"Market Volatility and Momentum: Evidence from Pakistani Stock Exchange"

By

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MASTER OF SCIENCE IN MANAGEMENT SCIENCES

(Finance)

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CERTIFICATE OF APPROVAL

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Dedication

This thesis is dedicated to my parents, brothers Mr. Raja Babar Rafique Khan, Mr. Raja Nasir Rafique Khan and Mr. Raja Ramiz Rafique Khan, sister Shamyla Rafique Khan, niece Eshal Fatima and supervisor Dr. Arshad Hassan.

CERTIFICATE

This is to certify that **Miss Anila Rafique Khan** bearing Registration No. **MMS151062** has incorporated all observations, suggestions and comments made by the external evaluators as well as the internal examiners and thesis supervisor **Dr. Arshad Hassan** at Capital University of Science and Technology, Islamabad. The title of his Thesis is: **"Market Volatility and Momentum: Evidence from Pakistani Stock Exchange".**

Forwarded for necessary action

Dr. Arshad Hassan
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STATEMENT BY CANDIDATE

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.

ANILA RAFIQUE KHAN
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May Allah bless them all.

Anila Rafique Khan

LIST OF ABBREVIATIONS

APT	Arbitrage Pricing Theory
BTM	Book to Market
CAPM	Capital Asset Pricing Model
CRSP	Center for Research in Securities Prices
IMF	International Monetary Fund
KSE	Karachi Stock Exchange
MKT	Market
MOM	Momentum
OLS	Ordinary Least Square
RD_{1-3}	Return Dispersion
VOL	Volatility
YLD	Yield

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ABSTRACT

The purpose of this study is to explore the relationship between market volatility and momentum profitability by using sample of eighty companies listed at Karachi Stock Exchange for the period 2003 to 2015. The companies are selected randomly. Time series regression based on OLS estimation technique is used to examine the role of market state, volatility and business cycle in estimating the market returns portfolio. This study indicates that market state volatility has significant power to predict momentum payoffs, especially in negative market states. Furthermore, the results are context in the existence of market state and business cycle variables. Market premium is significant and negative. Market volatility is also found negatively influencing momentum profits. However, when volatility is divided into volatility in positive market and volatility in negative market both are significantly and negatively influencing momentum profits. Although Vol+ and Vol- both have negative signs, Vol- is dominating in conditions of the magnitude of the co-efficient and the t-statistics. Business cycle effect measured by term and yield is not found significant. However, non-linearity has not been observed regarding term. Results are found robust for market adjusted momentum payoff.

The study also explores the impact of market state, volatility and business cycles on return of loser and winner portfolio. This study report that returns of the loser portfolios are explained by market components whereas volatility is found to be insignificant. The macroeconomic variables TERM, $TERM^2$ and Yield explain signs of statistical significance at 90% level of significance. Market factor is significantly and positively influencing winner portfolios. Volatility is insignificantly influences the winner returns and same behaviour is observed under positive and negative market state. The results show that volatile market forecast low returns on winner stock. Return dispersion used to measures cross-sectional is also found significant at 90% level of significance. The study recommends that investors should devise investment and momentum strategies on the basis of volatility of stocks and business cycle. The tests of this study demonstrate that volatile down markets predict low momentum payoffs. The time series predictability of momentum is asymmetric, which arises from loser stocks. These results jointly present a significant and raise a tough challenge to existing theories on momentum.

Keywords: Market volatility, Momentum, Time-series predictability of momentum

CHAPTER 01

Introduction

Modern asset pricing theory is linked with the seminal work of the Sharpe (1964) that proposes Capital Asset Pricing Model (CAMP) to estimate the association between systematic risk and systematic returns. This specific CAPM has been criticized on different grounds and Roll (1977) declares that the CAPM is not testable as the portfolio of market which comprise of the entire uncertain asset is not observable. Then numbers of anomalies are indentified by various studies. The critique by Ross (1976) in his paper, arbitrage pricing theory (APT), provides that not only a single factor influences the return but there are various K-factors that might affect the returns.

On the basis of APT, numbers of anomalies have been identified in existing literature. Basu (1977) introduces price earnings ratio effect by arguing that high price earning ratio firms have higher expected returns than that of low price earnings ratios firms. . According to Klein and Bawa (1977), higher returns of the small firms may be due to shortage of information concerning small firms and it lead to partial diversification and therefore to higher returns for the 'un-desirable' stocks of small firms. Jagadeesh and Titman (1993) introduces momentum effect by arguing that firms which have higher return in past will maintain higher return into the upcoming time and firms with low returns in the future will continue to earn low returns.

Market volatility is the up and down movement measured by standard deviation from the expectation. When the stock market rise one day and down for the next three and then up again so this up and down movement is called stock market volatility. Therefore, volatility is frequently referred to as a risk indicator as high price fluctuations can signal uncertainty

in the markets and the powers among buyers and sellers are regularly shifting. Momentum is frequently referred to as trend power. In a ranging market, there is no momentum because price moves reverse and forward among two margins. The strongest trend, consequently, has little to no volatility and a lot of momentum. A ranging market frequently has high volatility and low momentum. At the end of trends, we frequently notice volatility picking up when momentum turn down. "Short term volatility is peak at turn-off points and reduces as a trend develops." George Soros (1987).

Momentum strategy believes that stock which have performed good will be doing so also in the future, so it focuses on buying stocks with good historical performance and selling stock which have done worse. Market momentum is the expected market changes which are likely to occur in the near future. It is the change in price as well as volume. Market momentum is the expected strength of the positive or negative change in the market price. How prices change during a specific period of time verses volume during that period remains matter of debate exist. Traders who do not know how to exercise volatility and momentum information in their trading frequently find themselves in trades where risk cannot be controlled or enter the markets on the incorrect nodes. Momentums strategies can help out investors beat the market and keep away from loses.

Wang and Xu (2009) examine the momentum predictability. The study captures idea from the extreme 2008 to 2009 instance, and explore whether volatility of market is related to momentum. The study discovers that volatility of marketplace has significant and powerful predictive influence on momentum earnings particularly in negative market states. Momentum profitability is high for firm that have high information ambiguity or high default risk. The study demonstrates that unstable losing markets predict low momentum payoff. The time series predictability of momentum is not smooth, for loser stocks.

Wang and Xu (2009) investigate market volatility as a forecaster of momentum profits. The analyses show that the prognostic benefit of volatility of market for momentums proceeds is strong and significant. The study consists of two most important results. The first one is that the stock market volatility gives a strong empirical description of the time series predictability of momentum. The study find out that high market volatility predicts low down momentum benefit, so this relation is more robust in downwards marketplaces. The negatively linked, market volatility and market condition harmonize all other in foretelling of momentum payoffs. Momentum earnings are different clearly among positive market states of low down volatility and unstable downwards markets. Secondly, the time-variation in momentum profits has a remarkable characteristic. The study observes asymmetric predictability between loser and winner portfolio.

The result of momentum, formerly discovered by Jegadeesh and Titman (1993), has been widely examined. Results of, Cooper, Gutierrez, and Hameed (2004) and Avramov, Chordia, Jostova, and Philipov (2007) are strongly related to Wang and Xu (2009). Cooper, Gutierrez, and Hameed (2004) focus on time-series predictability. The study concludes that momentum profits rely upon market circumstances. It is deduced as helpful proof for overreaction models. Avramov, Chordia, Jostova, and Philipov (2007) reveal a Cross Sectional association among credit rating and momentum and discover that momentum earnings are extremely significant for low-quality firms, but an absent in high grade firms.

The study of Wang and Xu (2009), have broadens the results of Cooper, Gutierrez, and Hameed (2004) in two significant ways. First, Wang and Xu (2009), explore volatility as a predictor of momentum payoffs. Market volatility put in significant predictive influence in down marketplaces. Jointly, volatility of market and markets state control many other variables and endow with the most vigorous depiction of the time-varying momentum earnings. Secondly, the study report loser-centered predictability. The loser stocks generally

have comparatively high earnings following volatile down market. These recent results present a fascinating defy to a number of theories, both conduct and risk-based, which may have recently been anticipated to describe the momentum effect. Daniel, Hirshleifer, and Subrahmanyam (1998), for instance, imagine many investors are too confident of their confidential selective information and react excessively over it.

Wang and Xu (2015), investigate the predictive benefits on volatility of market intended for profitability of momentum. During 2009, the momentum stratagem performs of weakly making an average payoff of -17%. The momentums strategies furthermore report negatively subsequently after high volatility. These strong symptoms recommend that the volatility of markets might forecast momentums earnings. Wang and Xu (2015) reveal that the volatility has strong influence towards predict momentum payoff. Distinct business cycle along with variables of market state, report significant influence of the market volatility on momentum sorted portfolio. Further, forecasting role of volatility of market continues along with marketplace state and variables of business cycle. Just market state persists to report forecasting force for momentum effectiveness.

Although broad material and literary works on the momentum but results of Jegadeesh and Titman (1993), also study the cross-sectional characters of anomaly. Variations of time in momentum profits have attracted lesser interest. Chordia and Shivakumar (2002), states that momentum differs by business cycle, Cooper, Gutierrez, and Hameed (2004) discover that momentum is present in “UP" marketplace state. Stivers and Sun (2010) state that Cross Sectional gain distribution forecast momentum payoffs. Wang and Xu (2015), provide that volatility of market has prognostic force intended for variation of time into momentum payoffs.

Chordia and Shivakumar (2002) concentrate on the function of business cycle in elucidation momentums. Wang and Xu (2015) focus on the direction of volatility of market used for

profitability of momentum. Their findings are not in line with the studies of Chordia and Shivakumar (2002) and Cooper, Gutierrez, and Hameed (2004) that are supported by the business cycles risk justification and the behavioural theory. Wang and Xu (2015), results are impressing when evaluated with several Cross Sectional findings. The findings of Jiang, Lee, and Zhang (2005) and Zhang (2006) illustrate that payoffs of momentum are superior amongst organizations with high data ambiguity. On the other hand, Wang and Xu (2015) locate that high periods of volatility are followed by small momentum payoff. Though momentums have cross-sectional, but effect analysis demonstrates that time series aspect is essential in favour of designing a momentum convincing theory. Their results indicate contradiction to present work on momentum. The study also report that volatilities to the link to returns forecasting. Past researchers have investigated the time series relationship among volatility of markets and the expected returns of market. Their findings widen this distinctive research line by evaluating the time series association among volatility of market and profitability of momentum.

The study further investigates cross sectional stocks gain dispersal (Stivers and Sun (2010), in forecasting momentum profitability and support Stivers and Sun (2010) study that provide that the Cross Sectional gain distraction and forecast momentum. In several pricing models, the risk is measured by market volatility, and change in market volatility is found to influence the future income on all assets. The role of changes in volatility is helpful in explaining the change in expected profit over time (Harvey and Whaley, 1992).

1.1 Theoretical Background

1.1.1 Market Efficiency Theory

In literature three most important kinds of market efficiency are addressed by the authors. (1) Operational Efficiency which means market works at possible minimum level of cost. (2) Allocative Efficiency which means resources should be used in such a way that they provide maximum benefit. (3) Informational Efficiency which means existing prices completely reflect all available information (Holden, Thompson & Ruangrit, 2001). Fame's work upon informational efficiency and "Efficient Market Hypothesis" is based on the assumption that the prices of securities adjust quickly on the arrival of new information and existing prices completely reflect all available information. Fama states that:

"A market in which prices at any time fully reflect all available information is called efficient market'' (Fama, 1970).

Fama (1970) divide the market efficiency into three sub forms on the basis of security public and private information i.e. weak form efficiency, semi strong form efficiency and strong form efficiency.

Weak form efficiency assume that the current prices of securities reflect the market information only which includes past prices, trade volume and transaction cost. Past prices are useless to predict the future prices because past prices, are already included in existing prices. Prices are "memory less," they are unforecastable, and will only change in reaction to the arrival of latest information. So, the prices of securities on different days are independent from each other which are known as "Random Walk Hypothesis" in finance literature (Dupernex, 2007) which means that stock price changes have the similar division and are self-determining of each other, so the precedent progress or drift of a stock price or

market cannot be utilized to forecast its upcoming movement, and the asset prices rise and fall at random and suddenly.

Semi strong form efficiency states that the current prices of securities reflect the public information. Public information includes market and non-market information such as announcements of dividend, earning announcements, newspapers, press releases, computer databases and political and economic news etc. The level of asset prices should replicate all relevant past, present, and future information that can be attained from public resources. On the other hand, the asset prices have to change completely and immediately in reaction to the entrance of related latest information.

Strong form efficiency proves that the current prices of securities reflect the public and private information. Private information is that which is not available at public level. In strong efficient market no one is superior to access the information and there is no hidden and inside information on the base of which prices of securities are predictable. So, it is not possible for everyone to earn abnormal rate of return (Reilly & Brown, 2005). As creation of volatility create new information in market and market act upon it. So it must follow returns ultimately momentum.

Carhart, (1997) identifies the factor of momentum and link it with returns. The study measures that variable by winner and loser and state that its association exist with return. It provides that winners will always remain winners and loser always remain losers. Momentum is considered as a systematic risk and priced by market. One important issue is that determinants of momentum payoffs have been ignored. Only few studies exist in this regards. This study is an effort to explore the determinants of momentum payoff specifically in the context of volatility and market state.

1.2 Research Questions

There are five main questions that need detail empirical investigation in the context of Pakistani Stock Exchange:

i- Does volatility influence the momentum profit?

ii- How business cycles influence the momentum profits?

iii- Whether the impact of volatility is same across losers and winners?

iv- Whether time varying volatility and cross sectional volatility have same impact on momentum profit?

v- Does behaviour of market volatility varies in Up and Down market?

1.3 Research Objectives

The study is aimed with the following objective:

i- To examine the impact of volatility on momentum profits.

ii- To examine the role of business cycle in explaining momentum profit.

iii- To provide insight about the role of volatility in explaining return of losers and winners portfolios.

iv- To study the impact return dispersion on momentum profits.

v- To explore the difference of behaviour in Up and Down market.

1.4 Significance of the Study

Few studies have been conducted on relationship between market volatility and momentum. But little evidence has been found on time-varying risk effect on momentum profit (Wang et al., 2015). Moreover, momentum studies are conducted in Western countries and evidence from emerging market specifically Pakistan is limited. Pakistani markets have different dynamics. Therefore, it is the need of the time to investigate the same in contextual settings.

Pakistan market is emerging so it is important to examine the impact of volatility on momentum profits. It is one of the pioneering attempts to explore the role of market volatility and momentum in Pakistan stock exchange empirically. The momentum strategies can be implemented by both individual and institutional investors; the strategies in the empirical part are conducted in the way that seems most convenient and feasible to the every investor.

1.5 Plan of the Study

The plan of this study is as follows: First part of the study is comprised of introductory text regarding market volatility, market momentum on Pakistani Stock Exchange. Second part gives insights into the existing literature and its findings. Third part is methodology and data description. Fourth part of the study includes empirical results and discussions. Finally, the fifth part is conclusion and future research directions.

CHAPTER 02

Literature Review

Just similar to various models, this behavioural model creates indirect suggestions that are symmetric among positive and negative information. Facts that market state and market volatility predict momentum income are supporting to the model, if performance of the winners and losers portfolio are symmetrically knowable. A further example is the behavioural theory developed by Hong and Stein (1999). That provides that personal information spreads slowly but surely in the marketplace, which causes under-reaction. Hong, Lim, and Stein (2000) present verification that information spreading is slow pro unfortunate thing. Though, Wang and Xu (2009), result that high volatility in downwards markets forecasts high earnings on loser stocks is consistent among investor overreaction, not under-reaction, towards negative information in terrible period.

The cross-sectional testing of determinants of momentum profits by Avramov, Chordia, Jostova, and Philipov (2007) appears to recommend that payoffs of momentums are high in down markets as default risk is a foremost concern. The time-series analysis of Cooper, Gutierrez, and Hameed (2004) conversely shows that payoffs of momentums are significant in positive market states. The dissimilarity among the Cross Sectional as well as Time series results are puzzles that Avramov, Chordia, Jostova, and Philipov (2007) highlight but Wang and Xu (2009) point to the subsequent justification of this puzzle. On the other hand, investors be anxious about default risk in downwards markets, mainly for loss stocks by low credit ratings. Investors sell the loser stocks to escape high default risk in unstable down marketplaces the following loser change provides grow to negative momentum payoffs. On the other side, investors are too confident in high-quality market settings with disregard to negative phases of loss stocks with mostly credit risk. Sometimes investors over-buy loser stocks in excellent period, making significant momentum earnings. Constant to the opinion

that losers stock are comparatively over bought in fine time, Wang and Xu (2009) discover that the lofty market states predicted small profits, comparative to the market return within the similar time, on loser stocks.

Latest studies have revealed the significance of momentums for assured subsets of stock and shares. Jiang, Lee, and Zhang (2005) and Zhang (2006), comprehend that payoff of momentum be high along with organizations by means of higher information ambiguity. The proxy server information vagueness by organization size, firm age, and specialist predict dispersion, volatility of cash flow, and volatility of stock returns. These cross-sectional conclusions seem to recommend that momentum payoffs are higher in the occurrence of high market ambiguity which is in contradiction to Wang and Xu (2009). The difference between cross-sectional and time series result is alike towards the puzzle highlighted by Avramov, Chordia, Jostova, and Philipov (2007). The empirical proof is steady with the above loser-centered description. In down markets, the journey to security arises such that investors over-sell loser stocks with high information ambiguity, giving rise to low momentum payoffs. In superior market circumstances, investors are violent in looking for comparatively cheap stocks and shares such that they buy in excessive quantity insolvent stockpiles allied with higher information ambiguity, making high momentum payoffs. Wang and Xu (2009), results propose an easy approach to improve profits of momentum investing. In case of the lagged 12 months volatility is high than the annualized lagged 36 months volatility, they explain it as a month of high volatility.

Wang and Xu (2015), inspect the prognostic benefits of volatility of market in favour of momentums. They state with the purpose of (1) marketplace volatility have important capability towards predict momentum payoff, it is vigorous later than regulating on behalf of business cycle variables as well as market state; (2) the market volatility attracts largely of the prognostic influence of market state; (3) subsequent to managing meant for market

state along with market volatility but another variables don't have progressive foretelling force; (4) time series forecasting profit of volatility of marketplace be devoted to failure stockpile; furthermore (5) the defaulting probability help to describe the forecasting strength of volatility of market pro momentum. All these results mutually show a substantial defy to present assumptions lying on momentum.

The momentum is a largely acknowledged as assets pricing anomaly (Tang & Mu 2012). Jegadeesh and Titman (1993) document that the U S stock that does the superlative (poorest) more than 3 to 12 months phase maintains their performance fine (weakly) above the later 3- 12 months. During a proceedings finding, Jegadeesh & Titman (2001) shows that momentum strategies stay beneficial during the 90s in a time following the samples periods into Jegadeesh & Titman (1993).

Investor sentiments (Baker and Wurgler 2006), Chicago Board Option Volatility Index and Cross Sectional stock returns dispersal (Stivers and Sun 2010) are the possibly main variables here determining the profitability of momentum. Cross Sectional stocks return dispersal forecasts market functioning negatively (Stivers and Sun 2010).

There is a time-series relationship among the market volatility as well as the returns on the markets (Campbell and Hentschel 1992) but how cumulative volatility influence the cross-section of expected stock return has received less consideration (Glosten, Jagannathan and Runkle 1993).

Jegadeesh and Titman (1993) documents the momentum strategies and states buy past winner and sell past loser give statistical importance and huge payoffs economically. The experimental proof on stock returns momentum has been mainly stimulating for numerous grounds. Fama and French (1996) demonstrate that profitability of momentums are the simply capital asset pricing model related anomaly not explained by the Fama and French (1993) three factors models. Furthermore, Schwert (2003) show that the supposed financial

markets anomalies allied return and time series ability to be forecast, normally vanish, reverse, otherwise ease subsequent their discovery as well.

Several theoretical and empirical works on volatility on the basis of volatility weighting exist. Hallerbach (2012, 2014) use weighting strategy via their own volatility and for the same purpose of uses normalized returns. According to Barroso & Santa-Clara (2013), the process of weighting cross-sectional equity momentum through their volatility is extremely helpful to improve their risk-adjusted performance: the process of executing the volatility-weighting doubles the Sharpe ratio. The process of the categorization of stock according to their precedent residuary rather of overall return produces an additional constant edition of momentum (Blitz, Huij, and Martens 2011).

Lee and Swaminathan (2000) demonstrate that momentum is stronger for stock with high volume of trading. To the range that mutually volume and predict dispersal that measures difference of belief, momentum payoffs are related to both variable under the hypothesis that differences in thinking intensify return persistence. Hou and Moskowitz (2005) discover that the stock's price with higher residual volatility reveals delay in the incorporation of information.

Makarov and Rytchkov (2009) demonstrate that heterogeneous information can lead to momentum. Conrad and Kaul (1998) examine prominent verification signifying that the profits of momentum are ascription to cross-sectional difference in expected returns relatively than to any time-series reliance in returns. The innovative result acknowledged by Jagaeesh and Titman (1993) have consequently been extensive in various findings. Like, Rouwenhorst (1998) discover related momentum profit in the European markets, Moskowits and Grinblatt (1999) discover profit of momentum a cross industry sorted portfolio, and Grundy and Martin (2001) investigate the strategy of momentum have been persistently gainful in the United State ever since the 1920.

Jegadeesh and Titman (1993), direct to the scope that higher past return might be partially due to higher expected return, the winners' portfolio could possibly include higher risk stock that would maintain to get high expected return in the future. The study of Grundy and Martin (2001), demonstrate to momentums have significant minus beta (β) subsequent to prices falls. The study debate that hedging this time varying markets disclosure generates constant momentum returns however Daniel and Moskowitz (2013) demonstrate that using betas in real time doesn't stay away from the crashes. Jegadeesh and Titman (2001) and Jegadeesh and Titman (2002) exhibits the significance of momentum profitability after the primary discovery of momentum. Rouwenhorst (1998) finds momentum payoffs to be considerably positive in twelve other countries examined in his study. The strength of momentum returns has created a variety of justifications, behavioural and risk based as well. Essential exceptions consist of Chordia and Shivakumar (2002) that discover that the change in momentum is based across business cycle, Cooper, Gutierrez, and Hameed (2004), report the momentum live just into 'up' marketplace position. Stivers and Sun (2010) discover that Cross-Sectional Returns influence payoffs of momentum.

For the resolution of anomaly there is essential to know about its origin. Various Authors, e.g., Barberis et al (1998), Daniel et al. (1998) and Hong and Stein (1998) presents behavioural model that have foundation on the initiative that momentums profit occur due to inherent biases that's why investor interpret information. On the other hand, it's early to eliminate the rational model and recommend that the profitability's of momentums strategy might be recompense for threat.

According to Conrad and Kaul (1998) momentum profitability strategy might be a result of Cross Sectional deviation in mean return than expected time series deviations in stock return. Lo and MacKinlay (1990) and others, note down that stock with high(low) unrestricted future rate of returns in nearby time periods are expected to contain high

apprehend rate of return in same period. The positive average returns arise from momentum strategies although expected profits on stocks are stable overtime. Hodoshima et al. (2000) document the association among risk and stocks return in Japanese equities market via using Cross Section regressions. It is evidenced that there is insignificant relationship among return and risks as regressions apply on extra return. However, when regressions tests are applied individually on optimistic and pessimistic return subsequently short terms association among return and risk have been reported.

Strong positive average returns and sharp ratio of momentum strategies are interposed by rare crashes. Brunnermeier, Nagel, and Pedersen (2008) state that negative returns are definite and determined. According to Cooper, Gutierrez, and Hameed (2004) and Stivers and Sun (2010), momentum premium falls when there is the situation of negativity state in previous three year and the market volatility is high when the momentum premium is high. Cooper, Gutierrez, and Hameed (2004) recommend behavioural justification for these evidences that reliable momentum performing unsuccessfully throughout market recovers when others are time as well if assets are mispriced.

Blitz and Van Vliet (2007), Falkenstein (2009), Kumar (2009), Baker, Bradley, and Wurgler (2011), and Illmanen (2012) relate preference of skewness towards the volatility suggesting that low priced, volatiles stock offer optimistic skewness. Campbell (1996) argues that volatility-puzzle of stock prices, which seems to be related with predictable time-variation in abnormal stock returns. This excess volatility challenges the market efficiency. Blitz et al. (2007) significantly add to our understanding of the low volatility effect by documenting result in global equity markets, disentangling and distinguishing a volatility effect distinct from classic size, value and momentum effect, and suggesting possible explanations for the success of this strategy.

According to, Sondergaard (2010), in 1980's the broad structure of finance literature, permit that future stock prices are predictable support on past payoffs. De Bondt and Thaler (1985, 1987) find out that long-term past losers be liable to better long term future winners above a period of 3-5 years; it means that the market have a tendency to mean revert. Jegadeesh (1990) and Lehmann (1990) discover a trend to mean reversion above so small horizons of just 1 to 4 weeks.

Although the truth that contrarian strategies for a long period get the main consideration and it turns out that many other experts apply comparative force for standard stock assortment. (Sondergaard, 2010). For instance, Grinblatt and Titman (1989, 1991) detect that greater number of the mutual funds explain a trend to purchase stocks that have increased above the earlier quarter. Furthermore Grinblatt, Titman, and Wermers (1994) illustrate that around 77% of the 155 mutual funds in their test chase momentum strategies. The Value Line standings are recognized to base on earlier period comparative power.

The process of investing in momentum mainly engages on the foundation of a past tendency, where the general momentum, engages investing on the source of past stock prices. Particularly, it is recommended that if current tendencies in stock prices are uphold into the close to future, after that an investment access that purchases stocks that have high returns in current periods and short-sells stocks that have recognized poor outcomes will smash the market. The subsequent presents the process when testing the profitability of momentum strategies (Sondergaard, 2010). And this process is same as the method of Jegadeesh and Titman (1993) because firstly they present the revolutionary and original academic work on momentum strategies, and other researchers to a great level have implemented their tactic.

It is alleged that George Soros (1987) uses a variation of momentum investing by bidding process up the price of previously overrated equities in the market for conglomerates in the 1960s as well as for real estate investment pool in the 1970s. This tactic is termed positive response making an investment. Jegadeesh and Titman (1993) perform generally significant scholastic studies of momentum strategies, chased by several others.

Stocks and shares with higher volatility comparative to the Fama and French (1993) model contain terribly little average return. The study discovers that improvement in cumulative volatility hold a statistical significant risk of around -1% for each annum. Economical hypothesis offers numerous grounds how come the prices of risks of advance in volatility of market ought to be pessimistic. The greater requirement pro asset with higher orderly volatility charge raises their cost and lesser their average returns. Ultimately, stock to do deficiently when volatility increase incline to have adversely skewed return above advanced horizon, while stock which in turn fine when volatility goes up lean to have favourably skewed return. The greater demand for asset with higher orderly volatility charge raises their cost furthermore and lower their average returns. Ultimately, stock that do deficiently as volatility rises lean to have adversely skewed return above high horizon, whereas stock which in turn increase as volatility goes up be inclined to have positively skewed return.(Zhang et .al, 2006).

The upshot of volatility is one of the identified anomalies' to have been discussed within the literature of asset pricing so far. Likewise, Fama and French (1993) present three factor model that extends Capital Asset Pricing Model (CAPM) by including price earning (P/E) effects, size effects and value effects. Further in recent times, Frazzini and Pedersen (2014) as well explain the effects of volatility to leverage constraint. Furthermore, investigating the Cross Sectional, risk-return relation, they furthermore find when funding constraints become intense, betas close towards one and the risk-return relation becomes flatter. In addition,

their models argue so as to smaller amount leverage constrained investor (private equity) seize low beta stock, whereas additional leverage constrained investor (mutual funds) have a preference for high betas stock.

Phase of extremely high volatility as well lean to overlap by phase of illiquidity of markets (Jones 2003 & Pastor and Stambaugh 2003). In a recent document, Ang, Hodrick, Xing, and Zhang (2006) illustrate that the market returns volatility is a priced cross sectional risks factor. The comparatively pathetic support of momentum in international stock returns apparently occurs as we capture comparatively big firms for which the momentum cause is weaker in comparison to small firms (Rouwenhorst, 1998; Hong, Lim, and Stein, 2000). This kind of proof is important because Jegadeesh and Titman (1993) have revealed that the return to trade winners and selling losers turn back after one full year.

In particular, Hong, Lim, and Stein (2000) hit upon that momentum payoffs significantly turn down with firm market capitalization. Since firm size is typically contrariwise related to credit risk, it follows that momentum earnings have to turn down by bettering credit ratings. As in the situation of the industry regulation, we execute strategies on size-adjusted earnings by deducting the matched up deciles portfolio holding time return from the particular stock holding stage return.

Daniel et al. (2004) analysis the market behaviour, value and size affect in US stock markets previous to and subsequent to sorting out UP and DOWN markets. It is pragmatic that markets effect is not significant in capital asset pricing model (CAPM) set even as value and size effect are momentous as Cross Section regressions is applied. However as, Pattengill et al. (1995) method is apply in that case effect of markets becomes momentous and size' effect behaves in a different way in downwards markets because it causes lofty return pro smallest stock into losing markets although value's effect remain unchanged.

Tang and Shum (2004) observe that, the positive significant association among betas and accepted returns within UP markets and negative association inside DOWN markets in case of Singapore for the time of 1986 to 1998. Estrada and Serra (2005) identifies a variety of factor to affect stocks return in thirty countries and report that the generally essential factors that affect stock returns in a significant manner are lower side risk. On the other hand, book to market (BTM) ratio and size as well contribute in return deviation although their part in return inconsistency is not pronounced.

Liu (2013) report that market effect is not enough measuring factor towards captures the entire variation in return, however size and value effect too provide significant result as investment in large stock as well as value stock report higher return than little and growth stock for Chinese stock market. Fama and French (2012) investigate momentum, value and size within Europe, Japan, America and Asia Pacific stock markets and report significant relation except for Japan, momentum and value effect exist value's effect move down by risk and size allies through momentums reducing in large stock.

The stock market volatility has recently attracted much attention in the finance literature. The focused area of volatility in literature investigates the question that includes: what are the key factors of stock market volatility? Is it increase over the time? And what role, regulators should play in the stock market? Previous studies have examined these issues. For example, on the reasons of stock market volatility, Officer (1973) investigates the effects of volatility in business cycle variables, Black (1976) and Christie (1982) links stock market volatility to financial leverage, Merton (1980), Poterba and Summers (1986) and French et al. (1987) relate stock market volatility to the variation of expected stock returns, and Schwert (1989) documents an comprehensive series of tests at the extent of macroeconomic variables responsibility in causing stock market volatility. Koch and Koch (1991), Malliaris and Urrutia (1992), Chan et al. (1992) and Rahman and Yung (1994) have investigated the

extent to which international financial and capital markets transmit volatility. Furthermore, Peel et al. (1993), while Scott (1991) and Timmermann (1993) investigates that degree to which stock market volatility is responsible to change value of stocks.

Foster (1995) contrary to those of Lamoureux and Lastrapes (1990) findings have predicted that with the inclusion of volume as explanatory variable persistence in volatility sustains in return series. The findings hold for contemporaneous volume when considered in the variance equation. Although being a risk measure, extreme stock returns volatility is a sign about the right basic value of the firms (Karolyi, 2001). Pindyck (1984) argues that a fall in the US prices of share in the 1970s is the outcome of volatility raises. Similarly, Bollerslev, et al. (1988) report an association between conditional volatility and stock market return. French et al. (1987), Kearns and Pagan (1993), Odossiou and Lee (1995) and Choudhry (1996) also provide proof on the association among volatility and returns, in a various national equity markets. Schwert (1989) provide proof of the macro-economic reasons of volatility by using monthly data of the US market. Using low frequency data, Kearney (1998) also finds evidence that volatility on the London stock market is transmitted to the Irish market within the same month.

Adrian et al. (2008) finds a statically significant and negative correlation of volatility prices through mutually long-run as well as short-run factors of equity markets volatility. Short-run volatility is interrelated towards the tautness of financial constraint because skewness risks and long-run variation are associated to business cycles risk. Comparable to Faff (2001), Elsas et al. (2003), Tang and Shum (2004) and Leon et al. (2007), Zhu (2009) moreover report positive and significant affiliation among stock return and volatiles element via use two components volatility's model pro ten Asia pacific markets. It reports that constant element of volatility model is most essential however relationship is not significant with stock return.

Baker et al. (2011) document that the most well-intentioned anomaly which is the long-terms achievement of the low volatility and low beta stocks portfolio. Beyond this bold statement, the authors use behavioural models to help explain this effect as being driven by investor preferences for lotteries, along with over confidence and representativeness biases in conjunction with limits to arbitrage. Blitz and van Vliet (2011) argue for the evaluation of low volatility strategies against cap weighted indexes employing risk-adjusted performance measures such as Sharpe or Jensen ratios.

In Haugen's paper with Baker (2012), the authors find the low volatility effect exists in all global equity markets around the world, including emerging markets. Blitz et al. (2012) also identify the obvious existence of volatility effects in emerging markets and report a low correlation among the volatility effects in emerging and developed equity markets. Finally, a nice review of "smart beta" investing including low beta strategies can be found in Blitz (2012). In this article, "Smart Beta" is define like "passively following an index in which stock weights are not proportional to their market capitalization, but based on some alternative weighting scheme."As, low volatility research tsunami continues some papers starts to take some of the gloss off low volatility investing. Chow et al. (2011) highlight the investing "costs" of low down volatility invest, which includes "underperformance in an upward-trending market….substantial tracking error…limited capacity, less liquidity and higher turnover rates."

Li et al. (2014) continue this theme of questioning the practical applicability of low volatility strategies by finding no abnormal returns for equally weighted lower risk minus higher risk portfolio and that alpha is mostly removed when emitting low-priced stock. Clarke et al. (2014), report that "the realized alphas of low beta (high-beta) portfolios are reduced (increased) when a separate beta factor is included." Guner and Onder (2002) find a significant association among trading volume and volatility. Particularly, they find that yet

while high volatility is related with low volume stock in general, for morning session, high volume stock show higher volatility reducing from the concentration of information-based trading for high volume stocks in stock market opening. Lipson (1994) investigate that the size of the trades or volume has a significant effect on return volatility for only small firms. They further document that the size of trades has no information contents ahead of that contain in the numbers of transactions.

Schwert (1989) investigates that the macro-economic variables volatility and describe small regularity movement of cumulative volatility of stocks markets. It states that volatility of stocks market is associated with business cycles. Schwert (1989) finds that the stock return volatility is lower in good time then bad time. Campbell and Hentschel (1992) report that the return volatility is negatively associated with returns and proposes two possible explanations: first, risk premia rise by the volatility of dividends news; secondly, returns volatility raises through the volatility of dividends news.

Campbell and Hentshel (1992), and Duffee (1995) suggest that cumulative returns of market are pessimistically associated with cumulative volatility of market. "Leverage effect" hypothesis is main probable justification for this negative relationship. Black (1976) and Christie (1982) suggest that with fall in stock prices firms become more levered and it raises the stock return volatility. Subsequently, French, Schwert, and Stambaugh (1987), hold that, because an increment in systematic volatility increases risks premia and expected future stock return, an unanticipated variation in volatility is possible to decrease firms value, directing to pessimistic association between contemporaneous returns and volatility.

William (1990) conducts a study on stock market volatility in 1990 and provides that regular stocks of NYSE have not been usually high in 1980, except the period of crash October 1987. The study further document that the most market's highest return occurred in

depressions – the simple way to show stock market volatility is the market return. The study measures measured stock market volatility by standard deviation and observes that the duration of excessive profits have high standard deviation. The study analyses that volatility of returns to common stock is affected by financial and operating leverage as by increasing operational and financial leverage, so the volatility of its stock return also increases. The stock return volatility not only increases due to large fall into stocks prices but also influenced by financial leverage.

Paul et al (2008) provide evidence about relationship between trading volume and volatility different traders' by using Garman and Klass (1980) model. Hedger and speculators adjust their derivative trading pattern to reduce risk exposure when market volatility increases which leads to more liquid, less volatile and efficient markets. Kruger (2001) documents volatility as a measure of risk. Measuring risk through variance of returns over a period of time and assumed unstable share prices not perform as expected. Consequently, higher the volatility then higher will be the risk. At increase volatility risk adverse investors perceive more risky and expect more returns. He further documented that if higher risk is not compensated by higher returns then there will be unjustified pressure on prices and share would sell at discount rate.

Particularly, Moskowitz and Grinblatt (1999) document that industry momentum accounts for particular stock return momentum. Therefore, more robust momentum in low rated stocks may be accredited to such stocks and options being determined in one particular industry that constantly shows high momentum. On the other hand, if the results are generally not driven by industry momentum. Subsequently, Moskowitz and Grinblatt (1999) calculate industry-adjusted stock returns via deducting from each stock return over the holding time the return of the associated industry over the similar time. Avramov et al (2007), afterwards execute momentum strategies devised on industry-adjusted returns,

skilled on credit rating and earlier period return. Even subsequent to this kind of industry adjustment the study discover a strong credit risk consequence on the earnings of momentum strategies.

The studies, by as Baker and Wurgler (2006) use temporary advances in behavioural finance theory to offer sharper tests for the special effects of sentiment. Behavioural models of securities markets De Long et al. (1990) provide that shareholders are of two sorts: rational arbitrageurs who are sentiment-free and illogical traders inclined to exogenous sentiment. They contend in the marketplace and place prices and expected earnings. However, arbitrageurs are restricted in several ways. These restrictions are derived from small horizons or expenditure and risks of trading and short selling. Consequently, prices are not constantly at their primary values. In such models, mispricing occurs due to combination of two features: an alteration in sentiment on the part of the irrational investors, and a bound to arbitrage from the realistic ones.

Baker and Wurgler, (2006) merely sort stocks relating to their latest return volatility, particularly the standard deviation of monthly earnings over the previous twelve months. Returns figures are from the Center for Research in Securities Prices (CRSP). High volatility is quality of stocks with high approximate demand; short volatility is a bond-like characteristic. Furthermore, unpredictable stocks and shares are usually riskier to arbitrage, thus an arbitrageur with restricted risk-bearing power remain uncertain prior to make huge bets alongside mispricing. Every month, investors put each stock in one of ten portfolios in line with the deciles of their return volatility of the prior year, and then use the returns on the ensuing portfolios to indicate the cross-section of stock returns.

Merton (1987) recommends that in informational segmented markets, organizations by overweight firms' specific variance necessitate high average return to pay traders for holding improperly diverse portfolio. DeBondt and Thaler (1985), demonstrates that stocks

whose price has fallen drastically (by their standard) in the last 3 years demonstrate an abnormal return of 6.1% per year over the successive 3 years.

Scowcroft and Sefton, (2005) explore the factors that pushes the performance of stock price momentum strategies and provides a solution to value investors. The study provides while it comes to large-cap stocks, price momentum is mostly determined through the momentum of a stock's broader industry sector and not by the momentum of the particular stock itself. Scowcroft and Sefton (2005) come up to the finale that, "Value executives can decrease the chance of underperformance therefore of underweighting momentum by having a sector-neutral portfolio. The study further recommends that holding a sector-neutral stock portfolio could decrease the long-run portfolio risk occurring from variation in momentum.

Stivers & Sun (2010) discover that advanced return dispersal forecast worse future‘s momentums return. Dispersion of returns is calculated as the standards deviation (STDEV) of 100-sizes and Book to Market (BTM) every month returns of portfolio above the earlier 3-months. The study recommends that returns allocation might operate the same as a state’s variables that has information regarding following volatility of market. The outcomes of regression specify that the addition of returns dispersion count the prognostic benefits of the market’s state in Cooper et al. (2004) and macro-factors in Chordia & Shivakumar (2002).

Many conditioning variables, suggest forecasting time series variants into momentums returns. This type of study assesses monthly time series regression of the momentum profit lying on a condition state’s variables. Chordia & Shivakumar (2002), by means of standards macro-variables, discover that the momentum strategies are merely cost-effective in periods of economical growth. Yet, Griffin et al. (2003) discover that macro-economic factors can’t forecast momentum earnings in worldwide marketplace. Cooper et al. (2004) realize those macro-economic multifactor models that Chordia & Shivakumar utilize benchmark price panels and skip a month earnings. On the other hand, the study realizes that the 3 year

lagged market returns do forecast momentum profit. Distinctively, the momentums stratagem creates significant optimistic profits (0. 93% average monthly return) subsequent to up market returns, although insignificantly pessimistic profits (_0. 37% average monthly returns) subsequent to pessimistic markets income.

Antoniou et al. (2010) realize that investor sentiment forecasts momentum profits. Investor sentiment approximated by taking the residual of the regression of the Conference Board Consumer Confidence Index on a set of macroeconomic variables subsequent to the procedure used in Baker & Wurgler (2006, 2007). Throughout optimistic states, momentum strategies produce significant standard every month returns of 1. 64%, however in negative areas yields in-significant average every month profit of 0. 56%. Their outcomes stay by the addition of market's state variable. The momentum revenue are chiefly lofty in Up/Positive states making 1. 8% average monthly income except merely averaging 0.8% meant for up/negative state. Dissimilar the earlier study, Antoniou et al. (2010) clearly investigates the practises long run reversal causes to momentum strategy.

CHAPTER 03

Data and Methodology

3.1 Data Description

The current study aims to explore the impact of market volatility on momentum profits in Pakistan. This study uses monthly and daily prices of eighty companies listed at Karachi Stock Exchange (KSE) for the period of 2003 to 2015. The reasons for using eighty companies is that only few companies are frequently traded in market, so large sample leads to selection of inactive companies.

This study is based on secondary data. Sample consists of companies from Non-Financial Sector. The motive to study just Non-Financial Sector is that in case of financial sector accounting year closes at December but in Non-Financial Sector, accounting period close down in June generally. Moreover, the capital structures of financial and non-financial sector are different. Monthly and daily stock prices have been taken from Karachi Stock Exchange. T-bill (Treasury bill rate) and Government bonds are taken from International Financial Statistics of IMF. These are reliable sources of information.

The companies are listed in various sectors that include Automobile and Parts, Beverages, Chemicals, Construction and Materials, Electricity, Fixed Line Telecommunication, Food Producers, Gas Water and Multi-utilities, General Industrials, Health Care Equipment and Services, Household Goods, Industrial Engineering, Industrial metals and Mining, Oil and Gas. Construction and Materials is the largest sector that has 14 companies and Health Care Equipment and Services is the smallest sector that have only one company whose stocks are traded.

Table 3.1 below presents the sectors and number of companies that are included in the study sample.

Table 3.1 Sector and Number of Companies included in Sample

S. No	Sector	No. Of Companies
01	Automobile and Parts	08
02	Beverages	02
03	Chemicals	12
04	Construction and Materials	14
05	Electricity	09
06	Fixed Line Telecommunication	05
07	Food Producers	10
08	Gas water and Multi-utilities	02
09	General Industrials	06
10	Health Care Equipment and services	01
11	Household Goods	03
12	Industrial Engineering	03
13	Industrial metal and Mining	02
14	Oil and Gas	04
	Total	**80**

3.2 Methodology

The regression analysis before application of the econometric problem like autocorrelation, multicollinearity, heteroskedasticity and stationarity of the data has been tested. Problem of multicollinearity and stationarity does not exist. However, heteroskedasticity has been found. So, heteroskedasticity consistent regression has been used.

3.3 Variables Description

This study is based on variables that include state of market (MKT), volatility of market (Vol) plus variables of business cycle. Market volatility includes Vol+ and a Vol- and business cycle variable includes TERM, $TERM^2$ and Yield. TERM is the difference of Treasury bill rate and Government bonds rates. Momentum is the difference of winner and loser. Momentum payoff is dependent variable and Market State, volatility of market and variables of business cycle are independent variables. Secondly, this study regress winner and loser portfolios return on state of market, volatility of market and variables of business

cycles in perspective towards loser and winner (relative to the market) and loser and winner (adjusted by market).Then, dispersions of stock returns (RD_{1-3}) is used to explore the impact of cross sectional variation on momentum profit. RD_{1-3} is the three months moving average of the Cross Sectional standard deviation (STDEV) of return and it is taken as independent variable. Finally, momentum payoffs are regressed on market, volatility of market and variables of business cycle in UP and DOWN markets.

3.4 Econometric Model

The various econometric models used in the study are explained as under:

Market State and Volatility

The role of market and volatility in explaining return is examined by using following equation:

$$MOM_t = \alpha_0 + \alpha_1 MKT_t + \alpha_2 Vol_t + \varepsilon_t \quad \text{Eq. (1)}$$

Where,

MOM is the momentum payoffs of month's t. For calculating momentum, stock is categorized in portfolio on the base of past return. The time of ranking is as of whereas portfolios with lowest past returns are defined as loser portfolios. The portfolios with the top earlier period returns are defined as winner portfolios. Momentum payoffs are the difference of the return between winner and loser portfolio.

It is further added that momentum portfolio returns are difference of returns of winner and loser portfolio comprising of 40 stocks, each separated by using median. The robustness of results has also been tested by findings momentum returns as difference of extreme quartile.

MKT_t=market return at month t.

Vol_t=volatility of market at time t captured by standard deviation of returns last six months returns.

There is possibility that response of the momentum return may be different in high and low return period. The same possibility is explained by using following equation:

$$MOM_t = \alpha_0 + \alpha_1 MKT + \alpha_2 Vol^{+} + \alpha_3 Vol^{-} + \varepsilon_t \quad \text{Eq. (2)}$$

Where,

Vol+ = volatility if lagged six month market returns are positive otherwise zero.

Vol- = volatility of the lagged six market returns are negative otherwise zero.

Market State, Market Volatility, and Business Cycles

The study further adds the function of business's cycles in determining profits of momentum. The same has been investigated as following:

$$MOM_t = \beta_0 + \beta_1 MKT_t + \beta_2 Vol_t + \beta_3 TERM_t + \beta_4 TERM^2_{t+} \beta_5 YLD_t + \varepsilon_t \quad \text{Eq. (3)}$$

$$MOM_t = \beta_0 + \beta_1 MKT_t + \beta_2 Vol_t^{+} + \beta_3 Vol_t^{-} + \beta_4 TERM_t + \beta_5 TERM^2_t + \beta_6 YLD_t + \varepsilon_t \quad \text{Eq. (4)}$$

Where,

Term= difference of the yield among ten-year Treasury bond and three-month Treasury bill.

Yield= yield on a Treasury-bill by three month towards maturity.

Asymmetric Predictability.

The impact of market, volatility and business cycle on loser and winner portfolios has been investigated as:

$$Loser_t = \beta_0 + \beta_1 TERM_t + \beta_2 TERM^2_{t+} \beta_3 YLD_t + \beta_4 MKT_t + \beta_5 Vol_t + \varepsilon_t \quad \text{Eq. (5)}$$

$$Winner_t = \beta_0 + \beta_1 TERM_t + \beta_2 TERM^2_{t+} \beta_3 YLD_t + \beta_4 MKT_t + \beta_5 Vol_t + \varepsilon_t \quad \text{Eq. (6)}$$

Here actual returns of loser and winner portfolios are used as dependent variable.

The robustness of the model has also been tested by using market adjusted model. Hence examination of winner and loser has been calculated by subtracting market returns from the winners and losers portfolios:

$$LoserMKT_t = \beta_0 + \beta_1 TERM_t + \beta_2 TERM^2_{t+} \beta_3 YLD_t + \beta_4 MKT_t + \beta_5 Vol_t + \varepsilon_t \quad \text{Eq. (7)}$$

$$WinnerMKT_t = \beta_0 + \beta_1 TERM_t + \beta_2 TERM^2_t + \beta_3 YLD_t + \beta_4 MKT_t + \beta_5 Vol_t + \varepsilon_t \quad \text{Eq. (8)}$$

The basic model is also investigated in up and down markets as given below:

$$Loser_t = \beta_0 + \beta_1 TERM_t + \beta_2 TERM^2_t + \beta_3 YLD_t + \beta_4 MKT_t + \beta_5 Vol_t^+ + \beta_6 Vol_t^- + \varepsilon_t \quad \text{Eq. (9)}$$

$$Winner_t = \beta_0 + \beta_1 TERM_t + \beta_2 TERM^2_t + \beta_3 YLD_t + \beta_4 MKT_t + \beta_5 Vol_t^+ + \beta_6 Vol_t^- + \varepsilon_t \quad \text{Eq. (10)}$$

The behaviour in up and down market is explained by using following model:

$$LoserMKT_t = \beta_0 + \beta_1 TERM_t + \beta_2 TERM^2_t + \beta_3 YLD_t + \beta_4 MKT_t + \beta_5 Vol_t^+ + \beta_6 Vol_t^- + \varepsilon_t \quad \text{Eq. (11)}$$

$$WinnerMKT_t = \beta_0 + \beta_1 TERM_t + \beta_2 TERM^2_t + \beta_3 YLD_t + \beta_4 MKT_t + \beta_5 Vol_t^+ + \beta_6 Vol_t^- + \varepsilon_t \quad \text{Eq. (12)}$$

It is further added that square of the term is added to see the possibility of non-linear behaviour.

Potential Explanations: Return Dispersion

Literature provides that market's volatility measuring the time-series variant in total marketplace and returns dispersal measuring the cross sectional variant in stock return. So, the phenomenon is also explained by using:

$$MOM_t = \alpha_0 + \alpha_1 RD_{1-3} + \varepsilon_t \quad \text{Eq. (13)}$$

$$MOM_t = \alpha_0 + \alpha_1 MKT + \alpha_2 Vol + \alpha_3 RD_{1-3} + \varepsilon_t \quad \text{Eq. (14)}$$

The impact of business cycle on momentum in the presence of time series variation and cross sectional variation is examined by using following regression method:

$$MOM_t = \beta 0 + \beta_1 TERM_t + \beta_2 TERM^2_t + \beta_3 YLD_t + \beta_4 MKT_t + \beta_5 Vol_t + \beta_6 RD_{1-3} + \varepsilon_t \quad \text{Eq. (15)}$$

$$MOM_t = \beta_0 + \beta_1 TERM_t + \beta_2 TERM^2_t + \beta_3 YLD_t + \beta_4 MKT_t + \beta_5 Vol_t^+ + \beta_6 Vol_t^- + \beta_7 RD_{1-3} + \varepsilon_t \quad \text{Eq. (16)}$$

Where,

RD_{1-3}= three months moving average of the cross-sectional standard deviation (STDEV) of the returns of portfolio.

CHAPTER 04

Results and Discussion

Impact of Market Return and Volatility on Momentum Profit

Table 4.1.1 reports the results of regression analysis used to study the impact of volatility and market returns on momentum profits. Momentum payoff is taken as dependent variable and market state (MKT), market volatility (Vol, Vol+ and Vol-) are independent variables. This study uses different structure of momentum portfolio for robustness check. For every regression, intercepts, beta coefficient, t-statistic (in parentheses), adjusted R-squares and Prob(Wald F-statistic) are reported. Results of stepwise regressions are presented below:

Table No. 4.1.1 Impact of Market Return and Volatility on Momentum Profit

Market State and Volatility

C	MKT	Vol	Vol+	Vol-	Adj-R^2	P (Wald F-stat)
I. Market state and volatility (50%)						
0.065	-0.127	-0.154			0.0216	0.0168
(8.122)	(-2.648)	(-1.826)				
0.073	-0.110		-0.345	-0.150	0.0239	0.0017
(8.518)	(-2.155)		(-2.921)	(-2.036)		
II. Market state and volatility (25%)						
0.103	-0.213	-2.237			0.0251	0.0061
(8.041)	(-3.059)	(-1.540)				
0.117	-0.185		-0.564	-0.229	0.0293	0.0006
(9.047)	(-2.481)		(-3.038)	(-1.765)		

In I phase momentum is calculated on difference of 50% winners and 50% losers and momentum payoff is regressed on market return and volatility. Market premium is significant and negative whereas market volatility is found negatively influencing momentum profits. However, when volatility is divided into volatility in positive market and volatility in negative market both are significantly and negatively influencing momentum profits. The results are in line with earlier studies that high volatility is followed by low momentum profits.

The same process is repeated for II phase, momentum payoffs calculated by using difference of 25% winners and 25% losers. Both market and volatility are significant, demonstrating that both variables have capability to predict momentum payoffs. Table 4.1.1 presents the results of regressions with market state and market volatility as independent variable. Here, the momentum payoff is calculated at 50% and 25% to test the robustness of results. The model is found to be fit because F- Statistics is significant.

This study does not contradict the predictive influence of market state. This view is that volatility of market and market state when combine mutually, present a helpful sign of market condition. The predictive power of volatility of market is extra apparent in downwards markets. Even though Vol- and Vol+ both have negative sign, Vol− is dominant in terms of the magnitude of the co-efficient and the t statistics. The explanatory power of the model is remained low as all other factors that influence the returns have not been included in the model because the objective of the study is solely to explore the relationship between volatility and momentum. In both test, at 50% and 25%, results are same indicating the robustness of results.

Impact of Market State and Market Volatility, and Business Cycles on Momentum

Table 4.1.2 reports the results of regression analysis conducted to explore the impact of market state, volatility and business cycle on market return. When momentum payoffs are taken as dependent variable and market state, volatility of market and variables of business cycle (TERM, $TERM^2$, and YLD) are independent variables. This study uses substitute momentum profitability measures for checking the robustness. For all regressions, intercepts, beta coefficient, and t-statistics (in parentheses), adjusted R-squares and Prob (Wald F-statistic) are reported. Results of regression are presented below:

Table 4.1.2 Impact of Market State and Market Volatility, and Business Cycles on Momentum

C	MKT	Vol	TERM	$TERM^2$	YLD	Adj-R^2	P(Wald F-stat)
I. Regular momentum construction (50%)							
0.059	-0.121	-0.168	-0.171		0.114	0.0107	0.0320
(3.986)	(-2.327)	(-1.967)	(-0.406)		(0.711)		
0.058	-0.121	-0.170	-0.202	7.176	0.128	0.0036	0.0291
(2.824)	(-2.316)	(-2.046)	(-0.543)	(0.159)	(0.620)		
II. Regular momentum construction (25%)							
0.097	-0.207	-0.247	-0.051		0.111	0.0119	0.0183
(4.128)	(-2.826)	(-1.571)	(-0.086)		(0.410)		
0.089	-0.207	-0.257	-0.234	42.633	0.194	0.0059	0.0220
(2.823)	(-2.809)	(-1.638)	(-0.499)	(0.622)	(0.579)		

The results in section I of table 4.1.2 indicate that market returns and market volatility have significant influence on momentum payoffs. The signs of market state and market volatility are negative and significant indicating the momentum payoffs are inversely related to market returns and market volatility. It means when market returns increase or volatility increases, momentum payoff decrease. Business cycle effect measured by term and yield is not found significant. Similarly, non-linearity has not been observed regarding term.

The robustness of the model has also been tested by using momentum profits measured by using difference of top 25% winners and top 25% losers. The market state is found to effect

significantly whereas volatility has same sign but is now significant at approximately 90% level of significance.

Table 4.1.2 also presents the results of regressions analysis regarding impact of business cycle variables, market volatility, and market state on momentum profitability. The robustness of the basic results has also been tested by using return of momentum profit comprising of difference of 50% stock or top 25% stocks of winners and losers portfolios. Table 4.1.2 examine rate of the macroeconomic variables in explaining momentum.

The explanatory power of the model is low as all other factors that influence the returns have not been included in the model because the objective of the study is exclusively to explore the relationship between volatility and momentum. In both conditions, at 50% and 25% results are same. The model is found to be fit because F- Statistics is significant.

The results indicate that market state is significant and negative which is consistent with results reported in table 4.1.1 and 4.1.2. Market volatility is negative but insignificant however volatility in positive market has significant influence whereas volatility in negative market has insignificant impact on momentum payoffs. Yield has insignificant and positive effect whereas term and terms are found insignificantly influencing momentum payoffs. The results are found robust when momentum payoffs are calculated by using difference of top 25% winners and top 25% losers. The model is found fit the explanatory power of model is found low as model considers only volatility and business cycle and ignores fundamentals. The results are to focus on the volatility and momentum dynamics.

In sum, both Table 4.1.1and Table 4.1.2 shows that volatility of market has robust predictive power in the existence of market state and macro-economic variables. This study furthermore observes that in the entire cases the predictive power of volatility of market is supplementary prominent in downwards markets.

Impact of Market State and Market Volatility, and Business Cycles on Market Adjusted Momentum Payoff

Table 4.1.3 reports the results of regression analysis, when market adjusted momentum payoff are taken as dependent variable and market state, market volatility and variables of business cycle (TERM, $TERM^2$, and YLD) are independent variables. This study uses substitute momentum profitability measures for robustness test. Momentum adjusted portfolio is calculated by subtracting market returns from momentum returns. For each regression, intercepts, beta coefficient, t-statistics (in parentheses), adjusted R-squares and Prob (Wald F-statistic) are reported. Results of regression are presented below:

Table 4.1.3 Impact of Market State and Market Volatility, and Business Cycles on Market Adjusted Momentum Payoff

C	TERM	$TERM^2$	YLD	MKT	Vol	Vol+	Vol-	Adj-R^2	P(Wald F-stat)
I.MOM-Adjusted (50%)									
0.038				-0.139	-0.018			0.0147	0.0110
(3.705)				(-2.873)	(-0.143)				
0.053				-0.108		-0.371	-0.010	0.0369	0.0001
(5.450)				(-2.032)		(-2.783)	(-0.124)		
-0.006	0.336		0.688	-0.105	-0.064			0.0602	0.0000
(-0.340)	(0.661)		(3.609)	(-2.026)	(-0.640)				
-0.001	0.462	-29.397	0.631	-0.105	-0.057			0.0546	0.0000
(-0.028)	(1.067)	(-0.601)	(2.702)	(-2.030)	(-0.593)				
II.MOM-Adjusted (25%)									
0.076				-0.225	-0.100			0.0199	0.0069
(5.270)				(-3.190)	(-0.525)				
0.098				-0.183		-0.590	-0.090	0.0371	0.0003
(7.299)				(-2.373)		(-3.095)	(-0.661)		
0.032	0.456		0.686	-0.191	-0.143			0.0306	0.0018
(1.262)	(0.725)		(2.362)	(-2.586)	(-0.843)				
0.031	0.430	6.060	0.697	-0.191	-0.144			0.0236	0.0045
(0.922)	(0.817)	(0.086)	(1.954)	(-2.577)	(-0.860)				

Table 4.1.3 reports results of regressions analyses same as Table 4.1.1 and Table 4.1.2 and further add some business cycle variables same as Table 4.1.2. This table uses market,

momentum profit and market volatility, market state, and business cycle. The rationale is same to found the robustness of the vital results for profits constituted by using top 50% and 25% stocks from winners and losers. The phase I and II results indicate that market state have significant influence on adjusted momentum payoffs. The signs of market state and market volatility are negative and significant indicating the momentum payoffs are inversely related to market returns and market volatility. It means when market returns increase or volatility increases, momentum payoff decrease. Business cycle effect measured by term and yield is found significant. Similarly, non-linearity has not been observed regarding term. The model is found fit, however the explanatory power of the model is low.

Impact of Market, Volatility and Business Cycles on Returns of Winners and Losers

Impact of Market State and Market Volatility, and Business Cycles on Returns of Loser Portfolio

Table 4.2.1 reports the results of regression to study the impact of market state, volatility of market, and business cycle variables on loser portfolio. The description of these variables is the similar as in Table 4.1.1.The sample period is from 2003 to 2015 and intercepts, regression coefficients, t-statistics (in parentheses), adjusted R-squares and Prob(Wald F-statistic) are reported. Results are given below:

Table 4.2.1 Impact of Market State and Market Volatility, and Business Cycles on Returns of Loser Portfolio

Asymmetric Predictability

C	TERM	$TERM^2$	YLD	MKT	Vol	Vol+	Vol-	Adj-R^2	P(Wald F-stat)
Loser (50%)									
-0.025				0.184	-0.009			0.0143	0.0728
(-1.624)				(2.284)	(-0.051)				
-0.023				0.187		-0.046	-0.008	0.0074	0.1539
(-1.334)				(0.024)		(-0.190)	(-0.045)		
0.018	-1.158		-0.578	0.158	0.006			0.0255	0.1232
(0.638)	(-0.945)		(-1.587)	(1.921)	(0.039)				
-0.011	-1.875	166.474	-0.257	0.158	-0.032			0.0413	0.0687
(-0.359)	(-1.810)	(1.581)	(-0.623)	(1.982)	(-0.193)				
Loser (25%)									
-0.040				0.245	-0.011			0.0231	0.0298
(-2.326)				(2.674)	(-0.053)				
-0.041				0.244		0.004	-0.011	0.0162	0.0704
(-2.112)				(2.661)		(0.015)	(-0.054)		
0.001	-1.105		-0.562	0.220	0.005			0.0267	0.0566
(0.022)	(-0.795)		(-1.422)	(2.340)	(0.023)				
-0.028	-1.828	167.983	-0.238	0.219	-0.034			0.0368	0.0520
(-0.766)	(-1.481)	(1.390)	(-0.508)	(2.393)	(-0.171)				

This proceeds to check whether the predictability of momentum payoffs comes from the Winner or the Loser portfolios. Toward this end, the study explores the returns loser and winner portfolio the dependent variable is the loser. This study report that the loser

portfolios returns are explained by market components whereas volatility is found to be insignificant. To explore the behaviour in positive and negative market state, volatility is divided in Vol and Vol−, Vol+ and Vol- found insignificant. The adjusted R-squares are smaller 0.74% to 2.55%. First and fourth regression model are found fit but second and third regression model mis specified. The macro-economic variables furthermore demonstrate some predictive power for the performance of loser. The t-statistics of TERM, $TERM^2$ and YLD show sign of statistical significance at 90% level of significance.

The robustness of results is tested by using extreme 25% losers and results are generally found robustness. The model is correctly specified. Explanatory power of the model is form 1.6% to 3.6%. Market factor is significantly and positively influencing portfolios. It means that market perform better, loser portfolios also perform better.

Volatility is insignificantly influences the loser returns and same behaviour is observed under positive and negative market state. Similarly, yield and term capturing the impact of business cycle are insignificantly indicating the change in interest rate does not change the fate of loser portfolios.

Impact of Market State and Market Volatility, and Business Cycles on Market Adjusted Loser Portfolio

Table 4.2.2 report the impact of market state, volatility of market, and variables of business cycle on market adjusted loser returns. The definition of these variables is the same as explained earlier. Returns of portfolio are adjusted by the market. The sample period is from 2003 to 2015 and study report intercepts, regression coefficients, robust t-statistics (in parentheses), adjusted R-squares and Prob(Wald F-statistic). Results are given below:

Table 4.2.2 Impact of Market State and Market Volatility, and Business Cycles on Market Adjusted Loser Portfolio

C	TERM	$TERM^2$	YLD	MKT	Vol	Vol+	Vol-	$Adj\text{-}R^2$	P(Wald F-stat)
Loser (adjusted by market) 50%									
-0.025				-0.816	-0.009			0.3536	0
(-1.624)				(-10.129)	(-0.051)				
-0.023				-0.813		-0.046	-0.008	0.3491	0
(-1.334)				(-9.894)		(-0.190)	(-0.045)		
0.018	-1.158		-0.578	-0.842	0.006			0.3609	0
(0.638)	(-0.945)		(-1.587)	(-10.235)	(0.039)				
-0.011	-1.875	166.474	-0.257	-0.842	-0.032			0.3713	0
(-0.359)	(-1.810)	(1.581)	(-0.623)	(-10.577)	(-0.193)				
Loser (adjusted by market) 25%									
-0.040				-0.755	-0.011			0.2561	0
(-2.326)				(-8.238)	(-0.053)				
-0.0411				-0.756		0.004	-0.011	0.2508	0
(-2.112)				(-8.255)		(0.015)	(-0.054)		
0.001	-1.1054		-0.562	-0.780	0.005			0.2588	0
(0.022)	(-0.795		(-1.422)	-8.312	(0.023)				
-0.011	-1.875	166.474	-0.257	-0.842	-0.032			0.3713	0
(-0.359)	(-1.810)	(1.581)	(-0.623)	(-10.577)	(-0.193)				

Table 4.2.2 present that market state has significant negative relationship with market adjusted has loser portfolios. A market increase loser returns decrease. The results are robust for loser portfolios capturing of lower 50% stocks as well as lowest 25% stocks. Volatility insignificant in all cases but the behaviour of volatility is same for positive and negative market state.

Moreover its impact does not change with the change in computation of loser portfolio. Term is found significant at $\alpha = 0.1$. As term spread increase, returns of loser portfolio decrease. The explanatory power of the model remains 25% to 37% and model is found correctly specified. The behaviour of the variable is consistent for market adjusted loser portfolio irrespective of the fact that these are found by using 50% loser stocks or 25% loser stocks.

Impact of market state and market volatility and business cycles on winner payoffs

In next study, impact of market state, market volatility, and business cycle variables. The winner portfolio are examined variables same as explained earlier and sample period is from 2003 to 2015 and study report, intercepts, regression coefficients, robust t-statistics (in parentheses), adjusted R-squares and Prob(Wald F-statistic). Results are given in table 4.2.3.

Table 4.2.3 Impact of Market State and Market Volatility and Business Cycles on Winner payoffs

Asymmetric Predictability

C	TERM	$TERM^2$	YLD	MKT	Vol	Vol+	Vol-	$Adj\text{-}R^2$	P(Wald F-stat)
Winner (50%)									
0.040				0.057	-0.163			-0.0049	0.4613
(3.154)				(0.674)	(-1.173)				
0.050				0.077		-0.391	-0.158	-0.0037	0.5013
(2.943)				(0.882)		(-1.461)	(-0.991)		
0.077	-1.330		-0.464	0.037	-0.162			0.0057	0.3663
(3.270)	(-1.229)		(-1.441)	(0.448)	(-1.162)				
0.047	-2.077	173.650	-0.129	0.037	-0.202			0.0287	0.1776
(2.042)	(-2.261)	(1.768)	(-0.370)	(0.454)	(-1.408)				
Winner (25%)									
0.062				0.032	-0.247			-0.0039	0.2317
(4.238)				(0.736)	(-1.705)				
0.076				0.059		-0.560	-0.240	-0.0004	0.3483
(3.837)				(0.586)		(-1.812)	(-1.470)		
0.097	-1.156		-0.451	0.013	-0.242			-0.0038	0.2456
(3.497)	(-0.848)		(-1.186)	(0.137)	(-1.579)				
0.061	-2.0627	210.556	-0.044	0.012	-0.291			0.0189	0.1797
(2.046)	(-1.790)	(1.598)	(-0.102)	(0.137)	(-1.778)				

The robustness of results is tested by using extreme 25% winner and results are generally found robustness. The model is mis-specified. Explanatory power of the model is form -0.04% to 1.89%. Here in first case, market is significantly and negatively influencing portfolios. On the other hand, market factor is insignificantly and positively influencing winner portfolios. It means that market perform better, winner portfolios also perform better. Volatility is insignificantly influences the winner returns and same behaviour is observed under positive and negative market state. Similarly, yield and term capturing the impact of business cycle are insignificantly indicating the change in interest rate does not change the fate of winner portfolios.

In the case of asymmetric predictability results for Winner portfolio returns on market state and volatility of market, and business cycles are totally different. The explanatory power of the model is negative in first two regressions but in next two regressions adjusted R-squares are positive 0.57% and 2.87%. In both cases, model is found statically unfit. The results of the model for top 25% whereas stock are same indicating the model is mis specified and no variable is significant. These results indicate that market state and volatility of market, and business cycles are unable to explain return of winner portfolio.

Impact of Market State and Market Volatility, and Business Cycles on Market Adjusted Winner Portfolio

The study regress market state, market volatility, and variables of business cycle on market adjusted winner portfolio returns. Returns of portfolio are adjusted for the market return. Results are given below in table 4.2.4.

Table 4.2.4 Impact of Market State and Market Volatility, and Business Cycles on Market Adjusted Winner Portfolio

C	TERM	$TERM^2$	YLD	MKT	Vol	Vol+	Vol-	Adj-R^2	P(Wald F-stat)
Winner (adjusted by market) 50%									
0.040				-0.943	-0.163			0.4700	0
(3.154)				(-11.143)	(-1.173)				
0.050				-0.923		-0.391	-0.158	0.4707	0
(2.943)				(-10.61)		(-1.461)	(-0.991)		
0.077	-1.330		-0.464	-0.963	-0.162			0.4756	0
(3.270)	(-1.229)		(-1.441)	(-11.543)	(-1.162)				
0.047	-2.077	173.650	-0.129	-0.963	-0.202			0.4877	0
(2.042)	(-2.261)	(1.768)	(-0.370)	(-11.775)	(-1.408)				
Winner (adjusted by market) 25%									
0.062				-0.968	-0.247			0.3882	0
(4.238)				(-10.212)	(-1.705)				
0.0762				-0.941		-0.560	-0.240	0.3903	0
(3.837)				(-9.322)		(-1.812)	(-1.470)		
0.097	-1.156		-0.451	-0.988	-0.242			0.3882	0
(3.497)	(-0.848)		(-1.186)	(-10.813)	(-1.579)				
0.061	-2.063	210.556	-0.044	-0.988	-0.291			0.4020	0
(2.046)	(-1.790)	(1.598)	(-0.102)	(-11.053)	(-1.778)				

Table 4.2.4 exhibits that market returns has significant and negative impact on returns of market adjusted portfolio. Volatility is insignificant irrespective of the fact that the portfolio compares of 50% stocks or 25% stocks. In positive state of the market impact of Vol+ is negative and lower on winner portfolio comprising of top 25% stock and thus impact is increased and significant at 90% level of significance for portfolio comprising of top 25% stock same tendency is observed of Vol- but results remains insignificant. It leads to the idea

that Vol may be influencing the extreme winners. From business cycles variables, yield exhibit an insignificant influence whereas yield is significant and negative for winner portfolio comprising of top 25% but this relationship weakens for 25% winners stocks. However, no non linearity is observed in the behaviour of the terms. The explanatory power of the model ranges from 38% to 49%. The results show that volatile markets forecast low returns on winners stock.

Impact of Cross Sectional Variation or Time Variation on Momentum Profits

Table 4.3.1 reports the results of regression analysis. When momentum payoff are taken as dependent variable and market state (MKT), volatility of market (Vol), variables of business cycle (TERM, $TERM^2$, and YLD) and return dispersion (RD_{1-3}) are independent variables. This study investigates whether stock return dispersion (RD_{1-3}) can take in the predictive power of market volatility on profitability of momentum. The regressors MKT, Vol, Vol+ and Vol− are the same as explained earlier. Results for intercepts, regression coefficients, and t-statistics (in parentheses), adjusted R-squares and Prob (Wald F-statistic) are reported below:

Table 4.3.1 Impact of Cross Sectional Variation or Time Variation on Momentum Profits

C	TERM	$TERM^2$	YLD	MKT	Vol	Vol+	Vol-	RD_{1-3}	Adj-R^2	P(Wald F-stat)
Return dispersion 50%										
0.121								-2.926	0.0537	0.0858
(2.929)								(-1.730)		
0.131				-0.121	-0.149			-2.856	0.0733	0.0186
(3.204)				(-2.589)	(-1.967)			(-1.761)		
0.131	-0.161		0.017	-0.120	-0.155			-2.829	0.0605	0.0558
(2.577)	(-0.486)		(0.086)	(-2.394)	(-1.957)			(-1.678)		
0.132	-0.129	-7.451	0.002	-0.120	-0.153			-2.838	0.0537	0.0560
(2.319)	(-0.468)	(-0.176)	(0.008)	(-2.388)	(-1.986)			(-1.654)		
0.139	-0.249		-0.022			-0.359	-0.157	-2.748	0.0463	0.0185
(2.713)	(-0.709)		(-0.107)			(-2.546)	-2.034	(-1.581)		
0.140	-0.239	-2.251	-0.026			-0.358	-0.157	-2.751	0.0393	0.0089
(2.415)	(-0.742)	(-0.050)	(-0.103)			(-2.560)	(-2.083)	(-1.546)		
Return dispersion 25%										
0.183								-4.220	0.0445	0.1031
(2.903)								(-1.641)		
0.199				-0.205	-0.229			-4.104	0.0675	0.0104
(3.165)				(-2.985)	(-1.644)			(-1.664)		
0.201	-0.036		-0.030	-0.206	-0.228			-4.123	0.0540	0.0377
(2.575)	(-0.065)		(-0.091)	(-2.902)	(-1.541)			(-1.607)		
0.197	-0.128	21.508	0.012	-0.206	-0.233			-4.098	0.0474	0.0665
(2.231)	(-0.316)	(0.286)	(0.029)	(-2.890)	(-1.577)			(-1.552)		
0.218	-0.209		-0.116			-0.612	-0.230	-3.968	0.0392	0.0151
(2.724)	(-0.370)		(-0.327)			(-2.732)	(-1.765)	(-1.497)		
0.212	-0.349	31.563	-0.057			-0.625	-0.237	-3.929	0.0328	0.0188
(2.340)	(-0.690)	(0.400)	(-0.130)			(-2.818)	(-1.837)	(-1.430)		

Table 4.3.1; investigate prospective explanation for the predictive power of volatility of market for momentum profitability. In this study another variable the Cross Sectional stock returns distribution proposed by (Stivers and Sun (2010)) is used. Stivers and Sun (2010) discover that Cross-Sectional dispersion of return negatively predicts performance of momentum. Subsequent those, in this study compute the three months moving average of the Cross Sectional standard deviation of the returns, denoted by RD_{1-3}. Though the two variables are extremely linked, volatility of market and dispersion of returns are theoretically different. Volatility of market measures time series variation of the largely market returns. Dispersion of return measures Cross Sectional variation in stock return is also found significant at 90% level of significance.

The results, reported in Table 4.8, confirm that RD_{1-3} has predictive power with the right signs. When used alone, it has a significant t-statistics of 90% level of significance. The adjusted R-square is 0.5%. On the other hand, when market state and volatility are incorporated, the t-statistics of RD_{1-3} rises to -1.761. By adding up variables of business cycle doesn't save the predictive power of RD_{1-3}. In the same way, in the existence of Vol+ and Vol−, the significance of RD_{1-3} also decreases. Thus, even though volatility of market is not linked with returns dispersion, some of the predictive power of volatility of market is not derived from returns dispersion.

In this case, the explanatory power of the model is remain generally low as all other factors that influence the returns have not been included in the model because the purpose of the study is solely to explore the association between volatility and momentum. The results are found robust for different measures of return dispersion. The model is found to be fit because F- Statistics is significant.

CHAPTER 05

Conclusion and Recommendations

5.1 Conclusion

The purpose of this study is to explore the relationship between market volatility and momentum profitability by using KSE data. For this purpose 80 companies are taken from 14 non- financial sector of KSE. The range of data is from 2003 to 2015. Momentum portfolios have been created by using top 25% and lowest 25% as well as top 50% and lowest 50%. However, volatility is the dispersion, so it may be on positive side or negative side. It may be different in positive market state and negative market state. Market does not work in isolation. The macroeconomic dynamics especially business cycle variables are influencing the market. All major variables explore in this study. According to Wang and Xu (2015) Volatility is a central indication in capital markets. The aim of this study is to check out the role of volatility of market in characterizing time-series variation in momentum profits and execute different tests and disclose a robust and significant relationship among market volatility and momentum. The tests create a broad summary of time varying momentum performance, exhibiting that the time series predictability of momentum is relatively changed from cumulative stock market predictability.

The time variation habits balance cross sectional study and offer essential hints for understanding the resources of momentum payoffs. The results of this study are based on the simple fact that in several market conditions shareholders proceed in a different way toward loser stocks. This type of justification could be moreover rational or behavioural. Another credible trend is to investigate time-varying investors sentiment based on the fear aspect that rules investor in the volatile down market. Market state is significant and negative whereas market volatility is found negatively influencing momentum profits. However, when volatility is divided into volatility in positive market and volatility in negative market both

are significantly and negatively influencing momentum profits. The results are in line with earlier studies that high volatility is followed by low momentum profits.

This study examine whether market volatility has explanatory power for momentum as well as this study execute different tests and the results show that there exists a robust relationship among market volatility and momentum. Market volatility and market state balance each other and both markets present a robust empirical description of the time variation in momentum payoffs. Their predictive power can be exploited to boost the momentum profitability. The challenge is how to realistically clarify why these variables predict momentum. The signs of market state and market volatility are negative and significant indicating the momentum payoffs are inversely related to market returns and market volatility. It means when market returns increase or volatility increases, momentum payoff decrease. Business cycle effect measured by term and yield is not found significant. Also, non-linearity has not been observed regarding term. The market state is found to effect significantly.

The time series predictability is extremely significant and negative for loser but significant and positive for winner. The asymmetric predictability is a challenge to models that symmetrically treat negative and positive information. The sample of time variation in momentum profits emerge to be opposing to the cross sectional results on momentum along with firms having high information uncertainty. The Cross-Sectional relationship is that momentum profits are high along stocks with high information uncertainty or high credit risk. Momentum payoffs are low in volatile down market. Market volatility has robust predictive power in the existence of market state and macro-economic variables. This study furthermore observes that in all cases the predictive power of volatility of market is more prominent in downwards markets. Yield has significant and positive effect whereas term and

terms are found insignificantly influencing momentum payoffs. The results are to focus on the volatility and momentum dynamics.

In case of loser portfolios, market factor is significantly and positively influencing portfolios. It means that market perform better, loser portfolios also perform better. Volatility is insignificantly influences the loser returns and same behaviour is observed under positive and negative market state. Similarly, yield and tern capturing the impact of business cycle are insignificantly indicating the change in interest rate does not change the fate of loser portfolios.

In case of market adjusted loser portfolios, market state has significant negative relationship with market adjusted has loser portfolios. A market increase loser returns decrease. The results are robust for loser portfolios capturing of lower 50% stocks as well as lowest 25% stocks. Volatility significant in all cases but the behaviour of volatility is same for positive and negative market state.

Moreover its impact does not change with the change in computation of loser portfolio. Term is also found significant. As term spread increase, returns of loser portfolio decrease. The behaviour of the variable is consistent for market adjusted loser portfolio irrespective of the fact that these are found by using 50% loser stocks or 25% loser stocks.

The direction of the momentum literature has been on cross sectional variations with stocks in the winner and loser portfolios. The slight concentration has been paid to time variation in momentum profitability. The findings of this study exhibits that characteristics of the time series predictability are essential for accepting the sources of momentum payoffs. The dissimilarity among time series and cross sectional results is a predominantly hard challenges to the entire the existing theories on the momentum effects.

In context of winner portfolios, market factor is significantly and positively influencing portfolios. It means that market perform better, winners portfolios also perform better.

Volatility is insignificantly influences the winner returns and same behaviour is observed under positive and negative market state. Similarly, yield and tern capturing the impact of business cycle are insignificantly indicating the change in interest rate does not change the destiny of winner portfolio.

In case of market adjusted winner portfolios, market state has significant negative relationship with market adjusted has winner portfolios. A market increase winner returns decrease. The results are robust for winner portfolios capturing of lower 50% stocks as well as lowest 25% stocks. Volatility significant in all cases but the behaviour of volatility is same for positive and negative market state.

Moreover its impact does not change with the change in computation of winner portfolio. Term is also found significant. As term spread increase, returns of winner portfolio decrease. The behaviour of the variable is consistent for market adjusted winner portfolio irrespective of the fact that these are found by using 50% winner stocks or 25% winner stocks.

The spotlight of the research efforts is on Cross-Sectional dissimilarities between winner and loser stocks. Various studies mean to clarify why winner stocks earn higher average return than loser stocks. Fama and French (1996), Grundy and Martin (2001), Lewellen and Nagel (2006), and Liu and Zhang (2008), examined whether factor models can describe the average winner loser return difference. However, time-series predictability of momentum has not challenged the existing literature. The results of Cooper, Gutierrez, and Hameed (2004), are deduced as helpful indication for the models of Daniel, Hirshleifer, and Subrahmanyam (1998) and Hong and Stein (1999). The time-series predictability of momentum raises hard questions. The patterns of time-variation in the momentum profitability present a challenge to all the existing theories, whether risk based or behavioural.

In context of cross sectional variation or time variation investigate potential explanation for the predictive influence of volatility of market for momentum profitability. Through this study another variable the Cross Sectional stock returns distribution proposed by (Stivers and Sun (2010)) is used. Stivers and Sun (2010) realize that Cross Sectional return distribution pessimistically predicts performance of momentum. In this study compute the three month moving average of the Cross Sectional standard change of the returns, denoted by RD_{1-3}. Whereas the two variables are quite related, volatility of market and returns dispersion is theoretically different. Volatility of market measures time series variation of the overall market return. Return distribution measures Cross Sectional variation in returns of stock.

Cross sectional or time variation significantly and negatively influencing the market payoffs. The results of cross sectional and time variation confirm that return dispersion has predictive power with the negative sign. Variables of business cycle do not save the predictive power of return dispersion. Similarly, in the presence of Vol+ and Vol−, the significance of return dispersion also decreases. Market volatility is not related with returns dispersion; some of the predictive power of market's volatility is not derived from return dispersions. The results are found robust and the model is found to be fit as well.

5.2 Recommendations

Investors can earn excess returns on the basis of past market returns. These returns give an indication about the future movement in the company's stock returns. Investors can earn higher returns by investing in small companies. The negative relationship indicates that there is high volatility in the market. Its mean momentum returns will be decrease in future. So, investors should be taking into account that volatility is a leading indicator that the momentum strategy will be beneficial in the future. So, momentum strategies plan according to market conditions.

With the changing's conditions of market business cycle cannot be overlooked. During the period of high rate of interest momentum profits will decrease. However, during the period of low interest rate momentum profits will rise. So, when going to making decision then consider that during on which side average yield rate of return is more. Market, business cycle and volatility depends on investors momentum strategies. The benefits of momentum strategy on that time will be purposeful, when momentum profits will be increase. The things that decrease momentum profit, on that time momentum strategy should not adopted. If volatility increases then enter into winner portfolio strategies.

The study recommends that investors should devise investment and momentum strategies on the basis of volatility of stocks and business cycle variables. As volatile and stable stocks has different market returns, so efficient market hypothesis can be formed. Therefore, in the absence of significant factors, market returns will be low that may lead to sub optimal decision while evaluating new projects.

5.3 Direction for Future Research

Existing study on relationship between market volatility and momentum are mostly conducted in developed countries. This study provides insight about the momentum strategies, market volatility, and business cycle variables in emerging markets like Pakistan. The same model may be tested in other emerging markets so that consistency of the result is ensured.

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Appendix

A. I Lists of Companies Selected from Different Sectors

S. No	Companies	Sectors
1	Agriautos Industries Limited.	Automobile and Parts
2	Atlas Battery Limited	Automobile and Parts
3	Atlas Honda Ltd.	Automobile and Parts
4	Ghani Automobile Industries Limited	Automobile and Parts
5	Ghandhara Nissan Limited	Automobile and Parts
6	General Tyre and Rubber Co. of Pak. Ltd.	Automobile and Parts
7	Indus Motor Company Ltd.	Automobile and Parts
8	Pak Suzuki Motor Co. Ltd.	Automobile and Parts
9	Murree Brewery Company Ltd	Beverages
10	Shezan International Ltd.	Beverages
11	Berger Paints Pakistan Ltd.	Chemicals
12	Biafo Industries Limited	Chemicals
13	Buxly Paints Ltd.	Chemicals
14	Dewan Salman Fibre Limited.	Chemicals
15	Engro Corporation Ltd.	Chemicals
16	Ferozsons Laboratories Ltd	Chemicals
17	Fauji Fertilizer Bin Qasim Ltd.	Chemicals
18	I.C.I Pakistan Ltd	Chemicals
19	Nimir Ind.Chemicals	Chemicals
20	Pakistan Gum and Chemiclas Ltd.	Chemicals
21	Sardar Chemical Industries Limited	Chemicals
22	Sitara Chemical Industries Ltd.	Chemicals
23	Al-Abbas Cement Industries Limited	Construction and Materials
24	Bestway Cement Ltd.	Construction and Materials
25	Cherat Cement Company Limited	Construction and Materials
26	Dedex Eternit Limited.	Construction and Materials
27	Dadabhoy Cement Industries Limited	Construction and Materials
28	Dandot Cement Company Ltd.	Construction and Materials
29	Gammon Pakistan Ltd.	Construction and Materials
30	Gharibwal Cemant Ltd.	Construction and Materials
31	Javedan Cement Ltd.	Construction and Materials
32	Kohat Cement Limited	Construction and Materials
33	Lucky Cement Ltd.	Construction and Materials
34	Maple Leaf Cement Factory Limited	Construction and Materials
35	Pioneer Cement	Construction and Materials
36	Shabbir Tiles and Ceramics Ltd.	Construction and Materials
37	Altern Energy Ltd..	Electricity
38	Genertech Pakistan Limited	Electricity
39	Hub Power Company Ltd	Electricity
40	Japan Power Generation Limited	Electricity
41	Karachi Electric Supply Corporation	Electricity
42	Kohinoor Energy Limited	Electricity
43	Kohinoor Power Company Limited.	Electricity

44	Southern Electric Company Limited	Electricity
45	Johnson and Phillips (Pakistan) Ltd.	Electricity
46	Pak Datacom Ltd	Fixed Line Telecommunication
47	Pakistan Cables Ltd.	Fixed Line Telecommunication
48	Pakistan Telecommunication Company	Fixed Line Telecommunication
59	Pakistan Telephone Cables Ltd.	Fixed Line Telecommunication
50	Telecard Limited	Fixed Line Telecommunication
51	Clover Pakistan Limited.	Food Producers
52	Ismail Industries Ltd.	Food Producers
53	Mitchell's Fruit Farms Limited	Food Producers
54	Nestle Milk Pak Ltd	Food Producers
55	Quice Food Ltd.	Food Producers
56	Rafhan Maize Products Ltd	Food Producers
57	Sind Abadgar Mills Ltd.	Food Producers
58	Shakerganj Mills Ltd.	Food Producers
59	Unilever Pakistan Ltd	Food Producers
60	Unilever Pakistan Foods Ltd. (Formerly Rafhan Best Food)	Food Producers
61	Sui Northern Gas Pipelines Ltd	Gas Water and Multiutilities
62	Sui Southern Gas Co. Ltd	Gas Water and Multiutilities
63	Ghani Glass Mills Ltd	General Industrials
64	Merit Packaging Ltd	General Industrials
65	Packages Ltd.	General Industrials
66	Siemens Pakistan Engineering Co. Ltd.	General Industrials
67	Thal Limited	General Industrials
68	Tri-Pack Films Ltd.	General Industrials
69	Shifa International Hospitals Limited	Health Care Equipment and Services
70	Pak Elektron Ltd.	Household Goods
71	Singer Pakistan Limited	Household Goods
72	Tariq Glass Limited	Household Goods
73	AL-Ghazi Tractors Ltd.	Industrial Engineering
74	Millat Tractors Ltd.	Industrial Engineering
75	Crescent Steel & Allied	Industrial metals and Mining
76	International Industries Ltd.	Industrial metals and Mining
77	Attock Refinery Ltd	Oil and Gas
78	Burshane LPG (Pakistan) Limited	Oil and Gas
79	Mari Gas Company Ltd	Oil and Gas
80	National Refinery Ltd	Oil and Gas