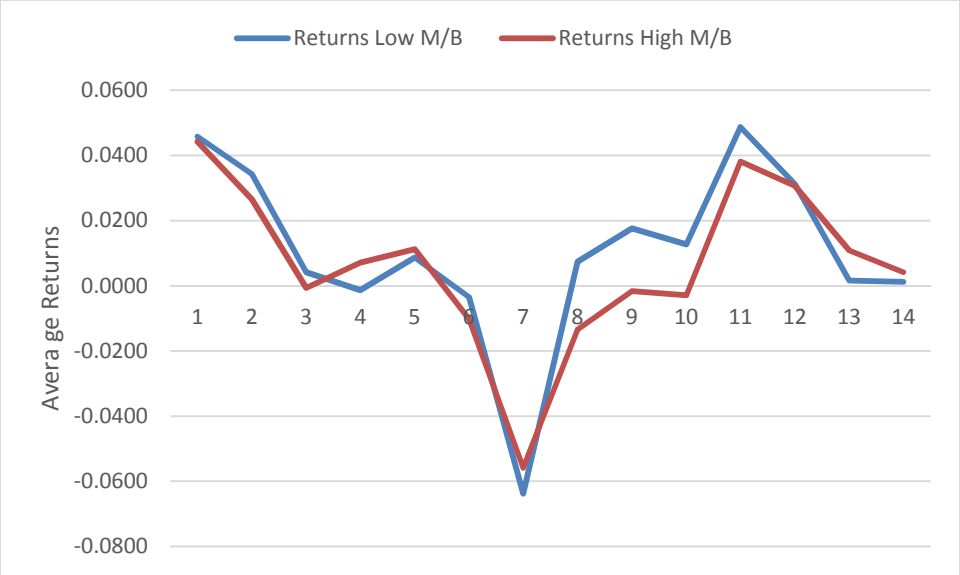
Table 4.3.1 also reports that portfolio with low M/B stocks earn more than portfolio with high M/B stocks. It is consistent with the theory because risk of low M/B portfolio is higher than high M/B portfolio. Figure 4.3.2 graphically represents the average returns of low M/B and high M/B portfolios.

Table 4.3.1 *Average Risk and Returns (1 year holding period)*

P/E, M/B, Momentum and Contrarian based Portfolios

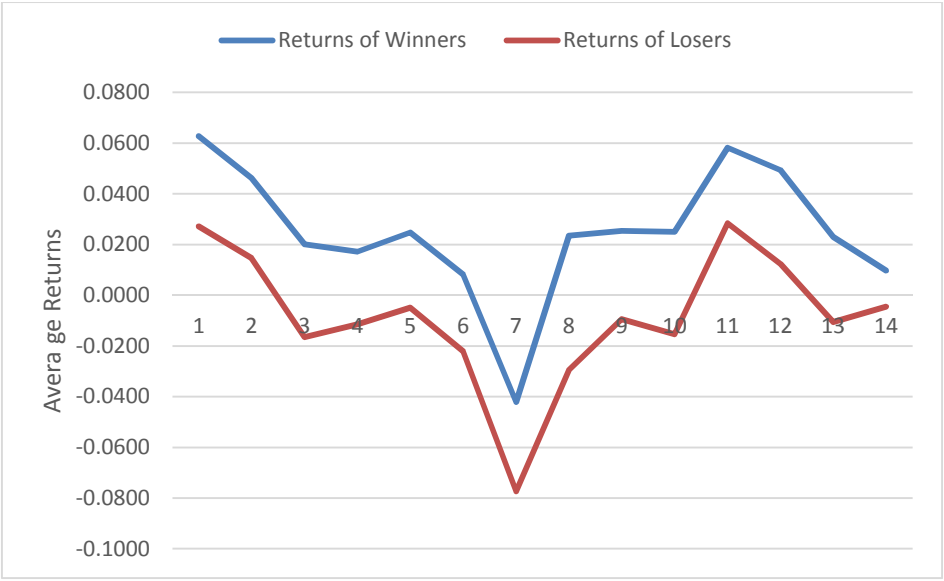
	Returns Low P/E	**Returns High P/E**	**S.D Low P/E**	**S.D High P/E**	**Returns Low M/B**	**Returns High M/B**	**S.D Low M/B**	**S.D High M/B**	**Returns Winners**	**Returns Losers**	**S.D Winners**	**S.D Losers**
2002-2003	0.0454	0.0446	0.0509	0.0540	0.0457	0.0442	0.0598	0.0470	0.0627	0.0272	0.0649	0.0471
2003-2004	0.0403	0.0206	0.0874	0.0596	0.0343	0.0265	0.0788	0.0663	0.0462	0.0146	0.0994	0.0554
2004-2005	0.0054	-0.0019	0.0714	0.0651	0.0042	-0.0007	0.0779	0.0569	0.0201	-0.0165	0.0565	0.0841
2005-2006	0.0068	-0.0011	0.0610	0.0502	-0.0013	0.0070	0.0513	0.0601	0.0172	-0.0115	0.0464	0.0686
2006-2007	0.0091	0.0108	0.0527	0.0566	0.0086	0.0112	0.0513	0.0571	0.0248	-0.0049	0.0707	0.0458
2007-2008	-0.0036	-0.0102	0.0532	0.0514	-0.0035	-0.0102	0.0383	0.0649	0.0083	-0.0220	0.0389	0.0741
2008-2009	-0.0610	-0.0585	0.0644	0.0593	-0.0638	-0.0558	0.0603	0.0699	-0.0422	-0.0774	0.1181	0.0876
2009-2010	0.0038	-0.0098	0.0911	0.0487	0.0074	-0.0134	0.0889	0.0517	0.0235	-0.0295	0.0505	0.0906
2010-2011	0.0161	-0.0001	0.0672	0.0483	0.0176	-0.0016	0.0707	0.0436	0.0255	-0.0094	0.0527	0.0702
2011-2012	0.0001	0.0096	0.0699	0.0544	0.0126	-0.0030	0.0685	0.0552	0.0250	-0.0153	0.0895	0.0371
2012-2013	0.0453	0.0414	0.0620	0.0399	0.0487	0.0381	0.0683	0.0378	0.0583	0.0285	0.0522	0.0521
2013-2014	0.0324	0.0294	0.1134	0.0798	0.0312	0.0306	0.1062	0.0857	0.0494	0.0124	0.0934	0.0995
2014-2015	0.0008	0.0116	0.0747	0.0673	0.0016	0.0108	0.0744	0.0677	0.0231	-0.0106	0.0691	0.0765
2015-2016	0.0047	0.0006	0.0538	0.0375	0.0012	0.0041	0.0591	0.0353	0.0098	-0.0045	0.0537	0.0469
2002-2016	0.0104	0.0062	0.0695	0.0552	0.0103	0.0063	0.0681	0.0571	0.0251	-0.0085	0.0683	0.0668

Figure 4.3.2 Average Returns of Low and High M/B Portfolios (1 year holding period)



From Table 4.3.1, it is clearly observed that winner portfolio earns more than loser portfolio. It is also consistent with the theory because risk of winner portfolio is on higher side than risk of loser portfolio. With respect to momentum strategy, as winner portfolio is outperforming loser portfolio, so the arbitrage portfolio based on momentum strategy earns positive abnormal return while it is opposite in case of contrarian strategy in which arbitrage portfolio earns negative return. Figure 4.3.3 graphically represents the average returns of winner and loser portfolios.

Figure 4.3.3 Average Returns of Winner and Loser Portfolios (1 year holding period)



Statistical differences between the average returns of low P/E and high P/E portfolio, low M/B and high M/B portfolio, winner and loser portfolios using 1 year time-period holding window are tested by two-sample t-test at level of significance $\alpha = 0.05$ and results are reported in Table 4.3.2

Table 4.3.2 Statistical Difference between Average Returns (1 year holding period)

P/E, M/B, Momentum and Contrarian based Portfolios

2002-2003	**Returns Low P/E**	**Returns High P/E**	**Difference**	**t-statistics**
	0.0454	0.0446	0.0008	0.0371
	Returns Low M/B	**Returns High M/B**		
	0.0457	0.0442	0.0015	0.0703
	Returns of Winners	**Returns of Losers**		
	0.0627	0.0272	0.0355	1.5345
	Returns of Losers	**Returns of Winners**		
	0.0272	0.0627	-0.0355	-1.5345
2003-2004	**Returns Low P/E**	**Returns High P/E**	**Difference**	**t-statistics**
	0.0403	0.0206	0.0197	0.6458
	Returns Low M/B	**Returns High M/B**		
	0.0343	0.0265	0.0078	0.2609
	Returns of Winners	**Returns of Losers**		
	0.0462	0.0146	0.0315	0.9608
	Returns of Losers	**Returns of Winners**		
	0.0146	0.0462	-0.0315	-0.9608
2004-2005	**Returns Low P/E**	**Returns High P/E**	**Difference**	**t-statistics**
	0.0054	-0.0019	0.0072	0.2592
	Returns Low M/B	**Returns High M/B**		
	0.0042	-0.0007	0.0048	0.1734
	Returns of Winners	**Returns of Losers**		
	0.0201	-0.0165	0.0366	1.2512
	Returns of Losers	**Returns of Winners**		
	-0.0165	0.0201	-0.0366	-1.2512

2005-2006	Returns Low P/E	Returns High P/E	Difference	t-statistics
	0.0068	-0.0011	0.0078	0.3438
	Returns Low M/B	**Returns High M/B**		
	-0.0013	0.0070	-0.0084	-0.3678
	Returns of Winners	**Returns of Losers**		
	0.0172	-0.0115	0.0287	1.2001
	Returns of Losers	**Returns of Winners**		
	-0.0115	0.0172	-0.0287	-1.2001
2006-2007	**Returns Low P/E**	**Returns High P/E**	**Difference**	**t-statistics**
	0.0091	0.0108	-0.0017	-0.0779
	Returns Low M/B	**Returns High M/B**		
	0.0086	0.0112	-0.0026	-0.1177
	Returns of Winners	**Returns of Losers**		
	0.0248	-0.0049	0.0297	1.2202
	Returns of Losers	**Returns of Winners**		
	-0.0049	0.0248	-0.0297	-1.2202
2007-2008	**Returns Low P/E**	**Returns High P/E**	**Difference**	**t-statistics**
	-0.0036	-0.0102	0.0065	0.3058
	Returns Low M/B	**Returns High M/B**		
	-0.0035	-0.0102	0.0067	0.3075
	Returns of Winners	**Returns of Losers**		
	0.0083	-0.0220	0.0303	1.2541
	Returns of Losers	**Returns of Winners**		
	-0.0220	0.0083	-0.0303	-1.2541
2008-2009	**Returns Low P/E**	**Returns High P/E**	**Difference**	**t-statistics**
	-0.0610	-0.0585	-0.0025	-0.0985
	Returns Low M/B	**Returns High M/B**		
	-0.0638	-0.0558	-0.0080	-0.2987
	Returns of Winners	**Returns of Losers**		
	-0.0422	-0.0774	0.0352	0.8295

	Returns of Losers	**Returns of Winners**		
	-0.0774	-0.0422	-0.0352	-0.8295
2009-2010	**Returns Low P/E**	**Returns High P/E**	**Difference**	**t-statistics**
	0.0038	-0.0098	0.0136	0.4566
	Returns Low M/B	**Returns High M/B**		
	0.0074	-0.0134	0.0208	0.7008
	Returns of Winners	**Returns of Losers**		
	0.0235	-0.0295	0.0530	1.7697
	Returns of Losers	**Returns of Winners**		
	-0.0295	0.0235	-0.0530	-1.7697
2010-2011	**Returns Low P/E**	**Returns High P/E**	**Difference**	**t-statistics**
	0.0161	-0.0001	0.0161	0.6753
	Returns Low M/B	**Returns High M/B**		
	0.0176	-0.0016	0.0193	0.8030
	Returns of Winners	**Returns of Losers**		
	0.0255	-0.0094	0.0349	1.3763
	Returns of Losers	**Returns of Winners**		
	-0.0094	0.0255	-0.0349	-1.3763
2011-2012	**Returns Low P/E**	**Returns High P/E**	**Difference**	**t-statistics**
	0.0001	0.0096	-0.0095	-0.3708
	Returns Low M/B	**Returns High M/B**		
	0.0126	-0.0030	0.0156	0.6145
	Returns of Winners	**Returns of Losers**		
	0.0250	-0.0153	0.0403	1.4417
	Returns of Losers	**Returns of Winners**		
	-0.0153	0.0250	-0.0403	-1.4417
2012-2013	**Returns Low P/E**	**Returns High P/E**	**Difference**	**t-statistics**
	0.0453	0.0414	0.0039	0.1830
	Returns Low M/B	**Returns High M/B**		
	0.0487	0.0381	0.0106	0.4705

	Returns of Winners	**Returns of Losers**		
	0.0583	0.0285	0.0298	1.4000
	Returns of Losers	**Returns of Winners**		
	0.0285	0.0583	-0.0298	-1.4000
2013-2014	**Returns Low P/E**	**Returns High P/E**	**Difference**	**t-statistics**
	0.0324	0.0294	0.0030	0.0743
	Returns Low M/B	**Returns High M/B**		
	0.0312	0.0306	0.0006	0.0146
	Returns of Winners	**Returns of Losers**		
	0.0494	0.0124	0.0369	0.9376
	Returns of Losers	**Returns of Winners**		
	0.0124	0.0494	-0.0369	-0.9376
2014-2015	**Returns Low P/E**	**Returns High P/E**	**Difference**	**t-statistics**
	0.0008	0.0116	-0.0108	-0.3715
	Returns Low M/B	**Returns High M/B**		
	0.0016	0.0108	-0.0092	-0.3180
	Returns of Winners	**Returns of Losers**		
	0.0231	-0.0106	0.0337	1.1322
	Returns of Losers	**Returns of Winners**		
	-0.0106	0.0231	-0.0337	-1.1322
2015-2016	**Returns Low P/E**	**Returns High P/E**	**Difference**	**t-statistics**
	0.0047	0.0006	0.0040	0.2124
	Returns Low M/B	**Returns High M/B**		
	0.0012	0.0041	-0.0030	-0.1486
	Returns of Winners	**Returns of Losers**		
	0.0098	-0.0045	0.0143	0.6945
	Returns of Losers	**Returns of Winners**		
	-0.0045	0.0098	-0.0143	-0.6945

Results clearly indicate that average returns of low P/E and high P/E portfolios are not significantly different in 1 year investment horizon. Average returns of low M/B and high M/B portfolios are also not significantly different. Similarly, average returns of winner and loser portfolios are also not significantly different for 1 year investment horizon. It is worth mentioning that for 1 year holding period after the formation of portfolios, all the four returns-based trading strategies i.e P/E, M/B, momentum and contrarian, are unable to earn significant abnormal returns in the Pakistani market.

Now, the returns of different portfolios based on P/E, M/B, momentum and contrarian strategies are compared by using 5 years' time-period holding window. Table 4.3.3 reports the average risk and returns of P/E, M/B, momentum and contrarian strategies based portfolios for the period 6/2002 to 6/2016 using 5 year time-period holding window.

Results clearly indicate that portfolio with low P/E stocks outperforms portfolio with high P/E stocks. It is consistent with the theory because risk of low P/E portfolio is higher than high P/E portfolio. Figure 4.3.4 graphically represents the average returns of low P/E and high P/E portfolios.

Figure 4.3.4 Average Returns of Low and High P/E Portfolios (5 years holding period)

Table 4.3.3 also reports that portfolio with low M/B stocks earn more than portfolio with high M/B stocks. It is consistent with the theory because risk of low M/B portfolio is higher than high M/B portfolio. Figure 4.3.5 graphically represents the average returns of low M/B and high M/B portfolios.

Table 4.3.3 *Average Risk and Returns (5 years holding period)*

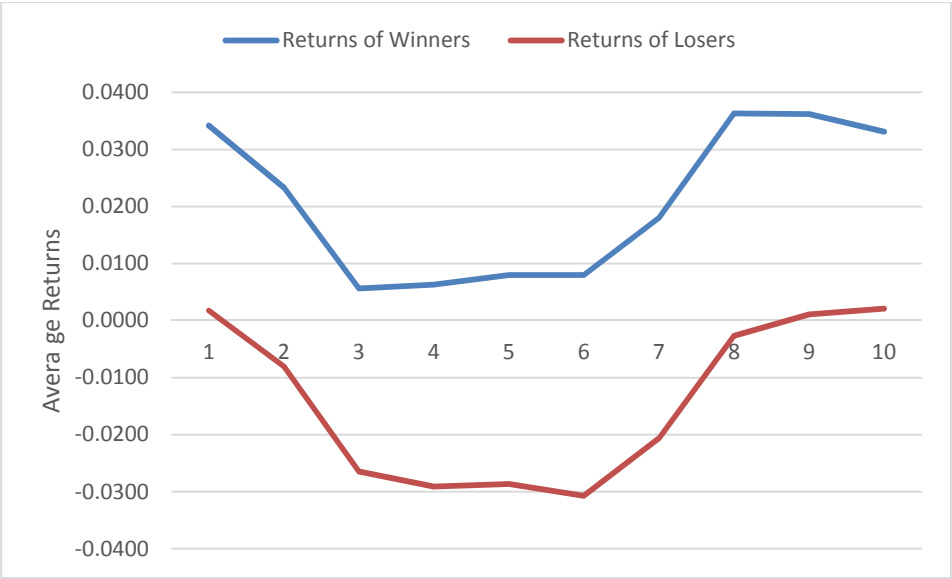
P/E, M/B, Momentum and Contrarian based Portfolios

	Returns Low P/E	**Returns High P/E**	**S.D Low P/E**	**S.D High P/E**	**Returns Low M/B**	**Returns High M/B**	**S.D Low M/B**	**S.D High M/B**	**Returns Winners**	**Returns Losers**	**S.D Winners**	**S.D Losers**
2002-2007	0.0214	0.0146	0.0662	0.0580	0.0183	0.0177	0.0654	0.0581	0.0342	0.0018	0.0698	0.0621
2003-2008	0.0116	0.0037	0.0659	0.0560	0.0084	0.0068	0.0611	0.0604	0.0233	-0.0081	0.0649	0.0659
2004-2009	-0.0087	-0.0122	0.0646	0.0600	-0.0112	-0.0097	0.0615	0.0646	0.0056	-0.0265	0.0736	0.0757
2005-2010	-0.0090	-0.0137	0.0690	0.0568	-0.0105	-0.0122	0.0644	0.0637	0.0063	-0.0291	0.0730	0.0770
2006-2011	-0.0071	-0.0135	0.0706	0.0565	-0.0067	-0.0140	0.0687	0.0607	0.0080	-0.0287	0.0741	0.0773
2007-2012	-0.0089	-0.0138	0.0730	0.0560	-0.0059	-0.0168	0.0716	0.0594	0.0080	-0.0307	0.0778	0.0759
2008-2013	0.0009	-0.0035	0.0776	0.0588	0.0045	-0.0071	0.0789	0.0593	0.0180	-0.0206	0.0818	0.0764
2009-2014	0.0195	0.0141	0.0819	0.0572	0.0235	0.0102	0.0805	0.0590	0.0363	-0.0027	0.0695	0.0741
2010-2015	0.0189	0.0184	0.0789	0.0595	0.0224	0.0150	0.0780	0.0608	0.0362	0.0011	0.0725	0.0700
2011-2016	0.0167	0.0185	0.0772	0.0580	0.0191	0.0161	0.0766	0.0595	0.0331	0.0021	0.0734	0.0662
2002-2016	0.0055	0.0013	0.0725	0.0577	0.0062	0.0006	0.0707	0.0605	0.0209	-0.0141	0.0730	0.0721

Figure 4.3.5 Average Returns of Low and High M/B Portfolios (5 years holding period)

From Table 4.3.3, it is clearly observed that winner portfolio outperforms loser portfolio. It is also consistent with the theory because risk of winner portfolio is on higher side than risk of loser portfolio. With respect to momentum strategy, as winner portfolio is outperforming loser portfolio, so the arbitrage portfolio based on momentum strategy earns positive abnormal return while it is opposite in case of contrarian strategy in which arbitrage portfolio earns negative return. Figure 4.3.6 graphically represents the average returns of winner and loser portfolios.

Figure 4.3.6 Average Returns of Winner and Loser Portfolios (5 years holding period)



Statistical differences between the average returns of low P/E and high P/E portfolio, low M/B and high M/B portfolio, winner and loser portfolios using 5 year time-period holding window are tested by two-sample t-test at level of significance $\alpha = 0.05$ and results are reported in Table 4.3.4

Table 4.3.4 Statistical Difference between Average Returns (5 years holding period)

P/E, M/B, Momentum and Contrarian based Portfolios

2002-2007	**Returns Low P/E**	**Returns High P/E**	**Difference**	**t-statistics**
	0.0214	0.0146	0.0068	0.5958
	Returns Low M/B	**Returns High M/B**		
	0.0183	0.0177	0.0006	0.0553
	Returns of Winners	**Returns of Losers**		
	0.0342	0.0018	0.0324	2.6884
	Returns of Losers	**Returns of Winners**		
	0.0018	0.0342	-0.0324	-2.6884
2003-2008	**Returns Low P/E**	**Returns High P/E**	**Difference**	**t-statistics**
	0.0116	0.0037	0.0079	0.7093
	Returns Low M/B	**Returns High M/B**		
	0.0084	0.0068	0.0017	0.1493
	Returns of Winners	**Returns of Losers**		
	0.0233	-0.0081	0.0314	2.6256
	Returns of Losers	**Returns of Winners**		
	-0.0081	0.0233	-0.0314	-2.6256
2004-2009	**Returns Low P/E**	**Returns High P/E**	**Difference**	**t-statistics**
	-0.0087	-0.0122	0.0035	0.3052
	Returns Low M/B	**Returns High M/B**		
	-0.0112	-0.0097	-0.0015	-0.1292
	Returns of Winners	**Returns of Losers**		
	0.0056	-0.0265	0.0321	2.3538

	Returns of Losers	**Returns of Winners**		
	-0.0265	0.0056	-0.0321	-2.3538
2005-2010	**Returns Low P/E**	**Returns High P/E**	**Difference**	**t-statistics**
	-0.0090	-0.0137	0.0047	0.4116
	Returns Low M/B	**Returns High M/B**		
	-0.0105	-0.0122	0.0017	0.1461
	Returns of Winners	**Returns of Losers**		
	0.0063	-0.0291	0.0354	2.5839
	Returns of Losers	**Returns of Winners**		
	-0.0291	0.0063	-0.0354	-2.5839
2006-2011	**Returns Low P/E**	**Returns High P/E**	**Difference**	**t-statistics**
	-0.0071	-0.0135	0.0064	0.5487
	Returns Low M/B	**Returns High M/B**		
	-0.0067	-0.0140	0.0072	0.6117
	Returns of Winners	**Returns of Losers**		
	0.0080	-0.0287	0.0366	2.6485
	Returns of Losers	**Returns of Winners**		
	-0.0287	0.0080	-0.0366	-2.6485
2007-2012	**Returns Low P/E**	**Returns High P/E**	**Difference**	**t-statistics**
	-0.0089	-0.0138	0.0049	0.4090
	Returns Low M/B	**Returns High M/B**		
	-0.0059	-0.0168	0.0109	0.9057
	Returns of Winners	**Returns of Losers**		
	0.0080	-0.0307	0.0387	2.7612
	Returns of Losers	**Returns of Winners**		
	-0.0307	0.0080	-0.0387	-2.7612

2008-2013	Returns Low P/E	Returns High P/E	Difference	t-statistics
	0.0009	-0.0035	0.0043	0.3449
	Returns Low M/B	**Returns High M/B**		
	0.0045	-0.0071	0.0117	0.9154
	Returns of Winners	**Returns of Losers**		
	0.0180	-0.0206	0.0386	2.6744
	Returns of Losers	**Returns of Winners**		
	-0.0206	0.0180	-0.0386	-2.6744
2009-2014	**Returns Low P/E**	**Returns High P/E**	**Difference**	**t-statistics**
	0.0195	0.0141	0.0054	0.4207
	Returns Low M/B	**Returns High M/B**		
	0.0235	0.0102	0.0134	1.0380
	Returns of Winners	**Returns of Losers**		
	0.0363	-0.0027	0.0390	2.9717
	Returns of Losers	**Returns of Winners**		
	-0.0027	0.0363	-0.0390	-2.9717
2010-2015	**Returns Low P/E**	**Returns High P/E**	**Difference**	**t-statistics**
	0.0189	0.0184	0.0005	0.0430
	Returns Low M/B	**Returns High M/B**		
	0.0224	0.0150	0.0074	0.5767
	Returns of Winners	**Returns of Losers**		
	0.0362	0.0011	0.0351	2.6998
	Returns of Losers	**Returns of Winners**		
	0.0011	0.0362	-0.0351	-2.6998
2011-2016	**Returns Low P/E**	**Returns High P/E**	**Difference**	**t-statistics**
	0.0167	0.0185	-0.0019	-0.1503

	Returns Low M/B	**Returns High M/B**		
	0.0191	0.0161	0.0029	0.2330
	Returns of Winners	**Returns of Losers**		
	0.0331	0.0021	0.0310	2.4314
	Returns of Losers	**Returns of Winners**		
	0.0021	0.0331	-0.0310	-2.4314

Results clearly indicate that average returns of low P/E and high P/E portfolios are not significantly different for 5 years' investment period starting from 2002 to 2016. Similarly, average returns of low M/B and high M/B portfolios are also not significantly different. The average returns of winner and loser portfolios are significantly different for 5 years' investment period starting from 2002 to 2016. It is worth mentioning that for 5 year holding period after the formation of portfolios, among all the four returns-based trading strategies i.e. P/E, M/B, momentum and contrarian, only momentum based strategy is able to earn significant abnormal returns in the Pakistani market.

After comparing returns on 1 year and 5 years holding periods, the returns of different portfolios based on P/E, M/B, momentum and contrarian strategies are now compared on 10 years holding period. Table 4.3.5 reports the average risk and returns of P/E, M/B, momentum and contrarian strategies based portfolios for the period 6/2002 to 6/2016 using 10 years' investment period holding window.

Table 4.3.5 *Average Risk and Returns (10 years holding period)*

P/E, M/B, Momentum and Contrarian based Portfolios

	Returns Low P/E	**Returns High P/E**	**S.D Low P/E**	**S.D High P/E**	**Returns Low M/B**	**Returns High M/B**	**S.D Low M/B**	**S.D High M/B**	**Returns Winners**	**Returns Losers**	**S.D Winners**	**S.D Losers**
2002-2012	0.0062	0.0004	0.0711	0.0585	0.0062	0.0004	0.0694	0.0610	0.0211	-0.0145	0.0747	0.0709
2003-2013	0.0062	0.0001	0.0719	0.0573	0.0065	-0.0002	0.0703	0.0600	0.0207	-0.0143	0.0736	0.0713
2004-2014	0.0054	0.0010	0.0748	0.0598	0.0062	0.0002	0.0734	0.0624	0.0210	-0.0146	0.0730	0.0756
2005-2015	0.0050	0.0023	0.0751	0.0601	0.0059	0.0014	0.0731	0.0635	0.0213	-0.0140	0.0740	0.0748
2006-2016	0.0048	0.0025	0.0746	0.0593	0.0062	0.0011	0.0736	0.0617	0.0205	-0.0133	0.0745	0.0733
2002-2016	0.0055	0.0013	0.0735	0.0590	0.0062	0.0006	0.0720	0.0617	0.0209	-0.0141	0.0739	0.0732

Results clearly indicate that portfolio with low P/E stocks outperforms portfolio with high P/E stocks. It is consistent with the theory because risk of low P/E portfolio is higher than high P/E portfolio. Figure 4.3.7 graphically represents the average returns of low P/E and high P/E portfolios.

Figure 4.3.7 Average Returns of Low and High P/E Portfolios (10 years holding period)

Table 4.3.5 also reports that portfolio with low M/B stocks earn more than portfolio with high M/B stocks. It is consistent with the theory because risk of low M/B portfolio is higher than high M/B portfolio. Figure 4.3.8 graphically represents the average returns of low M/B and high M/B portfolios.

Figure 4.3.8 Average Returns of Low and High M/B Portfolios (10 years holding period)

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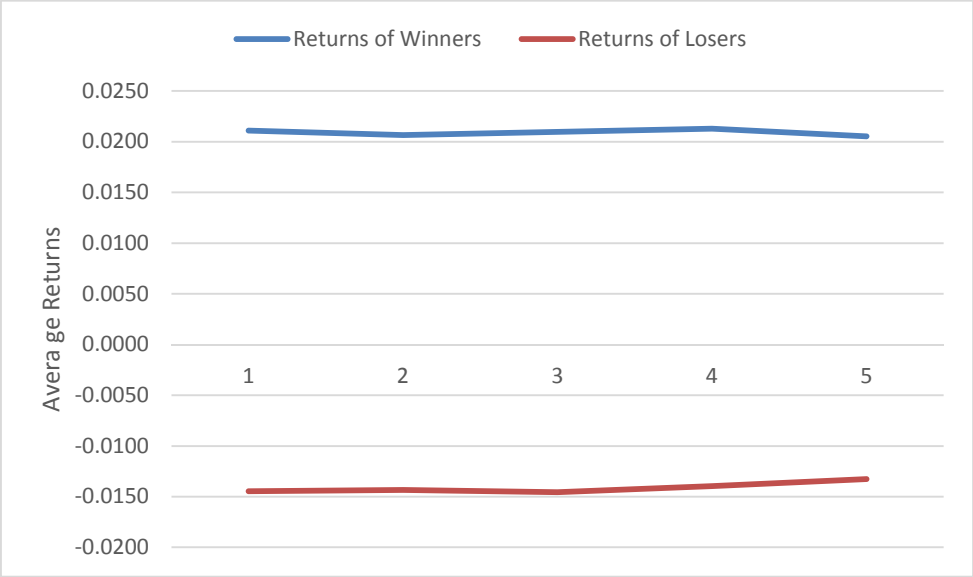
From Table 4.3.5, it is clearly observed that winner portfolio outperforms loser portfolio. It is also consistent with the theory because risk of winner portfolio is on higher side than risk of loser portfolio. With respect to momentum strategy, as winner portfolio is outperforming loser portfolio, so the arbitrage portfolio based on momentum strategy earns positive abnormal return while it is again opposite in case of contrarian strategy in which arbitrage portfolio earns negative return. Figure 4.3.9 graphically represents the average returns of winner and loser portfolios.

Figure 4.3.9 Average Returns of Winner and Loser Portfolios (10 years holding period)



Statistical differences between the average returns of low P/E and high P/E portfolio, low M/B and high M/B portfolio, winner and loser portfolios using 10 years' time-period holding window are tested by two-sample t-test at level of significance $\alpha = 0.05$ and results are reported in Table 4.3.6

Table 4.3.6 Statistical Difference between Average Returns (10 years holding period)

P/E, M/B, Momentum and Contrarian based Portfolios

2002-2012	**Returns Low P/E**	**Returns High P/E**	**Difference**	**t-statistics**
	0.0062	0.0004	0.0058	0.6919
	Returns Low M/B	**Returns High M/B**		
	0.0062	0.0004	0.0058	0.6821

	Returns of Winners	**Returns of Losers**		
	0.0211	-0.0145	0.0356	3.7819
	Returns of Losers	**Returns of Winners**		
	-0.0145	0.0211	-0.0356	-3.7819
2003-2013	**Returns Low P/E**	**Returns High P/E**	**Difference**	**t-statistics**
	0.0062	0.0001	0.0061	0.7302
	Returns Low M/B	**Returns High M/B**		
	0.0065	-0.0002	0.0067	0.7894
	Returns of Winners	**Returns of Losers**		
	0.0207	-0.0143	0.0350	3.7416
	Returns of Losers	**Returns of Winners**		
	-0.0143	0.0207	-0.0350	-3.7416
2004-2014	**Returns Low P/E**	**Returns High P/E**	**Difference**	**t-statistics**
	0.0054	0.0010	0.0045	0.5088
	Returns Low M/B	**Returns High M/B**		
	0.0062	0.0002	0.0059	0.6753
	Returns of Winners	**Returns of Losers**		
	0.0210	-0.0146	0.0355	3.7068
	Returns of Losers	**Returns of Winners**		
	-0.0146	0.0210	-0.0355	-3.7068
2005-2015	**Returns Low P/E**	**Returns High P/E**	**Difference**	**t-statistics**
	0.0050	0.0023	0.0026	0.3016
	Returns Low M/B	**Returns High M/B**		
	0.0059	0.0014	0.0045	0.5130
	Returns of Winners	**Returns of Losers**		
	0.0213	-0.0140	0.0352	3.6708

	Returns of Losers	**Returns of Winners**		
	-0.0140	0.0213	-0.0352	-3.6708
2006-2016	**Returns Low P/E**	**Returns High P/E**	**Difference**	**t-statistics**
	0.0048	0.0025	0.0023	0.2606
	Returns Low M/B	**Returns High M/B**		
	0.0062	0.0011	0.0051	0.5791
	Returns of Winners	**Returns of Losers**		
	0.0205	-0.0133	0.0338	3.5442
	Returns of Losers	**Returns of Winners**		
	-0.0133	0.0205	-0.0338	-3.5442

Results clearly indicate that average returns of low P/E and high P/E portfolios are not significantly different for 10 years' investment period starting from 2002 to 2016. Similarly, average returns of low M/B and high M/B portfolios are also not significantly different. The average returns of winner and loser portfolios are significantly different for 10 years' investment period. It is worth mentioning that for 10 years holding period after the formation of portfolios, among all the four returns-based trading strategies i.e P/E, M/B, momentum and contrarian, only momentum based strategy is able to earn significant abnormal returns in the Pakistani market.

4.4 Comparison of Sharpe Ratios of Stylized Portfolios

In this section Sharpe Ratios of arbitrage portfolios are reported to find excess return ($R_p - R_f$) per unit of risk each strategy is able to earn. As it is clearly identified from Table 4.3.2 that arbitrage portfolios based on P/E, M/B, momentum and contrarian strategies do not earn significant abnormal returns for 1 year investment period window. Table 4.4.1 reports the Sharpe Ratios of all strategies for 1 year holding period.

Results indicate that only momentum arbitrage portfolio is able to earn average excess return of 44.60% in a month. But this excess return is insignificant as reported in Table 4.3.2. P/E, M/B and contrarian based arbitrage portfolios are un-able to earn average excess returns and incurred

average excess losses of 11.43%, 10.87% and 69.15% in a month respectively. These excess losses are also insignificant as reported in Table 4.3.2.

Table 4.4.1 Sharpe Ratios of P/E, M/B, Momentum and Contrarian based Portfolios

(1 year holding period)

	P/E based Arbitrage Port.	**M/B based Arbitrage Port.**	**Momentum Arbitrage Port.**	**Contrarian Arbitrage Port.**
2002-2003	-0.1644	-0.0787	0.6694	-0.8362
2003-2004	0.3702	0.1733	0.3891	-0.4355
2004-2005	0.1169	0.0380	0.6264	-0.7692
2005-2006	0.0193	-0.5648	0.4793	-0.8070
2006-2007	-0.3652	-0.4648	0.4128	-0.6925
2007-2008	-0.0648	-0.0451	0.3617	-0.6295
2008-2009	-0.3982	-0.3502	0.1446	-0.2689
2009-2010	0.0586	0.1874	0.7168	-1.0589
2010-2011	0.1134	0.1797	0.3930	-0.7632
2011-2012	-0.5672	0.1695	0.4589	-0.7712
2012-2013	-0.0702	0.0363	0.3656	-0.6373
2013-2014	-0.0701	-0.1199	0.4758	-0.7347
2014-2015	-0.5352	-0.4851	0.5695	-0.8819
2015-2016	-0.0434	-0.1969	0.1805	-0.3941
2002-2016	-0.1143	-0.1087	0.4460	-0.6915

From Table 4.3.4 it is identified that arbitrage portfolios based on P/E, M/B and contrarian strategies do not earn significant abnormal returns for 5 years investment period window. Only momentum based arbitrage portfolio earns significant abnormal returns. Table 4.4.2 reports the Sharpe Ratios of all strategies for 5 years holding period.

Table 4.4.2 Sharpe Ratios of P/E, M/B, Momentum and Contrarian based Portfolios

(5 years holding period)

	P/E based Arbitrage Port.	**M/B based Arbitrage Port.**	**Momentum Arbitrage Port.**	**Contrarian Arbitrage Port.**
2002-2007	0.0608	-0.1486	0.5083	-0.6874
2003-2008	0.0686	-0.1390	0.4523	-0.6535
2004-2009	-0.1435	-0.2640	0.2837	-0.4557
2005-2010	-0.1134	-0.1721	0.3021	-0.5010
2006-2011	-0.0811	-0.0523	0.3017	-0.5141
2007-2012	-0.1294	0.0179	0.3145	-0.5355
2008-2013	-0.1231	0.0309	0.3143	-0.5354
2009-2014	-0.0764	0.0726	0.4940	-0.8131
2010-2015	-0.1685	-0.0314	0.4598	-0.7731
2011-2016	-0.2039	-0.0985	0.4176	-0.6961
2002-2016	-0.0910	-0.0784	0.3848	-0.6165

Results indicate that only momentum arbitrage portfolio is able to earn average excess return of 38.48% in a month. This excess return is significant as reported in Table 4.3.4. P/E, M/B and contrarian based arbitrage portfolios are un-able to earn average excess returns and incurred average excess losses of 9.10%, 7.84% and 61.65% in a month respectively. These excess losses are insignificant as reported in Table 4.3.4.

From Table 4.3.6 it is identified that arbitrage portfolios based on P/E, M/B and contrarian strategies do not earn significant abnormal returns for 10 years investment period window. Only momentum based arbitrage portfolio earns significant abnormal returns. Table 4.4.3 reports the Sharpe Ratios of all strategies for 10 years holding period.

Table 4.4.3 Sharpe Ratios of P/E, M/B, Momentum and Contrarian based Portfolios

(10 years holding period)

	P/E based Arbitrage Port.	**M/B based Arbitrage Port.**	**Momentum Arbitrage Port.**	**Contrarian Arbitrage Port.**
2002-2012	-0.0459	-0.0454	0.3761	-0.5758
2003-2013	-0.0440	-0.0289	0.3589	-0.5675
2004-2014	-0.0951	-0.0568	0.3643	-0.5931
2005-2015	-0.1440	-0.0946	0.3574	-0.5968
2006-2016	-0.1479	-0.0768	0.3381	-0.5704
2002-2016	-0.0954	-0.0605	0.3590	-0.5807

Results indicate that only momentum arbitrage portfolio is able to earn average excess return of 35.90% in a month. This excess return is significant as reported in Table 4.3.6. P/E, M/B and contrarian based arbitrage portfolios are un-able to earn average excess returns and incurred average excess losses of 9.54%, 6.05% and 58.07% in a month respectively. These excess losses are insignificant as reported in Table 4.3.6.

From Table 4.4.2 and Table 4.4.3 it is clearly identified that only momentum based arbitrage portfolios are able to earn significant average excess returns for 5 and 10 years investment periods. This excess return falls from 38.48% to 35.90% when moving from 5 to 10 years investment periods respectively.

4.5 Impact of Value, Momentum and Contrarian Premiums on Equity Returns

Cross-sectional multiple regression is applied to examine the role of P/E, M/B, momentum and contrarian premiums in explaining portfolio returns. Table 4.5.1 reports the results of multiple regression analysis with size-sorted portfolio's returns as dependent variable while P/E and momentum premiums as independent variables.

Table 4.5.1 *Impact of P/E and Momentum Premiums on Equity Returns*

	Intercept	MKTP	PERP	MOMP	Adj. R^2	F-statistics	F-sig.
S1	-0.0045	0.7483	-0.0001	-0.0870	0.5108	59.1146	0.0000
t-statistics	-1.1466	13.3213	-0.0006	-1.3416			
p-value	0.2532	0.0000	0.9995	0.1816			
S2	-0.0019	0.9029	-0.1209	0.0449	0.6865	122.8847	0.0000
t-statistics	-0.4709	18.3895	-1.1909	0.8301			
p-value	0.6383	0.0000	0.2354	0.4077			
S3	0.0028	1.0117	0.0123	0.0702	0.6159	90.2574	0.0000
t-statistics	0.5468	14.4726	0.0985	0.7399			
p-value	0.5853	0.0000	0.9217	0.4604			
S4	0.0063	0.8562	0.2989	-0.0543	0.4703	50.4156	0.0000
t-statistics	1.1419	9.3478	1.9125	-0.5390			
p-value	0.2552	0.0000	0.0576	0.5906			
S5	0.0068	0.6662	-0.0464	-0.1732	0.2460	19.1658	0.0000
t-statistics	0.8716	7.4279	-0.2827	-0.8380			
p-value	0.3847	0.0000	0.7778	0.4033			
S6	0.0087	0.7486	-0.1454	-0.0823	0.4003	38.1619	0.0000
t-statistics	1.5015	9.2812	-1.1086	-0.8260			
p-value	0.1352	0.0000	0.2692	0.4100			
S7	0.0015	0.6049	0.2980	-0.0286	0.3099	25.9981	0.0000
t-statistics	0.2297	4.6618	2.0322	-0.2088			
p-value	0.8186	0.0000	0.0437	0.8349			
S8	0.0042	0.5476	0.1085	-0.1989	0.2050	15.3565	0.0000
t-statistics	0.6449	4.9756	0.6249	-1.7963			
p-value	0.5199	0.0000	0.5329	0.0743			
S9	-0.0134	0.7328	0.1185	0.0260	0.3257	27.8933	0.0000
t-statistics	-1.8879	6.5231	0.8694	0.1986			
p-value	0.0608	0.0000	0.3859	0.8429			
S10	0.0096	0.7693	0.5092	-0.2257	0.4204	41.3723	0.0000
t-statistics	1.4639	7.6395	2.8409	-2.3251			
p-value	0.1451	0.0000	0.0051	0.0213			

S11	0.0076	0.5424	0.6860	-0.3144	0.2230	16.9802	0.0000
t-statistics	0.9539	4.8103	2.9919	-1.7722			
p-value	0.3415	0.0000	0.0032	0.0782			
S12	-0.0021	0.8788	-0.0164	0.0886	0.3985	37.8743	0.0000
t-statistics	-0.2854	10.5702	-0.0947	0.9450			
p-value	0.7757	0.0000	0.9247	0.3461			
S13	0.0129	0.4015	0.3535	-0.3683	0.1869	13.7942	0.0000
t-statistics	2.0099	5.2079	2.0049	-2.7910			
p-value	0.0461	0.0000	0.0466	0.0059			
S14	0.0178	0.4043	0.3848	-0.3327	0.1554	11.2457	0.0000
t-statistics	2.4167	3.8814	1.9633	-1.6726			
p-value	0.0168	0.0002	0.0513	0.0963			
S15	0.0109	0.5013	0.4325	-0.1922	0.2075	15.5757	0.0000
t-statistics	1.4635	4.3606	2.4024	-1.7794			
p-value	0.1452	0.0000	0.0174	0.0770			
S16	0.0035	0.5081	0.5749	-0.0596	0.2497	19.5289	0.0000
t-statistics	0.4836	5.6017	3.6813	-0.3555			
p-value	0.6293	0.0000	0.0003	0.7227			
S17	-0.0010	0.3745	0.5298	0.0425	0.2002	14.9352	0.0000
t-statistics	-0.1474	3.4201	3.9799	0.4393			
p-value	0.8830	0.0008	0.0001	0.6610			
S18	0.0060	0.3151	0.5669	-0.1694	0.1243	8.9007	0.0000
t-statistics	0.8422	3.7538	3.0269	-1.1382			
p-value	0.4009	0.0002	0.0029	0.2567			
S19	0.0076	0.4747	0.6744	-0.1631	0.2567	20.2295	0.0000
t-statistics	1.0533	6.2529	4.2028	-1.3038			
p-value	0.2937	0.0000	0.0000	0.1941			
S20	0.0020	0.4029	0.9330	-0.1792	0.2198	16.6820	0.0000
t-statistics	0.2667	4.4470	3.8379	-1.0792			
p-value	0.7901	0.0000	0.0002	0.2821			
S21	0.0145	0.5353	0.4106	-0.0369	0.1559	11.2815	0.0000
t-statistics	1.6827	5.7613	1.9845	-0.1646			
p-value	0.0943	0.0000	0.0489	0.8695			

S22	-0.0113	0.7124	0.7622	-0.0503	0.3177	26.9174	0.0000
t-statistics	-1.4389	6.0398	3.8200	-0.3066			
p-value	0.1521	0.0000	0.0002	0.7595			
S23	-0.0014	0.3489	1.2773	-0.1459	0.2501	19.5697	0.0000
t-statistics	-0.1743	3.4086	5.8492	-1.1408			
p-value	0.8618	0.0008	0.0000	0.2556			
S24	-0.0006	0.4288	1.4053	-0.1841	0.2461	19.1679	0.0000
t-statistics	-0.0565	3.7509	5.3578	-1.1719			
p-value	0.9550	0.0002	0.0000	0.2429			
S25	0.0159	0.8192	1.4886	-0.4319	0.2626	20.8247	0.0000
t-statistics	1.2302	4.2433	4.7523	-2.1056			
p-value	0.2204	0.0000	0.0000	0.0368			

Results indicate that in this model among all the premiums, market premium is the one which has significant positive relationship with all 25 portfolio's returns. Among all twenty five portfolios, P/E premium has significant positive relationship with only fifteen portfolio's returns. Momentum premium has significant negative relationship with only three portfolio's returns. The adjusted R^2 of the model lies in the range of 12.43% to 68.65%. It is worth mentioning that both the variables P/E and momentum premiums used in this model are unable to predict all the portfolio's returns significantly as the market premium variable does.

Table 4.5.2 reports the results of multiple regression analysis with size-sorted portfolio's returns as dependent variable while M/B and momentum premiums as independent variables.

Table 4.5.2 Impact of M/B and Momentum Premiums on Equity Returns

	Intercept	**MKTP**	**MBRP**	**MOMP**	**Adj. R^2**	**F-statistics**	**F-sig.**
S1	-0.0035	0.7490	-0.1512	-0.1016	0.5179	60.7961	0.0000
t-statistics	-0.8938	13.3989	-1.4309	-1.5236			
p-value	0.3727	0.0000	0.1544	0.1295			
S2	-0.0009	0.8960	-0.2416	0.0319	0.6984	129.9139	0.0000
t-statistics	-0.2278	19.6825	-2.6973	0.6398			
p-value	0.8201	0.0000	0.0077	0.5232			

S3	0.0038	1.0132	-0.1192	0.0576	0.6185	91.2536	0.0000
t-statistics	0.7255	14.2977	-1.0645	0.6013			
p-value	0.4692	0.0000	0.2887	0.5485			
S4	0.0075	0.8758	0.0936	-0.0709	0.4557	47.6012	0.0000
t-statistics	1.3410	9.2945	0.7974	-0.6455			
p-value	0.1818	0.0000	0.4264	0.5195			
S5	0.0052	0.6621	0.1843	-0.1513	0.2526	19.8113	0.0000
t-statistics	0.7253	7.3307	0.8707	-0.8374			
p-value	0.4693	0.0000	0.3852	0.4036			
S6	0.0096	0.7402	-0.2630	-0.0952	0.4127	40.1189	0.0000
t-statistics	1.6791	9.9187	-2.1750	-0.9424			
p-value	0.0950	0.0000	0.0311	0.3474			
S7	0.0040	0.6254	-0.0849	-0.0625	0.2910	23.8473	0.0000
t-statistics	0.6124	4.7020	-0.6062	-0.4320			
p-value	0.5411	0.0000	0.5452	0.6663			
S8	0.0054	0.5553	-0.0630	-0.2144	0.2034	15.2122	0.0000
t-statistics	0.8211	5.0283	-0.3978	-1.8833			
p-value	0.4128	0.0000	0.6913	0.0614			
S9	-0.0112	0.7417	-0.1899	-0.0026	0.3302	28.4464	0.0000
t-statistics	-1.6442	6.5409	-1.4403	-0.0195			
p-value	0.1020	0.0000	0.1517	0.9845			
S10	0.0112	0.8023	0.2222	-0.2480	0.3819	35.3996	0.0000
t-statistics	1.6228	7.5015	1.3920	-2.2109			
p-value	0.1066	0.0000	0.1658	0.0284			
S11	0.0081	0.5858	0.5198	-0.3232	0.1983	14.7715	0.0000
t-statistics	1.0297	5.1995	2.3670	-2.1444			
p-value	0.3047	0.0000	0.0191	0.0335			
S12	-0.0016	0.8781	-0.0849	0.0818	0.3996	38.0451	0.0000
t-statistics	-0.2184	10.5974	-0.5508	0.8512			
p-value	0.8274	0.0000	0.5825	0.3959			
S13	0.0119	0.4229	0.4415	-0.3560	0.2067	15.5047	0.0000
t-statistics	1.9614	5.6267	2.7694	-3.2806			
p-value	0.0515	0.0000	0.0063	0.0013			

S14	0.0156	0.4268	0.6351	-0.3043	0.2119	15.9678	0.0000
t-statistics	2.3278	4.3652	3.0778	-1.9130			
p-value	0.0211	0.0000	0.0024	0.0575			
S15	0.0108	0.5283	0.3949	-0.1912	0.2043	15.2934	0.0000
t-statistics	1.4300	4.4543	2.5571	-1.7557			
p-value	0.1546	0.0000	0.0115	0.0810			
S16	0.0015	0.5427	0.7732	-0.0342	0.3168	26.8156	0.0000
t-statistics	0.2351	6.3010	4.7722	-0.2743			
p-value	0.8144	0.0000	0.0000	0.7842			
S17	-0.0011	0.4077	0.4738	0.0428	0.1916	14.1968	0.0000
t-statistics	-0.1525	3.5843	3.9465	0.4568			
p-value	0.8790	0.0004	0.0001	0.6484			
S18	0.0046	0.3497	0.6815	-0.1522	0.1598	11.5849	0.0000
t-statistics	0.6681	4.1804	3.7695	-1.1535			
p-value	0.5050	0.0000	0.0002	0.2504			
S19	0.0074	0.5169	0.6102	-0.1621	0.2473	19.2931	0.0000
t-statistics	1.0734	6.5547	3.8686	-1.5068			
p-value	0.2847	0.0000	0.0002	0.1338			
S20	0.0003	0.4601	1.0574	-0.1571	0.2728	21.8775	0.0000
t-statistics	0.0413	4.7664	4.7426	-1.3405			
p-value	0.9671	0.0000	0.0000	0.1819			
S21	0.0100	0.5578	0.9808	0.0228	0.2828	22.9448	0.0000
t-statistics	1.3655	6.1084	4.6079	0.1352			
p-value	0.1740	0.0000	0.0000	0.8926			
S22	-0.0133	0.7588	0.9365	-0.0252	0.3691	33.5621	0.0000
t-statistics	-1.7895	7.5483	4.9551	-0.1934			
p-value	0.0754	0.0000	0.0000	0.8469			
S23	-0.0008	0.4294	1.0331	-0.1558	0.1963	14.5927	0.0000
t-statistics	-0.0962	3.9025	5.6887	-1.3171			
p-value	0.9235	0.0001	0.0000	0.1896			

S24	-0.0020	0.5159	1.4260	-0.1670	0.2696	21.5442	0.0000
t-statistics	-0.1896	4.0542	5.7169	-1.1487			
p-value	0.8498	0.0001	0.0000	0.2523			
S25	0.0160	0.9126	1.2858	-0.4355	0.2409	18.6657	0.0000
t-statistics	1.1963	4.1876	3.8903	-1.8114			
p-value	0.2333	0.0000	0.0001	0.0719			

Results clearly indicate that in this model among all the premiums, market premium is again the one which has significant positive relationship with all 25 portfolio's returns. Among all twenty five portfolios, M/B premium has significant positive relationship with only fourteen portfolio's returns and significant negative relationship with only two portfolio's returns. Momentum premium has significant negative relationship with only three portfolio's returns. The adjusted R^2 of the model lies in the range of 15.98% to 69.84% which is higher than the adjusted R^2 reported in Table 4.5.1. It means that M/B premium can better explain the cross-sectional variations of the portfolios' returns than P/E premium and is more suitable to capture the value effect in Pakistani market. But it is worth mentioning that both the variables M/B and momentum premiums used in this model are unable to predict all the portfolio's returns significantly as the market premium variable does.

Table 4.5.3 reports the results of multiple regression analysis with size-sorted portfolio's returns as dependent variable while P/E and contrarian premiums as independent variables.

Table 4.5.3 Impact of P/E and Contrarian Premiums on Equity Returns

	Intercept	**MKTP**	**PERP**	**CONP**	**Adj. R^2**	**F-statistics**	**F-sig.**
S1	-0.0045	0.7483	-0.0001	0.0870	0.5108	59.1146	0.0000
t-statistics	-1.1466	13.3213	-0.0006	1.3416			
p-value	0.2532	0.0000	0.9995	0.1816			
S2	-0.0019	0.9029	-0.1209	-0.0449	0.6865	122.8847	0.0000
t-statistics	-0.4709	18.3895	-1.1909	-0.8301			
p-value	0.6383	0.0000	0.2354	0.4077			
S3	0.0028	1.0117	0.0123	-0.0702	0.6159	90.2574	0.0000
t-statistics	0.5468	14.4726	0.0985	-0.7399			
p-value	0.5853	0.0000	0.9217	0.4604			

S4	0.0063	0.8562	0.2989	0.0543	0.4703	50.4156	0.0000
t-statistics	1.1419	9.3478	1.9125	0.5390			
p-value	0.2552	0.0000	0.0576	0.5906			
S5	0.0068	0.6662	-0.0464	0.1732	0.2460	19.1658	0.0000
t-statistics	0.8716	7.4279	-0.2827	0.8380			
p-value	0.3847	0.0000	0.7778	0.4033			
S6	0.0087	0.7486	-0.1454	0.0823	0.4003	38.1619	0.0000
t-statistics	1.5015	9.2812	-1.1086	0.8260			
p-value	0.1352	0.0000	0.2692	0.4100			
S7	0.0015	0.6049	0.2980	0.0286	0.3099	25.9981	0.0000
t-statistics	0.2297	4.6618	2.0322	0.2088			
p-value	0.8186	0.0000	0.0437	0.8349			
S8	0.0042	0.5476	0.1085	0.1989	0.2050	15.3565	0.0000
t-statistics	0.6449	4.9756	0.6249	1.7963			
p-value	0.5199	0.0000	0.5329	0.0743			
S9	-0.0134	0.7328	0.1185	-0.0260	0.3257	27.8933	0.0000
t-statistics	-1.8879	6.5231	0.8694	-0.1986			
p-value	0.0608	0.0000	0.3859	0.8429			
S10	0.0096	0.7693	0.5092	0.2257	0.4204	41.3723	0.0000
t-statistics	1.4639	7.6395	2.8409	2.3251			
p-value	0.1451	0.0000	0.0051	0.0213			
S11	0.0076	0.5424	0.6860	0.3144	0.2230	16.9802	0.0000
t-statistics	0.9539	4.8103	2.9919	1.7722			
p-value	0.3415	0.0000	0.0032	0.0782			
S12	-0.0021	0.8788	-0.0164	-0.0886	0.3985	37.8743	0.0000
t-statistics	-0.2854	10.5702	-0.0947	-0.9450			
p-value	0.7757	0.0000	0.9247	0.3461			
S13	0.0129	0.4015	0.3535	0.3683	0.1869	13.7942	0.0000
t-statistics	2.0099	5.2079	2.0049	2.7910			
p-value	0.0461	0.0000	0.0466	0.0059			
S14	0.0178	0.4043	0.3848	0.3327	0.1554	11.2457	0.0000
t-statistics	2.4167	3.8814	1.9633	1.6726			
p-value	0.0168	0.0002	0.0513	0.0963			

S15	0.0109	0.5013	0.4325	0.1922	0.2075	15.5757	0.0000
t-statistics	1.4635	4.3606	2.4024	1.7794			
p-value	0.1452	0.0000	0.0174	0.0770			
S16	0.0035	0.5081	0.5749	0.0596	0.2497	19.5289	0.0000
t-statistics	0.4836	5.6017	3.6813	0.3555			
p-value	0.6293	0.0000	0.0003	0.7227			
S17	-0.0010	0.3745	0.5298	-0.0425	0.2002	14.9352	0.0000
t-statistics	-0.1474	3.4201	3.9799	-0.4393			
p-value	0.8830	0.0008	0.0001	0.6610			
S18	0.0060	0.3151	0.5669	0.1694	0.1243	8.9007	0.0000
t-statistics	0.8422	3.7538	3.0269	1.1382			
p-value	0.4009	0.0002	0.0029	0.2567			
S19	0.0076	0.4747	0.6744	0.1631	0.2567	20.2295	0.0000
t-statistics	1.0533	6.2529	4.2028	1.3038			
p-value	0.2937	0.0000	0.0000	0.1941			
S20	0.0020	0.4029	0.9330	0.1792	0.2198	16.6820	0.0000
t-statistics	0.2667	4.4470	3.8379	1.0792			
p-value	0.7901	0.0000	0.0002	0.2821			
S21	0.0145	0.5353	0.4106	0.0369	0.1559	11.2815	0.0000
t-statistics	1.6827	5.7613	1.9845	0.1646			
p-value	0.0943	0.0000	0.0489	0.8695			
S22	-0.0113	0.7124	0.7622	0.0503	0.3177	26.9174	0.0000
t-statistics	-1.4389	6.0398	3.8200	0.3066			
p-value	0.1521	0.0000	0.0002	0.7595			
S23	-0.0014	0.3489	1.2773	0.1459	0.2501	19.5697	0.0000
t-statistics	-0.1743	3.4086	5.8492	1.1408			
p-value	0.8618	0.0008	0.0000	0.2556			
S24	-0.0006	0.4288	1.4053	0.1841	0.2461	19.1679	0.0000
t-statistics	-0.0565	3.7509	5.3578	1.1719			
p-value	0.9550	0.0002	0.0000	0.2429			

S25	0.0159	0.8192	1.4886	0.4319	0.2626	20.8247	0.0000
t-statistics	1.2302	4.2433	4.7523	2.1056			
p-value	0.2204	0.0000	0.0000	0.0368			

Results indicate that in this model among all the premiums, market premium is again the one which has significant positive relationship with all 25 portfolio's returns. Among all twenty five portfolios, P/E premium has significant positive relationship with only fifteen portfolio's returns. Contrarian premium has significant positive relationship with only three portfolio's returns. The adjusted R^2 of the model lies in the range of 12.43% to 68.65%. It is worth mentioning that both the variables P/E and contrarian premiums used in this model are unable to predict all the portfolio's returns significantly as the market premium variable does.

Table 4.5.4 reports the results of multiple regression analysis with size-sorted portfolio's returns as dependent variable while M/B and contrarian premiums as independent variables.

Table 4.5.4 Impact of M/B and Contrarian Premiums on Equity Returns

	Intercept	**MKTP**	**MBRP**	**CONP**	**Adj. R^2**	**F-statistics**	**F-sig.**
S1	-0.0035	0.7490	-0.1512	0.1016	0.5179	60.7961	0.0000
t-statistics	-0.8938	13.3989	-1.4309	1.5236			
p-value	0.3727	0.0000	0.1544	0.1295			
S2	-0.0009	0.8960	-0.2416	-0.0319	0.6984	129.9139	0.0000
t-statistics	-0.2278	19.6825	-2.6973	-0.6398			
p-value	0.8201	0.0000	0.0077	0.5232			
S3	0.0038	1.0132	-0.1192	-0.0576	0.6185	91.2536	0.0000
t-statistics	0.7255	14.2977	-1.0645	-0.6013			
p-value	0.4692	0.0000	0.2887	0.5485			
S4	0.0075	0.8758	0.0936	0.0709	0.4557	47.6012	0.0000
t-statistics	1.3410	9.2945	0.7974	0.6455			
p-value	0.1818	0.0000	0.4264	0.5195			
S5	0.0052	0.6621	0.1843	0.1513	0.2526	19.8113	0.0000
t-statistics	0.7253	7.3307	0.8707	0.8374			
p-value	0.4693	0.0000	0.3852	0.4036			

S6	0.0096	0.7402	-0.2630	0.0952	0.4127	40.1189	0.0000
t-statistics	1.6791	9.9187	-2.1750	0.9424			
p-value	0.0950	0.0000	0.0311	0.3474			
S7	0.0040	0.6254	-0.0849	0.0625	0.2910	23.8473	0.0000
t-statistics	0.6124	4.7020	-0.6062	0.4320			
p-value	0.5411	0.0000	0.5452	0.6663			
S8	0.0054	0.5553	-0.0630	0.2144	0.2034	15.2122	0.0000
t-statistics	0.8211	5.0283	-0.3978	1.8833			
p-value	0.4128	0.0000	0.6913	0.0614			
S9	-0.0112	0.7417	-0.1899	0.0026	0.3302	28.4464	0.0000
t-statistics	-1.6442	6.5409	-1.4403	0.0195			
p-value	0.1020	0.0000	0.1517	0.9845			
S10	0.0112	0.8023	0.2222	0.2480	0.3819	35.3996	0.0000
t-statistics	1.6228	7.5015	1.3920	2.2109			
p-value	0.1066	0.0000	0.1658	0.0284			
S11	0.0081	0.5858	0.5198	0.3232	0.1983	14.7715	0.0000
t-statistics	1.0297	5.1995	2.3670	2.1444			
p-value	0.3047	0.0000	0.0191	0.0335			
S12	-0.0016	0.8781	-0.0849	-0.0818	0.3996	38.0451	0.0000
t-statistics	-0.2184	10.5974	-0.5508	-0.8512			
p-value	0.8274	0.0000	0.5825	0.3959			
S13	0.0119	0.4229	0.4415	0.3560	0.2067	15.5047	0.0000
t-statistics	1.9614	5.6267	2.7694	3.2806			
p-value	0.0515	0.0000	0.0063	0.0013			
S14	0.0156	0.4268	0.6351	0.3043	0.2119	15.9678	0.0000
t-statistics	2.3278	4.3652	3.0778	1.9130			
p-value	0.0211	0.0000	0.0024	0.0575			
S15	0.0108	0.5283	0.3949	0.1912	0.2043	15.2934	0.0000
t-statistics	1.4300	4.4543	2.5571	1.7557			
p-value	0.1546	0.0000	0.0115	0.0810			
S16	0.0015	0.5427	0.7732	0.0342	0.3168	26.8156	0.0000
t-statistics	0.2351	6.3010	4.7722	0.2743			
p-value	0.8144	0.0000	0.0000	0.7842			

S17	-0.0011	0.4077	0.4738	-0.0428	0.1916	14.1968	0.0000
t-statistics	-0.1525	3.5843	3.9465	-0.4568			
p-value	0.8790	0.0004	0.0001	0.6484			
S18	0.0046	0.3497	0.6815	0.1522	0.1598	11.5849	0.0000
t-statistics	0.6681	4.1804	3.7695	1.1535			
p-value	0.5050	0.0000	0.0002	0.2504			
S19	0.0074	0.5169	0.6102	0.1621	0.2473	19.2931	0.0000
t-statistics	1.0734	6.5547	3.8686	1.5068			
p-value	0.2847	0.0000	0.0002	0.1338			
S20	0.0003	0.4601	1.0574	0.1571	0.2728	21.8775	0.0000
t-statistics	0.0413	4.7664	4.7426	1.3405			
p-value	0.9671	0.0000	0.0000	0.1819			
S21	0.0100	0.5578	0.9808	-0.0228	0.2828	22.9448	0.0000
t-statistics	1.3655	6.1084	4.6079	-0.1352			
p-value	0.1740	0.0000	0.0000	0.8926			
S22	-0.0133	0.7588	0.9365	0.0252	0.3691	33.5621	0.0000
t-statistics	-1.7895	7.5483	4.9551	0.1934			
p-value	0.0754	0.0000	0.0000	0.8469			
S23	-0.0008	0.4294	1.0331	0.1558	0.1963	14.5927	0.0000
t-statistics	-0.0962	3.9025	5.6887	1.3171			
p-value	0.9235	0.0001	0.0000	0.1896			
S24	-0.0020	0.5159	1.4260	0.1670	0.2696	21.5442	0.0000
t-statistics	-0.1896	4.0542	5.7169	1.1487			
p-value	0.8498	0.0001	0.0000	0.2523			
S25	0.0160	0.9126	1.2858	0.4355	0.2409	18.6657	0.0000
t-statistics	1.1963	4.1876	3.8903	1.8114			
p-value	0.2333	0.0000	0.0001	0.0719			

Results clearly indicate that in this model among all the premiums, market premium is again the one which has significant positive relationship with all 25 portfolio's returns. Among all twenty five portfolios, M/B premium has significant positive relationship with only fourteen portfolio's returns and significant negative relationship with only two portfolio's returns. Contrarian premium

has significant positive relationship with only three portfolio's returns. The adjusted R^2 of the model lies in the range of 15.98% to 69.84% which is higher than the adjusted R^2 reported in Table 4.5.3. It means that M/B premium once again can better explain the cross-sectional variations of the portfolios' returns than P/E premium and is more suitable to capture the value effect in Pakistani market. But it is worth mentioning that both the variables M/B and contrarian premiums used in this model are unable to predict all the portfolio's returns significantly as the market premium variable does.

Chapter 05

Conclusion and Policy Recommendations

5.1 Conclusion

According to Efficient Market Hypothesis (Fama, 1970), only risk-adjusted returns can be earned by the investors. It means higher returns can only be booked by taking higher risk levels (investment in more risky stocks) and no other way exist to earn abnormal returns. After 1970's Efficient Market Theory, different anomalies have been identified that contradict with the EMH and by adopting strategies based on these anomalies, one can book abnormal returns.

After the discussion of anomalies starts, a series of anomalies are identified namely P/E anomaly in 1977, M/B anomaly in 1980, momentum anomaly in 1993 and contrarian anomaly in 1985. Trading strategies based on these anomalies tend to make profit from the arbitrage opportunities existed in the market. Premiums of these strategies are also tested for the explanation of cross-sectional variations in the equity returns by Fama and French (1992-93) and Carhart (1997). A sample of 100 non-financial companies listed on PSX for the period of 2002 to 2016 is used to examine different trading strategies based on anomalies which includes value, momentum and contrarian strategies. Average returns of arbitrage portfolios based on these strategies are found. The statistical differences between the average returns of all the strategies are tested by two-sample t-tests. It is found that the arbitrage portfolios based on P/E, M/B, momentum and contrarian strategies do not earn significant abnormal returns for the 1 year holding period after the formation of portfolios. While for 5 and 10 years holding periods, only momentum strategy is able to earn significant abnormal returns. This confirms the presence of momentum effect in the Pakistani market which is consistent with the studies conducted in Pakistan by Habib and Mohsin (2012), Shah (2015), Tauseef (2016).

Cross-sectional Multiple Regression is applied to find the relationship between premiums of all strategies used in the study and the returns of size-sorted portfolios. It is found that among all the variables (premiums), no one has significant relationship with all the portfolio returns. This confirms that it is not possible to predict the equity returns by using these variables in the Pakistani market.

5.2 Policy Recommendations

1. Investors should not devise investment strategies on the basis of value effect including P/E and M/B ratios of stocks. Contrarian strategy is also not recommended for the investment purposes in the Pakistani market.

2. Investors can earn abnormal returns by using momentum strategy as returns of winner stocks are significantly higher than the returns of loser stocks.

3. Momentum investment strategies that are diversified across the countries especially including emerging markets help the investors to earn diversified abnormal returns as reported by Naranjo (2007). As Pakistan is an emerging market, so the local as well as foreign investors can be benefited from here.

4. Required return on equity is an important factor for the investors during the investment decisions. It has also a concern with the cost of capital calculations for the companies. Estimation of required return on equity by using all the variables in the study provides insignificant results. Therefore in the absence of significant factors, required return on equity and cost of capital must be calculated by using CAPM or any other risk-factors not used in this study.

5.3 Direction for Future Research

1. Empirical research on these strategies can further be carried out in the Pakistani market by using different portfolio formation and holding period windows.

2. Further studies can use larger sample size to confirm the findings of this study.

3. This study is focused on the emerging market of Pakistan. The same study can be conducted on the other emerging markets of the world to ensure the consistency of the results.

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